# UNIVERSITY OF WASHINGTON BULLETIN • 1972-74

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GENERAL CATALOG ISSUE

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# UNIVERSITY OF WASHINGTON



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# DESCRIPTION OF COURSES

Colleges and schools are listed in alphabetical order in this section. Courses are arranged alphabetically by department under the heading of the college or school in which they are offered.

Courses numbered from 100 through 299 are lowerdivision courses for freshmen and sophomores; those numbered from 300 through 499 are upper-division courses for juniors, seniors, and fifth-year students.

Courses numbered 500 and above are intended for and restricted to graduate students. Some courses numbered in the 300's and 400's are open both to graduates and to upper-division undergraduates. Such courses, when acceptable to the major department 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; approved 400-level courses are accepted as part of the major.

Undergraduate students of senior standing who wish to register for a 500-level course must obtain permission from both the instructor of the class and the Dean of the Graduate School.

The number in parentheses following the course title indicates the amount of credit each course carries. In most lecture courses, a credit is given for each weekly class hour during a quarter; laboratory courses generally carry less credit than the work time required. An asterisk in place of a credit number means that the amount of credit is variable.

The letters A, W, Sp, and S, following the number of credits, refers to the quarter or quarters in which the course is offered. A refers to Autumn Quarter, W to Winter, Sp to Spring, and S to Summer.

Specific areas in the departments of Anthropology, Art, Civil Engineering, Education, History, and Speech are designated by area letters. These letters *must* precede course numbers on the Official Program.

Not all of these courses are offered every quarter. Final confirmation of courses to be offered, as well as a list of times and places of class meetings, is given in the *Time Schedule*, published each quarter. The three courses numbered 600, 700, and 800 are restricted to graduate 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. The asterisk (\*) following the course title indicates the amount of credit is variable.

## 600 Independent Study or Research (\*)

Individual readings or study, including independent study in preparation for doctoral examinations, research, etc. Prerequisite, permission of Supervisory Committee Chairman or Graduate Program Adviser. Name of faculty member responsible for supervising the student should be indicated on Program of Studies.

## 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 Chairman or Graduate Program Adviser. Name of faculty member responsible for supervising the student should be indicated on Program of Studies.

## **800** Doctoral Dissertation (\*)

Research for the doctoral dissertation and research preparatory or related thereto. Limited to Intermediate graduate students, i.e., those 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 Chairman or Graduate Program Adviser. Name of faculty member responsible for supervising the student should be indicated on the Program of Studies.

## COLLEGE OF ARCHITECTURE AND URBAN PLANNING

## ARCHITECTURE

## **Courses for Undergraduates**

#### 150, 151 Appreciation of Architecture I, II (2,2) ASp, WS PUNDT

Historical survey of the architecture of Western civilization. Prerequisite, 150 for 151. For nonmaiors.

#### 152 Environmental Design Professions (3) Sp BONSTEEL

Survey of professional role in shaping physical environment. For nonmajors.

#### 250 American Architecture and Urban Environments (2) Sp PUNDT

Study and critical investigation of architecture and the problems of urban life in America' from colonial times to the present. Prerequisite, 151 or permission. For nonmajors.

#### 300, 301, 302 Introduction to Design: Laboratory (4,4,4) AWSp, AWSp, AWSp

Registration for credit in these courses permits the student to choose from among a number of sections that introduce design theories, methods, and processes. Sections are given in various studio-seminar-lecture formats and include subjects in four general groups: technological determinants of design; visual-theoretical determinants of design; sociobehavioral determinants of design; introduction to design synthesis sections. Detailed descriptions of work in all sections are available quarterly from the Department of Architecture. Prerequisite, permission.

## 310, 311, 312 Introduction to Design

Graphics (2,2,2) AWSp, AWSp, AWSp Lectures and laboratory in theories and processes of graphic communication for designers: lettering, drafting, multiview and paraline drawing, photographic simulation, descriptive geometry, perspective, shade and shadow, computer graphics, and freehand drawing. Prerequisite, permission.

#### 320 Introduction to Structural Theory I (3) A

LEBERT, ONOUYE, TORRENCE

A course to acquaint the student with the nature of forces, where they originate, and how structural elements carry the forces through a building. Prerequisite, permission.

## 321 Introduction to Structural Theory II (3) W

LEBERT, ONOUYE, TORRENCE

Nature of structural materials, their strengths and properties, and the effect of sectional shapes on structural elements. Prerequisite, 320.

#### 322 Introduction to Structural Theory III (3) Sp

LEBERT, ONOUYE, TORRENCE

Simple building structural elements and systems. Beams and posts. Trussed structures, including a complete structural design-analysis and construction of a trussed building. Prerequisite, 321.

#### 330 Introduction to Building Methods, Materials, and Assemblies I (2) A SMALL

Introduction to the requirements for the development of the built environment; a survey of the built environment's response to human physiological needs, natural and unnatural physical phenomena.

## 331 Introduction to Building Methods, Materials, and Assemblies II (2) W

Introduction to the life systems of the built environment; a survey of man's fundamental concepts and methods for the control and modification of the natural physical environment. Prerequisite, 330.

#### 332 Introduction to Building Methods, Materials, and Assemblies III (2) Sp VAREY

Introduction to the physical structuring of the built environment; a survey of man's fundamental concepts and methods for building, the conversion of raw material into building components, the assembly process, the maintenance of the built environment. Prerequisite, 331.

#### 340 Environmental Awareness: Ecosystems (3) A

BEENHOUWER

Introduction to general concepts of systems and an interdisciplinary development of concepts and problems of human and physical ecology.

#### 341 Environmental Awareness: Appreciation (3) W

#### BEENHOUWER

Survey of the sensory and intellectual qualities of the environment. Prerequisite, 340 or permission.

### 342 Environmental Awareness: Prognostics (3) Sp

BEENHOUWER

The future of the environment—forces and problems, techniques and tools; the environmental design professions and emerging alternative environments. Prerequisite, 341 or permission.

#### 350 Survey of Environmental Arts I (3) A HILDEBRAND

A survey of city form, landscape architecture, and architecture from earliest times to circa 1150.

#### 351 Survey of Environmental Arts II (3) W HILDEBRAND

A survey of the city form, landscape architecture, and architecture from circa 1150 to 1750. Prerequisite, 350.

352 Survey of Environmental Arts III (3) Sp JOHNSTON

Survey of city form, landscape architecture, and architecture from circa 1750 to the present. Prerequisite, 351.

## 400, 401, 402 Introduction to Architectural

Design (6,6,6) AWSp, AWSp, AWSp Registration for credit in these courses permits the student to choose from among a number of sections that introduce architectural design theories and processes. Sections are given in various studio-seminar-lecture formats and include subjects in several groups: introduction to architectural design sections, case studies, and design studies; and introduction to urban design. Detailed descriptions of work in all sections are available quarterly from the Department of Architecture. Prerequisites, 302 and permission.

## 410, 411, 412 Design Graphics (2,2,2) . AWSp, AWSp, AWSp

Lectures and laboratory in theories and processes of graphic communication for designers: photographic simulation, descriptive geometry, perspective, shade, shadow, computer graphics, and freehand drawing. Prerequisites, 312 and permission.

## 420 Structural Design I (4) A

ALBRECHT, RADCLIFFE, TORRENCE Design of complete building frames in timber and steel, considering wind and earthquake lateral forces, building responses, continuity, and the complete structural design process. Prerequisite, 322.

## 421 Structural Design II (4) W

ALBRECHT, RADCLIFFE, TORRENCE Development of basic reinforced concrete theory and design process. Prerequisite, 420.

## 422 Structural Design III (4) Sp

ALBRECHT, RADCLIFFE, TORRENCE Design of reinforced concrete structures, including two-way systems, columns, footings, retaining walls, and prestressed concrete theory. Prerequisite, 421.

#### 430 Environmental Control Systems I (3) A HOPKINS

Investigation and evaluation of methods of analysis, established theories for environmental control; climate control systems, illumination and daylighting systems, sound control systems, mechanized and unmechanized circulation systems, safety systems, communication systems, waste removal and discharge systems. Prerequisite, 332.

#### 431 Integrated Building Systems I (3) W HOPKINS

Investigation and evaluation of the integrated building process; components, subassemblies, structural systems, environmental control systems, integrated structural environmental control systems. Investigation and evaluation of material for building. Prerequisite, 430.

#### 432 Integrated Building Systems II (3) Sp HOPKINS

Investigation and evaluation of the integrated building process; production, fabrication, assembly, post-assembly evaluation. Investigation and evaluation of materials for building. Prerequisite, 431.

#### 434 Mechanical Equipment of Buildings-Plumbing and Sanitation (2) A TIMPB

## 435 Mechanical Equipment of Buildings-Electrical (2) W

LYONS

Basic considerations for electrical power distribution in buildings, including elementary residential wiring design. Light sources and elementary lighting design concepts; evaluation of electric heating methods; sound and signal systems.

#### 436 Mechanical Equipment of Buildings-Heating and Ventilation (2) Sp TIMPE

440 Human Needs Analysis (3) A

The development of programming methods for the study of human needs in relation to architectural design. Prerequisites, junior or senior standing and permission.

#### 441 Laboratory in Human Needs Analysis (3) W

The application of human needs programming methods in architectural settings. Prerequisite, 440.

## ARCHITECTURE AND URBAN PLANNING

#### 442 Social Implications of Architecture (3) Sp

A consideration of the ways man both shapes and is shaped by his physical environment. Prerequisites, junior or senior standing, Sociology 110 or Psychology 100, and permission.

#### 450 Survey of Environmental Arts (4) S HILDEBRAND

The environmental arts of architecture, landscape architecture, and urban planning. An historical evolution with special emphasis on factors shaping these arts in the Western world and the twentieth century. Basically for nonmajors.

#### 451 History of Modern Architecture (3) A PUNDT

Study and critical analysis of major architectural achievements since the mid-nineteenth century. Prerequisites, 352 and permission.

#### 452 Characteristics of Puget Sound Architecture and Towns (3) ASp STEINBRUECK

Form, detail, and construction as determining and identifying qualities of buildings. Esthetic and historical values as seen in the visual qualities of the urban form of the Puget Sound town.

## 453 Architecture of the Ancient World(3) W

BOSWORTH

Study and critical analysis of major architectural achievements of ancient Greece and Rome. Prerequisites, 350 and permission.

#### 454 Romanesque and Gothic Architecture (3) Sp

HILDEBRAND

Study and critical analysis of European architecture and urban design from circa 1450 to 1750.

# 455 Renaissance and Baroque Architecture (3) W or Sp PUNDT

Study and critical analysis of European architecture and urban design from circa 1450 to 1750. Prerequisites, 351 and permission.

#### 456 History of Chicago School Architecture (3) WS

PUNDT Study and critical investigation of the contribution of major architects in Chicago, the Midwest and West Coast from circa 1870 to 1920. Prerequisite, permission.

## 457 Neoclassicism and Romanticism in Europe and America (3) W or Sp PUNDT

Study and critical investigation of European and American architecture and urban design from 1750 to 1850. Prerequisites, 451 and permission.

#### 460 Design Theory and Analysis (3) AWSp SELIGMANN

Problematical nature of philosophies of architecture; interaction of philosophical concepts and architectural form and expression. Fundamentals of architectural criticism. Prerequisite, 352 or permission.

## 470 Production Management I (2) Sp

Investigation and evaluation of office production management methods; production development, production drawings, contract documents, construction administration, construction cost control, post-construction evaluation. Prerequisite, concurrent registration in 432.

#### 480, 481 Contract Drawings (3,3) AW, AW CARROLL

Lectures and drafting-room practice.

495 Architecture Studies Abroad (1-10) Sp ZARINA

Studies conducted under faculty supervision in various locations outside the United States. Prerequisite, permission.

## 498 Special Projects (1-10) AWSp

Special projects as arranged. Prerequisite, permission.

**499 Undergraduate Research (1-6) AWSpS** Prerequisite, permission.

## **Courses for Graduates Only**

## 500, 501 Architectural Design Laboratory

and Studies Options (6,6) AWSp, AWSp Theories and processes in architectural design, with emphasis on development of professional skills in architectural synthesis. Also architectural studies courses and sequences in general architectural synthesis and in special projects, examining particular architectural determinants in detail. Prerequisites, 402, fifth-year or graduate standing, and permission.

#### 502, 503, 504, 505 Architectural Studies Options (6,6,6,6) AWSp, AWSp, AWSp, AWSp

A group of advanced architectural studies courses and sequences in general architectural synthesis, in special projects examining particular architectural determinants in detail, and in architectural research.

#### 506 Advanced Visual Design (2) A DONNETTE

Principles of visual organization applied to problem-solving in multidimensional media. Prerequisite, 302 or permission.

## 507 Graphic Representation and Simulation (2) W

DONNETTE

Representation of objects and space employing traditional, figurative, and abstract idioms. Prerequisite, 302 or permission.

#### 508 Light and Color (2) Sp DONNETTE

Experimental studies in light and color directed toward their creative manipulation in art and architecture. Prerequisite, 302 or permission.

#### 510 Design Graphics I (3) A SPROULE

Laboratory work in observation and monochromatic freehand drawing of geometric and nongeometric form in direct media. Prerequisite, permission.

#### 511 Design Graphics II (3) W

SPROULE

Laboratory work in monochromatic drawing of geometric and nongeometric form in varied media. Prerequisite, 510.

## 512 Design Graphics III (3) S

SPROULE Laboratory work in freehand polychromatic representational drawing of geometric and nongeometric form in transparent and opaque color. Prerequisite, 511.

## 513 Design Communication I (3) A

Historical and contemporary survey of design illustration and work in application to current design solution explanation. Prerequisites, 510, 511, 512 or permission.

## 514, 515 Design Communication II, III (3,3) WSp, WSp

ROHRER Survey of contemporary professional practice in design and solution presentation; field trips

to current design presentation events. Individual research projects in graphic drawing, photography scale models, advanced photography, mechanical and electronic aids towards a synthesis of design solution communication. Prerequisites, 513 for 514; 514 for 515.

#### 520 Advanced Structural Design (3) Sp ALBRECHT

Design of air-supported structures, folded plates, thin shells, and cable-supported structures.

## 521 Structural Design Through Model Studies (3) W

ALBRECHT y of models, dimen

Theory of models, dimensional analysis, direct model analysis; studies employing specific materials, techniques of testing and measurement. Offered jointly with Civil Engineering as CESM 477. Prerequisite, 422 or permission.

#### 522 Skin-Resistant Structures (3) A ALBRECHT

Structural design workshop where students pick, or are assigned, design projects of considerable scope. The projects are to be completed and presented by the end of the quarter. Prerequisite, 422.

#### 523 Industrialized Building Systems (3) A HOPKINS

Consideration of the evolution of prefabrication, building products, components, construction methods, and building systems through the nineteenth and twentieth centuries.

#### 530 Environmental Control Systems II (3) A ROSNER

Detailed studies in building equipment systems. Simulation of comparative conditions, experiment and investigation of contemporary practices and standards, extrapolations, heating, ventilating, and air conditioning systems, water and energy supply systems, waste removal and discharge systems. Prerequisite, 430.

#### 531 Environmental Control Systems III (3) W

HOPKINS

Detailed studies in building equipment systems. Simulation of comparative conditions, experiment and investigation of contemporary practices and standards, extrapolations, illumination systems, sun control systems, acoustical control systems, communication systems, mechanical circulation systems. Prerequisite, 430.

#### 532 Integrated Building Systems III (3) Sp HOPKINS

Detailed studies in integrated building systems. Simulation of comparative conditions, experiment and investigation of contemporary practices and standards, extrapolations; integrated structural or environmental control systems, and materials for building. Prerequisites, 432, 470. To be taken concurrently with 570.

## 535 Illumination Seminar (2) Sp

CONGDON

Principles and methods of natural artificial lighting. Prerequisite, senior in Architecture or permission.

#### 536 Acoustics Seminar (2) AWSp TOWNE

Principles of acoustical designing as applied to buildings. Prerequisite, senior in Architecture.

## 540 Structural Unit Masonry (2) Sp

Structural behavior and design of reinforced brick, tile, and unit masonry structures.

#### 550, 551 Graduate Seminar: Environmental Design Issues (3,3) AW, AW HILDEBRAND

Seminars concerning a wide variety of current issues in the area of environmental design. Seminar focuses on different specific topics and is directed by seminar leaders who are authorities in their fields. Prerequisite, graduate standing or permission.

#### 570 Production Management II (3) Sp

Investigation and development of advanced office production management methods; schematic development, design development, construction documents, construction administration, post-construction evaluation. Prerequisites, 402, 432, 470; to be taken concurrently with 532.

## 571 Building Economics (3) A

MITHUN

Social, political, and economic factors affecting the location, construction, financing, and marketing of buildings.

#### 572 Specifications and Contracts (3) W MITHUN

Construction documents—detailed organization and composition of contracts, specifications, and related contract documents,

#### 573 Professional Practice (3) Sp MITHUN

Introduction to the architectural office, business operation, and professional practice.

- 575 Graduate Seminar, Research and Analysis I (3) A
- 576 Graduate Seminar, Research and Analysis II (3) W
- 577 Graduate Seminar, Research and Analysis III (3) Sp
- 578 Computer Applications in Architecture (3) A

BONSTEEL

Studies of feasibility and the application of computer programs and automated systems for the building design process.

## 590 Educational Facilities Evaluation (3) A SCHNEIDER

Small-group discussion of extant models used in the evaluation of educational facilities for obsolescence, accreditation, and user response. Discussion of relevant research and visitation of selected school facilities in the Puget Sound area. Prerequisites, graduate standing and permission of instructor. Offered on pass/ fail basis only.

#### 591 Graduate Seminar in Educational Facility Programming (3) W SCHNEIDER

Small-group discussion of the educational facility programming process. Introduction of theory and practice relevant to the preparation of educational facility requirements (edspecs). Prerequisites, graduate standing and permission. Some independent study is expected. Offered on pass/fail basis only.

## 592 The School Site (3) Sp

#### SCHNEIDER

Small-group discussion of factors affecting the location of educational facilities, including overviews of needs, implications of change, environmental parameters, as well as location, acquisition, and development criteria. Prerequisites, graduate standing and permission. Some independent study is expected. Offered on pass/fail basis only.

#### 600 Independent Study or Research (\*) AWSpS

In addition to other studies, a student may elect to conduct, individually or cooperatively with a fellow student or faculty member, a special research project. The objective of this research should be to investigate certain areas of either basic or applied research.

700 Master's Thesis (\*) AWSpS

## **BUILDING CONSTRUCTION**

## **Courses for Undergraduates**

301, 302 Building Industry (3,3) A,W EBERHARTER

Organization and functioning of the building industry, legal, ethical, business, and management aspects.

## 310 History of Building (3) Sp

VAREY

A historical survey of building techniques and materials as conditioned by environmental, technical, and social influences.

#### 330 Building Methods and Materials I (2) A JANSEN

Introduction to building materials and methods, with detailed emphasis on the properties, the products, and the uses of building materials.

## Building Methods and Materials II (2) W

JANSEN

Introduction to building methods and materials, with emphasis on methods of assembly of buildings in detailed analysis. Prerequisite, 330.

#### 332 Building Methods and Materials III (2) Sp

JANSEN

Introduction to building methods and materials with emphasis on the assembly and finish of multistory commercial and institutional buildings. Prerequisite, 331.

401, 402 Building Estimating (4,4) A,W HUTCHINSON, JANSEN

The principles of building costs, estimating, and construction cost control. Prerequisite, 332.

#### 410 Senior Study (4) AWSp

Independent study of a specific building industry problem with assigned proctor. Prerequisite, senior standing.

## 420 Building Financing (3) Sp

The financing of building construction, financial institutions, regulations, government participation, and financing principles.

#### 499 Undergraduate Research (\*, max. 12) AWSpS

Individual or small group studies in which students may select topics with approval of faculty sponsor and department. Prerequisite, permission.

## LANDSCAPE ARCHITECTURE

## **Courses for Undergraduates**

## 301 Site Planning (3 or 6) W

HAAG, STREATFIELD, UNTERMANN 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. Prerequisites: Landscape majors must concurrently take the lecture and the laboratory sections for 6 credits; nonmajors may, with permission, take only the lecture section for 3 credits. (Formerly 240.)

#### 302 Landscape Design Studio (6) W BUCHANAN, HAAG

Urban design through landscape architecture. 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. (Formerly 241.)

## 303 Urban Recreational Design (3 or 6)

BUCHANAN, HAAG 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. (Formerly 242.)

## 320 Site Planning (4) S

Planning, design, construction, and behavioral studies for selected case-study projects. A design survey-studio course with related seminar sessions and field trips in the Seattle area. Prerequisite, permission for students not in the College of Architecture and Urban Planning.

#### 331 Landscape Construction (4) A SAKUMA, UNTERMANN

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. (Formerly 334.)

#### 332 Landscape Construction (4) W SAKUMA

Materials and structures in landscape construction. Design criteria and construction techniques for detail elements of landscape architecture. Working drawings, specifications, cost estimates, and procedures. (Formerly 335.)

#### 333 Landscape Construction (4) Sp STREATFIELD, UNTERMANN

Site engineering for large-scale land development. Design and development considerations affected by service/utility systems, soil character, and natural features. Physiographic suitability of site, and construction procedures, costs, and scheduling. (Formerly 336.)

## 352 History of Landscape Architecture(3) W

## JOHNSTON

Critical and historical analysis of man's progress in designing land and outdoor space. (Formerly 331.)

#### 361 Theory and Perception of Landscape Architecture (3) A HAAG

Reciprocal relationships of man/nature are explored, with particular attention given to the cultural variations and interpretations of aesthetics, 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. (Formerly 330.)

## ARCHITECTURE AND URBAN PLANNING

#### 401 Landscape Design Studio (6) A BUCHANAN, STREATFIELD

Scenic roads and lineal parks, riverways, and trails as design studies dealing with policy and planning implications for scenic control in the landscape. Generally focusing on semirural areas or undeveloped urban areas. (Formerly 350.)

#### 402 Landscape Design Studio (6) W STREATFIELD, UNTERMANN

Large-scale site planning and design. Identification of landscape character, resources and problems of site, cost factors, design alternatives and implications for architectural direction, policy for land acquisition and scenic easements, program development to maximize site utilization, and preservation of natural attributes. Generally related to housing, new communities, or institutional site development. (Formerly 351.)

#### 403 Landscape Design Studio (6) Sp STREATFIELD, UNTERMANN

Environmental and technological aspects of site development. Project design studies in areas of "critical concern," related to environmental restraints, natural systems, landscape character, and capacity of site to recover from human intervention. Generally deals with environmental issues, with federal, state, and local legislation, and with policies and funding for typical landscape architectural projects. (Formerly 352.)

#### 404 Landscape Design Studio (6) A UNTERMANN

Elements of the urban landscape. Visual assessment and resource identification and implications for large-scale urban landscape planning. Landscape features, image factors, and design potentials for recreation, open-space character, and neighborhood identity. Design policy recommendations and detailed design study for typical problem area, from metropolitan to neighborhood scale. (Formerly 460.)

#### 405 Landscape Design Studio (6) W JONES, STREATFIELD

Landscape planning and policies utilizing natural systems. Examination of the ecological restraints and the design criteria for selected land use and development categories. Case studies dealing with landscape types, features, amenities, and cultural resources; their identification, classification, visual assessment, and interpretation for design planning, program development, and policy decisions. Metropolitan to regional scale. (Formerly 461.)

#### 406 Landscape Design Studio (6) Sp JONES

Senior projects in landscape architecture. Projects vary according to the student's particular emphasis and needs. Open only to majors in Landscape Architecture. (Formerly 462.)

#### 411 Landscape Graphics (2) A OLIN

Delineation techniques and office presentation methods for landscape plans, perspectives, and sections. Rendering of plants, landscape materials, and studies of composition in landscape drawing for presentation drawings. Discussion of historical and contemporary examples of landscape drawing.

#### 412 Landscape Graphics (2) W UNTERMANN

Office presentation techniques for various phases of landscape architectural projects. Multimedia techniques and presentation methods suitable for public hearings, citizen groups, design commissions, and private clients. Individual projects and case-study examples.

#### 422 Planting Design (4) W UNTERMANN

Plants and their design characteristics. Utilization of plants in the urban areas and as major elements of project design. Technical considerations for selection, climate, and cultural suitability; maintenance, costs, and availability. History and theory of composition and abstract design qualities of plants. (Formerly 465.)

## 473 Office Procedure (3) Sp

HAAG

Professional practice in the private office and public agencies. Federal, state, and local controls and financing for public projects. Ethics, fees, proposal development, contracts, construction documents, supervision, operational aspects of a private office, relationship to other professionals. (Formerly 470.)

#### 499 Undergraduate Research (1-6) AWSpS

Individual or small-group studies pertaining to special problems, theories, or issues of landscape architecture and environmental issues.

## URBAN PLANNING

## **Courses for Undergraduates**

## 310 American Urban Problems (3) W HANCOCK

Study of major trends and problems in urban America that have grown out of our past or that are developing today. A new topic and new materials will be presented each quarter. Topics are selected for their contemporary importance, environmental (biocultural) impact, and planning implications. History is used as our chief record of the past, not as a blueprint of the present and future.

#### 400 Introduction to Urban Planning (3) AWSpS

DENISON, HANCOCK, HRUZA, SHINN, WOLFE

History, principles, theories of city growth and planning. Emphasis on city structure as a physical monument to contemporary culture. Present urban problems and remedial action.

## 425 Introduction to Urban Transportation

#### (3) Sp HORWOOD

Identification of the framework, central concepts, constraints, and issues of the urban transportation planning problem. Offered jointly with Civil Engineering as CETC 425.

## 430 Quantitative Methods in Urban Planning (3) W

Methods of statistical analysis applied to urban planning; measurement and inference. Central tendency, correlation, trends, probability, surveys.

#### 431 Quantitative Analytical Models and Methods (3) Sp

BELL

Survey of probabilistic and mathematical models and other techniques of operations research relevant to planning. Emphasis will be placed upon linear and dynamic programming, critical path methods, queing models, networks, and the Bayesian approach to decision making under uncertainty. Stress will be placed upon the underlying model and implications for planning rather than on mathematical detail. Prerequisite, 430 or permission.

## 440 Forecasting Methods in Urban

#### Planning (2) Sp J. B. SCHNEIDER

Examination of several forecasting methods, including trend extrapolation, Delphi, relevance trees, morphological boxes, crossimpact matrices, scenario generation, and literature monitoring techniques. Past failures and successes. Applications to urban planning problems.

## 446 Field Study (4, max. 8) AW

AMOSS

Explicit task assignment in a community development organization under professional and academic supervision. Placement arranged by the Bureau of Community Development. Participation ordinarily limited to seniors. Prerequisite, permission of the instructor.

## 451 Regional Planning and Development (3 or 5) Sp

MORRILL, THOMAS

Emphasis placed primarily on the process of implementing regional development policies in economically advanced and lesser developed countries. Resultant changes which occur in the distribution and structure of economic activities and settlement patterns are also studied and evaluated. Lectures, 3 credits; independent study, 2 additional credits with permission of instructor. Offered jointly with Geography as Geography 451.

#### 460 \* Metropolitan Área Government (5) W WARREN

Conceptual problems in metropolitan analysis; urban governmental systems; regional political decision-making structures; metropolitan, state, and federal relations; value implications of formal organization. Offered jointly with Political Science as Political Science 480.

## 470 Theory and Philosophy of Planning(3) A

An attempt to reveal "planning theory" as a synthesis or integration of concepts of societal structure (sociology), with concepts of environmental structure (cosmology), and with the social decision processes by which a society may alter both itself and its environment. Prerequisite, senior standing or permission.

## 475 Directed Social Change (3) A

AMOSS

General course for both undergraduate and graduate students on the theories and practice of directed social change and citizen involvement in the planning process.

## 479 The Urban Form (3) A

WOLFE

Examination of the physical patterns of urban areas related to the forces producing them. Observation, identification, and methods of recording aspects of the urban scene. Prerequisite, 400.

#### 480 The Urban Planning Process (4) W MILLER, WOLFE

The urban plan and plan making. Emphasis on comprehensive, coordinative urban planning. Various planning surveys and methodology and techniques discussed. Prerequisite, 400.

## 482 Urban Community Facilities (3) W

Relationships of goal structure and physical requirements of public facilities. Criteria pertinent to schools, parks, utilities, etc., and

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their effect on the comprehensive plan. Prerequisite, urban planning or architecture major, or permission.

#### 485 Housing (3) ASp GREY

Survey of housing and redevelopment problems, theories, standards, and practice. Development of public policies, finance, technological considerations, social factors, and priorities. Prerequisite, 400.

#### 489 History of City Development (3) A JOHNSTON

Analysis of city forms and designs emphasizing their relation to the culture of each period.

# 490 Urban Planning Policies and Programs(3) W

NORTON

Goals, processes of policy formulation, methods of planning, effectuation, and related problems. Community, regional, state, and national programs. Prerequisite, 480 or permission.

#### 498 Special Topics (2-4) AWSpS

Systematic study of specialized subject matter. Topic for each quarter varies, depending upon current interest and needs, and is announced in the preceding quarter. May be repeated for credit. Prerequisite, permission.

#### 499 Special Projects in Urban Planning (5) AWSp

Preprofessional independent research. Emphasizes acquiring facility in analytical, programmatic, and communications techniques developed in other courses by means of several assigned problems. Prerequisite, senior standing.

## **Courses for Graduates Only**

#### 500 Survey of Urban Planning (3) A NORTON

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. Not open to students who have taken 400.

#### 501 Resources for Urban Planning (2) A HRUZA, STAFF

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. Required of new graduate students; not open to others.

## 502 Graphic Communication in Urban Planning (3) W

Intended to introduce the nondesign student to the use of graphics and other representational techniques as a means of conceptualizing and expressing ideas, and for recording, analyzing, and controlling the environment. The course will cover the use of drawing, three-dimensional models, mapping, diagrams, report layout, photography, exhibit preparation, etc., as tools for the effective communication of ideas.

#### 504 Legal and Administrative Framework of Planning (3)

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.

## 505 Urban Renewal (3) Sp

SEYFRIED

Analysis of urban renewal needs and practices. Particular emphasis on problems encountered and on potential new directions of development.

#### 512 Economic and Fiscal Activity (2) Sp GREY

Planning implications of income, price, employment data; composition and impacts of federal spending. Formulating priorities. Taxation in relation to planning objectives. Market demand studies. Tópical emphasis varies in response to contemporary concerns. Prerequisite, Economics 211 or equivalent.

#### 521 General Urban Planning (2) Sp MILLER, SHINN

Introduction to applied professional planning. Consideration of analysis, programming, and implementation methods in preparation for General Urban Planning Laboratory.

#### 522 Metropolitan Planning Analysis (2) A J. B. SCHNEIDER

Investigative and analytical techniques appropriate to plan preparation at metropolitan or regional scales, including consideration and evaluation of methodologies and organizing concepts derived from other disciplines.

#### 523 Urban Design Analysis (2) A SIMS

The study of concepts, methods, and processes basic to planning, design, and effectuation. Prerequisite, permission.

## 524 Seminar in Urban Design (2) W

WOLFB Studies of the various arrangements of urban forms that affect perceptual experiences. Urban design considerations of the location of structures, open space, movement channels, and methods of implementing public policy decisions affecting urban design. Prerequisites, 400, 479 or academic design background, or permission.

#### 525 Transportation and Land Use Planning Models (3) A

J. B. SCHNEIDER

Theory underlying land use and transportation planning models. Past attempts to model urban development. Modelling of alternatives. Forecasting technological innovations, assessing their land use implications. Offered jointly with Civil Engineering as CETC 525. Prerequisite, permission.

## 527 Information Systems for Planning and Research (3) A

HORWOOD, STAFF

Computer programming technology and data systems design for large scale data inputs. Machine editing, data manipulation, and information retrieval. Laboratory problems adapted to specialized interests of students. No previous computer programming experience required. Offered jointly with Geography 527 and Civil Engineering as CETC 527.

#### 528 Automated Mapping and Graphing (3) W

HORWOOD

Computer applications to statistical and areal analysis. Laboratory problems adapted to specialized interests of students. Offered jointly with Geography as Geography 528 and with Civil Engineering as CETC 528. Prerequisites, basic statistics and 527, or permission.

#### 529 Computer Applications to Urban and Regional Analysis (3) Sp HORWOOD, STAFF

Simulation models and automated systems for the study of land use and related economic and demographic data. Machine methods of planning analysis and feedback review. Laboratory projects. Offered jointly with Geography as Geography 529 and with Civil Engineering as CETC 529. Prerequisite, 528 or permission.

#### 530 Research Seminar: Geography and Development (3, max. 6) A THOMAS

Offered jointly with Geography as Geography 530.

#### 535 Airport Systems Planning (3) W SHINN

Investigation of physical, socio-political, and economic features of air transportation system planning. Emerging technologies, intermodal relationships, the decision-making environment. Scenarios of anticipated conflict and resolution problems. Offered jointly with Civil Engineering as CETC 535.

#### 541 General Urban Planning Laboratory (5) A

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.

## 542 Specialized Planning Laboratory (5) W

Several different sections or options are to be offered each year, such as regional-environmental planning, urban systems analysis, housing, metropolitan planning, urban design, and community services and organization. Some sections may have prerequisite Urban Planning lecture or seminar courses.

## 544 Urban Planning Problems (5) Sp

Advanced laboratory problems. Intensive consideration of planning problems of topical significance. Prerequisite, permission.

546 Practicum (4, max. 8) AWSp

## AMOSS, STAFF

Field work assignments to participate in some phase of a community problemsolving activity utilizing planning skills. Placement is ordinarily arranged by the Bureau of Community Development. Prerequisite, permission.

550 Research Seminar (1-3) W

# Development and presentation of advanced topics of individual investigation.

#### 551 Regional Planning Seminar (1-3) W THOMAS

Regional planning and development theories and methodologies. Critical evaluation of regional planning in selected "economically advanced" and "lesser developed countries." Offered jointly with Geography as Geography 551. Prerequisites, 451 and graduate standing.

## 575 Seminar in Citizen Participation (3) W

Seminar on modes of citizen participation in public decision making; advocacy planning, participant democracy, and community development are considered in terms of contemporary problems.

#### 579 Comparative Urbanism (3) Sp WOLFE

Characteristics and problems of urbanization in the world; comparisons of origins and development; physical form, land utilization, and planning. Selected major cities. Prerequisite, permission.

## 580 Theories and Methodology of Planning I (4) W

WOLFE A survey of the philosophy, methods, and analytical techniques used in planning public actions and policies, with emphasis on the logic and assumptions on which these are based. Various planning surveys and methods discussed. Prerequisite, 400 or permission.

#### 581 Theories and Methodology of Planning II (4) Sp HIGHTOWER, WOLFE

Factors relating to the timing, phasing, and programming of urban development. The bearing of amenity, density, etc., on the actual development process. Prerequisite, 480 or 580.

## 591-592-593 Doctoral Seminar I, II, III (2-2-2) A,W,Sp

Researchable issues and research methodology. Discussion and critique of selected pieces of recent research work. Presentation and critique of research proposed by mem-bers of the seminar. Credits given on satisfactory completion of the three-quarter se-quence. Prerequisite, master's degree or the equivalent in a planning discipline.

## 598 Special Topics (1-4) AWSpS

Systematic study of specialized subject mat-ter. Topic varies for each quarter, depending upon current interest and needs, and is announced in the preceding quarter. Prerequisite, permission.

600 Independent Study or Research (\*) AWSpS

700 Master's Thesis (\*) AWSpS

#### 800 Doctoral Dissertation (\*) AWSnS

By arrangement with department.

## COLLEGE OF ARTS AND SCIENCES

## **ANTHROPOLOGY**

Specific areas in Anthropology are designated by area letters. These letters must precede course numbers on the student's Official Program. Designation letters and their definitions are:

ANTH-Anthropology (General and Sociocultural Anthropology)

ARCHY-Archaeology

PHY A-Physical Anthropology

## **Courses for Undergraduates**

#### GENERAL

ANTH

100 Introduction to the Study of Man (5) Introduction to the subfields of archaeology, physical anthropology, and sociocultural anthropology through the examination of selected problems in human physical, cultural, and social evolution. (Not open to students who have had or are currently taking other courses in anthropology.)

## SOCIOCULTURAL ANTHROPOLOGY ANTH

111 Afro-American Culture (3) The historical development and nature of Afro-American culture in the United States,

including discussion of the Atlantic slave trade, slavery as a social institution, the evolution of black folk culture, and contemporary Afro-American urban culture.

#### ANTH

## 202 Principles of Social Anthropology (5)

Introduction to analytical and comparative methods for the analysis of social and cultural systems. Training in fundamentals for more advanced courses in social anthropology.

## ANTH

212 Perspectives on Afro-American Culture (3)

Analyses of Afro-American personality and culture, including exploration of contemporary attitudes and issues which emerge from racial awareness, Black identity, hostility, and ag-gression. Emphasis is placed upon the conflict between adaptive and assimilative patterns.

## ANTH

## 213 Africa (3)

An introduction to the cultures and societies of Africa with emphasis on sub-Saharan Africa.

## ANTH

216 Oceania (3)

Contemporary and traditional life in the Pacific Basin.

#### ANTH

225 Community Development and Action (3) The use of concepts and examples of directed culture change to analyze community action and community development. Lectures will be supplemented by case studies, films, and discussions with those who are actually working with directed culture change.

## ANTH

#### 301 Human Nature and Culture (3)

The sources of variations in the customs, values, and beliefs of human groups. Apprai-sal of the anthropological notion of "cultural relativism." Not open to students who have had or are currently taking other anthropology courses. Prerequisite, sophomore standing.

#### ANTH

311 Indian Cultures of the Pacific Northwest (3)

Comparative analysis of material culture and social, religious, and political institutions. Prerequisite, sophomore standing.

#### ANTÌ

## 316 South Asia (3)

Major cultural features of the Indian and Pakistan subcontinent. Prerequisite, sophomore standing.

## ANTH

#### 317 Southeast Asia (3)

Survey of the culture, history and contemporary ethnology of the peoples of southeast Asian countries: Burma, Thailand, Laos, Cambodia, Vietnam, Malaysia, Indonesia, and the Philippines. Prerequisite, sophomore standing or permission.

#### ANTH

#### 319 **Peoples and Cultures of the Iranian** Plateau (3)

A survey of the cultural features of the Iranian plateau with particular attention to modern problems of cultural change. Prerequisite, sophomore standing or permission.

#### ANTH

## 322 Peoples of South America (3)

Contemporary societies of South America: economic, political, ethnic, and cultural characteristics; historical background. Prerequisite, sophomore standing or permission.

## ANTH

333 Art of the Northwest Coast Indian (3) Emphasis on the structure and style of twodimensional art of the northern tribes. Offered jointly with the School of Art as Art History 333

## ANTH

334 Art of the Northwest Coast Indian (3) Three-dimensional art of the Northwest coast cultural art with emphasis on aesthetic principles, techniques, and cultural functions. Offered jointly with the School of Art as Art History 334.

ANTH 335 Art of the Northwest Coast Indian (3) Northwest coast Indian art as related to drama and dance with special attention to the Kwakiutl Indians. Offered jointly with the School of Art as Art History 335.

### ANTH

350 The Civilized and the Primitive (3) The development of urban modes of life in the light of the common and distinctive social and cultural characteristics of cities, peasantries, and tribal groups or bands. The process of urbanization, the disappearance of truly primitive peoples, and the emergence of the peas-ant. Selected case studies from the past and the present. Prerequisite, sophomore standing.

#### ANTH

## 401 West African Societies (3)

Detailed analysis of social and cultural features, including the western Sudan area. Prerequisite, 202 or permission.

#### ANTH

## 402 Societies of Eastern and Southern Africa (3)

The 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, 202 or permission.

#### ANTH

## 403 Traditional Chinese Society (5)

Institutional forms of late traditional Chinasocietal, political, economic, and religiousare analyzed in light of contemporary social science theory. Attention is also given to modernizing change. Prerequisite, 202 or permission.

## ANTH

404 Mainland Southeast Asian Societies (5) Intensive treatment of the kinship systems, religious institutions, ecology, and socio-political systems of the peoples of mainland southeast Asia. Prerequisite, 202 or permission.

#### ANTH

#### 405 Comparative Social Anthropology of Malay Peoples (4)

Comparison of the social institutions and ethnohistory of Malay peoples in western Austronesia. Prerequisite, 202 or permission.

## ANTH

#### 408 New Guinea Societies (5)

The indigenous peoples of coastal and interior New Guinea and adjacent islands; their aboriginal cultures and modern development in spatial and temporal perspective. The studies will deal intensively with selected general problems of ethnographic method and ethnological and sociological interpretation. Prerequisite, 202 or permission.

## ANTH

409 Western Austonesian Societies (3)

Comparative social anthropology of the social systems of Micronesia, Polynesia, and the eastern islands of Melanesia with special attention to the small communities inhabiting low coral atolls. Prerequisite, 202 or permission.

## ANTH

## 412 South Asian Social Structure (5)

Caste dynamics, political control, economic organization, and religion in Hindu-village India. Prerequisite, 202 or permission.

#### ANTH

416 North American Indians (3)

A descriptive and historical treatment of the native Indian cultures of the United States and Canada. Prerequisite, 202 or permission.

#### ANTH

**418** Meso-American Society and Culture (3) Analysis of the social and cultural features of Meso-America. Prerequisite, 202 or permission.

#### ANTH

425 Applied Anthropology (3)

Planned and directed social and cultural change. Prerequisite, 202 or permission.

### ANTH

426 Peasant Culture and Society (5) Survey of current methodological and theoret-

ical approaches to the study of peasant society and culture. Comparative analysis of selected cases illustrating the relationship of peasant societies to other types of social systems. Prerequisite, 202 or permission.

## ANTH

## 429 Expressive Culture (5)

An anthropological view of the expressive aspects of culture: plastic-graphic arts, myth and folktale, music, dance, humor and tragedy, play and games. Prerequisite, 202 or permission.

### ANTH

430 Music: An Anthropological View (3) Consideration of music in its social context; change and continuity in music traditions, and basic structure in music, with some consideration of problems of field work in ethnomusicology. Prerequisite, 202 or permission.

## ANTH

#### 431 Primitive Literature (3)

Mythology and folktales of nonliterate peoples. Theories of interpretation of oral literature as they apply to theories of culture growth and diffusion. Prerequisite, 202 or permission.

#### ANTE

## 432 Visual Anthropology (3)

The place of photography and films in ethnography; their use in the documentation and interpretation of cultural and social systems. Prerequisite, 202 or permission.

## ANTH

#### 434 Comparative Morals and Value Systems (3)

The sociological functions of morality in simple societies. Prerequisite, 202 or permission.

#### ANTH

#### 435 Primitive and Peasant Economic Systems (5)

The chief features of nonmonetary and simple monetary economies. The impact of monetary economy and industrial technology on preindustrial systems and those of limited monetary circulation. Prerequisite, 202 or permission.

#### ANTH

## 436 Social Anthropology of Religion (5)

A comparative social anthropological study of religious systems. Deals with the major theoretical approaches derived from the cultural evolutionists and from Marx, Freud, Durkheim, and Weber. Substantive discussions and interpretations of various aspects of comparative religion: ritual, myth, rites of passage, magic, witcheraft and sorcery, mana and taboo, sacrifice, religious specialists, etc. Problems of definition, method, and theory. Prerequisite, 202 or permission.

## ANTH

## 437 Political Anthropology (5)

Survey of the major approaches and theories. Prerequisite, 202 or permission.

#### ANTH

438 The Analysis of Kinship Systems (5)

Kinship groups in evolutionary perspective; functional analyses of kin roles; structural analyses of kin statuses; the analysis of sets of kinship terminology; the culture of kinship. Prerequisite, 202 or permission.

## ANTH

439 Primitive Law and Social Control (5) Juridical activities in preliterate societies. Relation of law to religion, politics, and social structure. Prerequisite, 202 or permission.

## ANTH

## 440 Child-Rearing, Culture, and Health (3)

Cross-cultural study of the child-rearing practices, the cultural norms, and the health behavior of children and adolescents in different societies. Comparative approaches, diverse theoretical postures, and empirical research findings will be used to study socialization practices and their relationship to cultural, social, and health systems of selected cultures. No prerequisites; however, it is recommended that a registrant has taken courses in child development, introductory anthropology, and psychological anthropology. Offered jointly with the School of Nursing as Nursing 495.

#### ANTH

#### 441 Introduction to Culture and Personality (5)

Systematic survey of the field of culture and personality as a subdiscipline of social anthropology. The relevance of psychological variables for the study of social systems and culture. Prerequisites, 202 and any introductory course in general psychology or personality theory, or permission.

## ANTH

#### 442 Anthropological Aspects of Communication (5)

Introduction to communicational aspects of culture. Prerequisite, 202.

## ANTH

## 450 Introduction to Language (5)

The science of language surveyed with the emphases and orientations of anthropological linguistics. Prerequisite, 202 or permission.

## ANTH

## 451, 452, 453 Phonology (3,3,3)

Detailed study of speech sounds, mechanism of their production, and structuring of sounds in languages; practical experience with a wide variety of languages; field techniques. Offered jointly with the Department of Linguistics as Linguistics 451, 452, 453. Prerequisite, Linguistics 200 or 400, which may be taken concurrently, or permission.

#### ANTH

454 Methods in Comparative Linguistics (3) Methods and theory of comparative linguistics in relation to anthropological research. Offered jointly with the Department of Linguistics as Linguistics 454. Prerequisite, Linguistics 400 or permission.

## ANTH

## 455 Areal Linguistics (3, max. 6)

Linguistics analyses of the languages of a selected area. Offered jointly with the Department of Linguistics as Linguistics\_455.

## ANTH

## `456, 457, 458 Basic Swahili (5,5,5)

An introduction to the structure of spoken and written Swahili. Concentration on the acquisition of elemental conversational skill and an introduction to written texts of graded difficulty. Prerequisites, 456 for 457; 457 for 458.

#### ANTH

#### 459 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.

## ANTH

## 460 History of Anthropology (5)

History of developments in the several fields of general anthropology. Prerequisites, 202 and 15 additional credits in anthropology.

#### ANTH

#### 461, 462, 463 Syntax (3,3,3)

Study of the structuring of meaningful elements in language; practical experience with a wide variety of languages; taxonomic and generative views of grammar. Offered jointly with the Department of Linguistics as Linguistics 461, 462, 463. Prerequisite, Linguistics 200 or 400 or permission.

### ANTH

## 464 Bantu Linguistics (2)

A general survey of the development of Bantu linguistics with special emphasis on comparative Bantu phonology, morphology, and syntax. Prerequisite, permission of instructor.

#### ANTH

## 466, 467, 468 Intermediate Swahili (3,3,3)

Reading of relatively complicated material from prose to traditional poetry. Emphasis on acquiring an ability to manipulate ideas in Swahili orally and written. Review of structure. Prerequisites, 456, 457, 458 or equivalent for 466; 466 for 467; 467 for 468.

## ANTH

469 Special Studies in Anthropology (3) The delineation and analysis of a specific problem or related problems in anthropology. To be offered occasionally by visitors or resident faculty. May be repeated for credit by permission. Prerequisite, 202 or permission.

## ARTS AND SCIENCES

#### ANTH

**490 Problems in Social Structure (3)** Selected current problems in the study of social structure. Prerequisites, 202, 20 additional credits in anthropology, and permission.

#### ANTH

#### 491 Museology (3, max. 6)

Tutorial involvement with some of the technical competencies required in the acquisition, preservation, preparation, and exhibition of anthropological materials in a museum. Prerequisites, 25 credits in anthropology and permission.

#### ANTH

#### 492 Data Analysis in Social Anthropology (3)

An introduction to elementary manual and semiautomated techniques for the processing, organization, and analysis of typical anthropological data. Lectures, demonstrations, class projects. Prerequisites, 202 and 20 additional credits in anthropology or permission.

## ANTH

#### 493 Advanced Topics in Expressive Culture (3)

Analysis and testing of special domains of aesthetic expression, such as graphic arts, oral literature, dance, and humor among non-Western peoples. Prerequisites, 202, 429, 450 (or 453), and permission.

## ANTH

#### 494 Problems in the Social Anthropology of Religion (3)

Selected current problems. Prerequisites, 202, 436, 15 additional credits in anthropology, and permission.

## ANTH

## 495 Advanced Problems in Ethnology (3)

One or more current problems in ethnology. Seminar format. Prerequisites, 25 credits in anthropology and permission.

### ANTH

#### 496 Problems in Psychological Anthropology (3)

Problem areas and new approaches to the study of culture and personality. Prerequisites, 441, 20 additional credits in anthropology, and permission.

#### ANTH

499, 499H Undergraduate Research (\*, max. 12; max. '18 for honors students only) Prerequisite, permission.

## ARCHAEOLOGY

## ARCHY

## 205 Principles of Archaeology (5)

Introduction to the aims of archaeology and methods of reconstructing prehistory. Significance of various methods of food collection and food production, of domestication of plants and animals, and of agricultural systems. Techniques of dating archaeological remains.

#### ARCHY

#### 270 Field Course in Archaeology (12)

Methods and techniques of field excavation as demonstrated through field experience. (Offered Summer Quarter only.) Prerequisite, permission.

#### ARCHY

#### 303 Prehistoric Cultures of the Old World (3)

The beginnings of culture in the Old World to the Early Iron Age in Western Europe. Prerequisite, sophomore standing.

#### ARCHY

## 304 Prehistoric Cultures of the New World (3)

The beginnings of culture of the New World from Pleistocene times until European exploration and conquest. Prerequisite, sophomore standing.

## ARCHY

370 Methods and Problems of

Archaeology (5) Field experience in the Pacific Northwest.

Prerequisite, permission.

## ARCHY

## 371 Analysis of Archaeological Data (3)

Designed for students who have had field experience in archaeology. Prerequisite, permission.

#### ARCHY

#### 417 Quaternary Stratigraphy and Early Man (5)

History of climatic changes during the Quaternary Period as revealed by physical and biological data. Global chronology and correlation of quaternary sediments. Offered jointly with the Department of Geological Sciences as Geological Sciences 417, and with the Quaternary Research Center as Quaternary Studies 417. Prerequisite, senior standing or permission.

## ARCHY

#### 471 Trans-Pacific Contacts in Pre-Columbian Times (3)

Investigation of numerous parallels in agricultural techniques, architecture, religious symbolism, astronomical and calendric systems, and various implements of specific form between Asia, Occania, Middle America, and South America beginning with the third or fourth millenium before Christ. Prerequisite, 205 or permission.

## ARCHY

**472 Prehistoric Cultures of North America (3)** Archaeological history of the various regions of North America north of Mexico. Prerequisite, 205 or permission.

## ARCHY

## 473 Archaeology of Mexico (3)

Pre-Hispanic culture history of Middle American civilizations in central and southern Mexico and the desert dwellers in northern Mexico. Prerequisite, 205 or permission.

#### ARCHY

474 Prehistoric Cultures of South America (3) Archaeological history of the Andean region from the beginnings of agriculture to me culmination of Incan civilization and related civilizations in Colombia, Ecuador, Peru, Bolivia, Chile, and Argentina. Archaeological history of some tropical and subtropical regions of South America. Prerequisite, 205 or permission.

#### ARCHY

## 475 Archaeology of the Mayan Civilization (3)

Pre-Hispanic culture history of the Mayan peoples of Guatemala, the Yucatan peninsula, Honduras, and Chiapas (Mexico). Prerequsite, 205 or permission.

## ARCHY

**497** Theory and Method in Archaeology (3) Examination of theoretical constructs in the analysis of archaeological data. Terminology, typologies, and interregional comparisons. Prerequisites, 205, 20 additional credits in anthropology, and permission.

## PHYSICAL ANTHROPOLOGY PHY A

201 Principles of Physical Anthropology (5) The evidence for primate evolution from the fossil record and from the morphological, genetic, and behavioral variability of living forms. Relationship of human genetics to the evolution of modern populations.

## PHY A

#### 281 African Origins: Social Biology of Sub-Saharan Africa (3)

Origin and biological nature of the peoples of Africa south of the Sahara with emphasis upon the influences of ecology, disease, and nutrition. Race mixtures, growth and development, physique, heat stress physiology, and genetics. (Offered Summer Quarter only.) Prerequisite, sophomore standing.

#### PHY A

#### 282 Afro-Americans: Social Biology of Blacks in the New World (3)

African source areas, distribution, and biology of Negroes in the Americas with special emphasis on the United States. Race mixture, racial laws, and Negro reactions. Racial composition, growth patterns, body build, climatic stresses, and disease susceptibilities. (Offered Summer Quarter only.) Prerequisite, sophomore standing.

#### PHY A

#### 284 Social Biology of the North American Indian (3)

Peopling of the aboriginal New World, its population at time of discovery, and subsequent changes. Past histories as seen through skeletal remains and analysis of morphological and genetic variation in living North American Indians. Race mixture. Effects of cultural, dietary, and disease factors in their physical and clinical status. Prerequisite, sophomore standing.

#### PHY A

#### 285 Social Biology of Middle and South American Indians (3)

Synthesis of archaeological, historical, cultural, and biological data in delineating the clusters of extant populations of living Indians. Intensive review of nutritional and clinical studies in Guatemalan and Peruvian Indians. Current genetic data on largely intact Indian populations. Prerequisite, 284 or permission.

#### PHY A

#### 387 Ecology and Biological Adaptation in Man (5)

Man's biological legacy and present adaptability viewed from various aspects of human ecology: the cultural past, climate and geography, nutrition and disease, and pollutants and contaminants. Oriented in terms of natural and cultural selection of those who are to live to reproduce and those who are not, and of the physical and mental damage resulting from ecological factors. Prerequisites, 201 or Biology 101-102 or 210.

#### PHY A

#### 388 Evolution and Ecology of Early Man and Other Primates (5)

Nature of the evolutionary process as applied to primate and human evolution. Discussion of geological and ecological background and of pertinent dating methods. Relevance of behavioral, cytogenetic, and biochemical data to morphological distance in primate systematics.

Man, ecology, and culture in the Pleistocene and recent periods. Prerequisite, 201.

## PHY A

## 470 Introduction to the Primates (3)

In-depth examination of the origin and the distribution of primates in time and space: growth and development, posture and locomotion, sexual and intraspecific differences, special sense organs, oral cavity, skin and hair, behavior, and major evolutionary trends. Pre-requisite, 201.

## РНУ А

## 480-481 Primate Anatomy: Structure and Function (5-5)

The anatomy of various primates is studied in detail with special reference to structural and functional relationships. The evolution and present ecology of primates are examined as they relate to the total anatomical picture. The laboratory consists of dissection of a specified primate and a study of the dentition and osteology. Prerequisite, 201 or permission.

## PHY A

## 482 Physical Anthropology: Population Genetics (5)

The population as a unit of study will be defined, and methods of analyzing the forces of evolution operative in human populations will be presented. Prerequisites. Genetics 351 or 451 and statistics.

## PHY A

## 483 Primate and Human Variations (5)

Discussion of the morphological, physiological, and genetic variability of living primate and human populations with special reference to adaptation. Stressed are adaptive responses to selective pressures engendered by the total environment. Laboratory. Prerequisites, Genetics 351 or 451 and statistics, or permission.

#### PHY A

#### 484 Primate and Human Growth (3)

Genetics of growth and maturation in experimental primates and man. Emphasis is the effect of the total environment upon growth processes with special reference to non-Western human societies. Prerequisite, statistics or permission.

## PHY A

#### Primate and Human Growth 485 Laboratory (2)

Laboratory dealing with current methods used to assess growth and development. Must be accompanied by 484. Prerequisite, statistics or permission.

#### PHY A

## 486 Primate and Human Evolution (5)

Discussion of living forms and the fossil record with reference to the nature of primate evolution. Morphological, genetic, and behavioral data are used to appraise taxonomy of living primates and their phylogenetic implications. Special emphasis is placed on the evolution of the hominids and their cultures. Laboratory. Prerequisite, Geological Sciences 437, which may be taken concurrently, or per-mission.

#### PHY A

487 Human and Comparative Osteology (3) Introduction to the vertebrate skeleton. The skeleton is described in detail and various methods of determining age and sex are presented, as well as osteometry and modern statistical methods for handling such data. Prerequisite, permission.

## PHY A

sion.

Advanced Topics in Physical 498

Anthropology (3, max. 9) A series of seminars on different aspects of

physical anthropology. Prerequisite, permis-

## **Courses for Graduates Only**

GENERAL

ANTH 600 Independent Study or Research (\*) AWSp

## ANTH

700 Master's Thesis (\*)

ANTH

800 Doctoral Dissertation (\*)

## SOCIOCULTURAL ANTHROPOLOGY

## ANTH

500 Preceptorial Reading (6) A course 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.

#### ANTH

### 504 Anthropological Research Design (3)

Focus is on a number of research designs useful in anthropological research. Primary emphasis is on the analysis of quasiexperimental designs that as a class hold considerable promise for the development of anthropological science. Students are expected to analyze examples of actual anthropological research in terms of the conceptual framework developed in the class.

#### ANTH

505 Field Techniques in Ethnography (3) The techniques of collecting, recording, ordering, and utilizing ethnographic data in the field. Problems of rapport, sample, interview, observation, and interpretation.

#### ANTH

510 Seminar on North American Indians (3) An advanced comparative treatment of selected aspects of the Indian cultures and societies of North America.

#### ANTH

512 Seminar on Oceania (3)

An advanced comparative treatment of selected aspects of the cultures and societies of Oceania.

#### ANTH

#### 513 Seminar on Africa (3, max. 9)

An advanced comparative treatment of selected aspects of the cultures and societies of Africa.

#### ANTH

515 Seminar on South America (3) An advanced comparative treatment of se-

lected aspects of the cultures and societies of South America.

#### ANTH

516 Seminar on Southeast Asia (3, max. 9) An advanced comparative treatment of selected aspects of the cultures and societies of Southeast Asia.

## ANTH

## 517 Seminar on South Asia (3)

An advanced analysis of selected problems in South Asian ethnology and social structure. Prerequisite, 412.

#### ANTH

## 518 Seminar on Middle America (3)

An advanced comparative treatment of selected aspects of the cultures and societies of Middle 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 (3)

Systematic analysis of psychological, social, and cultural implications of the contact of peoples.

#### ANTH

**Structures and Functions of Oral** 530 Literature (3)

Of interest to students of language and literature.

#### ANTH

531 Analysis of Oral Literature (3, max. 6) Various approaches to the study of folklore and myth. Of interest to students of language and literature.

#### ANTH

532 Content Analysis of Oral Literatures (3) Analysis of oral literature for main themes, relationships, personalities, tragedy, humor, values, world view, and their sociocultural connections. Of interest to students of language and literature. Prerequisite, permission.

#### ANTH

537 Non-Western Political Systems (3) Ethnic manifestations, methodological problems, and theoretical implications of polity in a wide range of cultures.

#### ANTH

540 Anthropology and Health (3) Seminar on the history, development, and future of anthropological contributions to problems of health and illness. Prerequisite permission.

#### ANTH

#### Seminar in Psychological Aspects of 541 Culture (3)

Selected problems in the relation of culture and personality types. Prerequisite, 441 or permission.

#### ANTH

## 550 Field Text Recording (3)

Training in verbatim recording in non-Western connected speech such as myth and biographical dictations; especially designed for sociocultural anthropologists, rather than linguists, who are shortly leaving for a long session of field research.

## ANTH

## 553 Analysis of Linguistic Structures (3, max. 6)

Offered jointly with the Department of Linguistics as Linguistics 553. Prerequisite, permission.

#### ANTH

559 Seminar in Language and Culture (3) Theoretical and methodological problems in language and culture.

#### 11 ANTH

561 Seminar in Methods and Theories (3. max. 9)

## ARTS AND SCIENCES

## ANTH

## 562 Implications of Concepts From Anthropology for Nursing (3)

An examination of selected core concepts from anthropology and an assessment of the implications of these concepts for nursing research. Offered jointly with the School of Nursing as Nursing 562.

## ANTH

563 Structural Functional Analysis  $(3, \max, 9)$ 

#### ANTH

#### 564 Formal Methods of Analysis for Social Anthropology (3)

A seminar on selected nonstatistical mathematical methods and models of relevance to various problems in social anthropology.

#### ANTH

## 565, 566, 567 History of Anthropological Sciences (3,3,3)

A series of core courses for the beginning graduate student in which the growth and development of anthropological science is analyzed.

#### ANTH

569 Social and Cultural Change: Africa (3, max. 9)

Urbanization, stratification, technology, education, social and religious movements, and cul-tural pluralism in contemporary Africa. Offered jointly with the Department of Sociol-ogy as Sociology 569. Prerequisite, graduate standing in a social science department.

#### ANTH

## 570 Research Techniques in the

Anthropological Study of Kinship (3-9) Introduction to research methods in the study of kinship systems. Prerequisite, 438 or permission.

## ANTH

571 Communicational Anthropology (3-9) Introduction to communicational aspects of culture. Prerequisite, permission.

#### ANTH

591 Seminar in Museology (3) Research into problems of museology. Prerequisite, permission.

## ARCHAEOLOGY

## ARCHY

501 Preceptorial Reading (6)

A course for beginning graduate students who have not had adequate training in the problems, principles, and methods involved in the reconstruction of prehistory.

#### ARCHY

570 Seminar in Theory and Method in Archaeology (3)

#### ARCHY

571 Field Course in Archaeology (5) Study of prehistoric cultures through archaeological excavation and analysis. Work will be largely in the state of Washington, but other areas may be included. Offered Summer Quarter only.

## ARCHY

572 Seminar in North American Archaeology (3, max. 6)

Selected problems in the archaeology of America north of Mexico. Prerequisite, Archaeology 472 or permission.

## ARCHY

#### 573 Seminar in Middle American Archaeology (3, max. 6)

Selected problems in the archaeology of Middle America. Prerequisite, Archaeology 473 or 475 or permission.

## ARCHY

## 574 Seminar in South American

Archaeology (3, max. 6) Selected problems in the archaeology of South America and southern Central America. Prerequisite. Archaeology 474 or permission.

#### ARCHY

#### 575 Strategy of Archaeology (3)

A systematic examination of the methodology and elementary techniques of archaeology for the objective of prehistory, acquainting the student as well with sources of material and techniques of wide applicability in the field situation. Prerequisite, permission.

#### ARCHY

579 Seminar in Underwater Archaeology (3) Problems and practices of archaeology underwater. Includes world survey of types of sites, problems of working in underwater environment, methods, principles, accomplishments to date and possible projects in northwest America. Prerequisite, Archaeology 571 or permission.

## PHYSICAL ANTHROPOLOGY PHY A

#### 502 Preceptorial Reading (6)

A course for beginning graduate students who have not had adequate training in the problems, principles, and methods involved in the study of primate evolution, human genetics, and the evolution of modern populations.

#### PHY A

#### 581 Dental Anthropology (5)

An intensive survey of the dentitions of primates from tree shrews to man. Emphasis will be placed on the range of metric and morphologic variability existing in the teeth of these animals, both in fossil and living groups. Environmental and genetic factors will be considered within this ontogenetic and phylogenetic framework.

## PHY A 582 Seminar in Race and Genetics (3, max. 9)

Examination of various problems dealing with the forces of evolution operative on human populations. Prerequisite, Physical Anthropology 482 or permission.

## PHY A 583 Topics in Growth and Development (3, max. 9)

Seminar dealing with various topics of child growth and development. Topics to change from quarter to quarter. Prerequisite, Physical Anthropology 484 or permission.

## PHY A

#### 584 Topics in Ecology and Adaptation (3, max. 9)

Seminar dealing with various aspects of ecol-ogy and adaptation. Topics to change from quarter to quarter. Prerequisite, PHY A 483 or permission.

## РНУ А

#### 586 Topics in Primate and Human Evolution (3, max. 9)

A consideration of one or more major topics relevant to the evolution of man and the primates. Prerequisite, permission.

## ART

Specific areas in Art are designated by area letters. These letters must precede course numbers on the student's Official Program. Designation letters and their definitions are:

## ART-Art

## **ART H-Art History**

## **Courses for Undergraduates**

## Humanities 103 The Arts of Africa, the

Caribbean, and Black America (5) Creative achievements by the Blacks of Af-rica, the Caribbean, and America in visual arts, music, dance, literature, and theatre. Guest lecturers and performing artists.

## ART

## 100 Introduction to Art (3)

## A course for majors in elementary education.

#### ART

#### 101 Special Studies in Art for Nonmajors (3, max. 9)

Individual and group instruction in art with special projects, readings, and papers in art serving as a focus for studio work. Prerequisite, permission.

#### ART

## 103 Drawing and Design (6, max. 18)

Drawing and design offered in a coordinated program to provide a fundamental background for further art study. Prerequisite, permission.

#### ART

## 105, 106, 107 Drawing (3,3,3)

Perspective, light and shade, composition. Pre-requisites, ART 105 for 106; 106 for 107.

#### ART

## 109, 110 Design (3,3)

Art structure as the basis for creative work. Organization of line, space, and color. Lec-tures, discussion, and supplementary reading. Prerequisite, ART 109 for 110.

#### ART

#### 115 Contemporary American Indian Art (1) Research and analysis of traditional Indian art forms by region; study of contemporary works by Indian artists; experimentation in media.

## ART

## 129 Appreciation of Design (2)

Lectures on design fundamentals, illustrated with slides and paintings, pottery, textiles, etc. Reading and reference work.

## ART

#### 197 Study Abroad: Nonmajor Individual Projects (3-5, max. 10)

Prerequisite, permission.

#### ART

## 201, 202, 203 Ceramic Art (3,3,3) Pottery: hand-building processes, wheel throw-ing, glazing, kiln firing. Prerequisites, ART 107, 110, 129 for 201; 201 for 202; 202 for 203

#### ART

#### 205 Graphic Design (3)

Survey and introduction (design and use of letter forms). Prerequisites, ART 107, 110, 129.

### ART

## 206 Graphic Design (3)

#### Basic problems in visual design. Prerequisite, 205

## ART

210 Art and the Individual (3)

Studio-lecture survey of contemporary art forms and their significance as they relate to the individual. One of a three-quarter series required of all Art Education majors on the sophomore level to develop a core of knowledge appropriate to prospective teachers of art. Prerequisite, sophomore standing in Art Education.

#### ART

## 211 Art in the Schools (3)

Studio-lecture survey of contemporary art forms and their significance as they relate to the schools. One of a three-quarter series required of all Art Education majors on the sophomore level to develop a core of knowledge appropriate to prospective teachers of art. Prerequisite, sophomore standing in Art Education.

## ART

212 Art in the Community (3) Studio-lecture survey of contemporary art forms as they relate to the community. One of a three-quarter series required of all Art Education majors on the sophomore level to develop a core of knowledge appropriate to prospective teachers of art. Prerequisite, sophomore standing in Art Education.

#### ART

## 250 Design and Materials: Textiles-Printing and Dyeing (3)

Printing and dyeing of textiles. Techniques include block printing, batik, tie and dye, dis-charging. Prerequisites, ART 107, 110, 129.

251 Design and Materials: Glass (3)

Fusing, forming, laminating, and surface treatments of glass. (Glass-blowing excluded.) Prerequisites, ART 107, 110, 129.

252 Design and Materials: Plastics (3) Forming, joining, and casting of plastics. Pre-requisites, ART 107, 110, 129.

#### ART

253 Design and Materials: Wood (3) Shaping and forming of wood. Lamination

and fabricating techniques. Usage of hand and power tools. Prerequisites, ART 107, 110, 129.

## ART

## 254 Design and Materials: Metal (3)

Basic techniques in manipulation and con-struction of metals. Visual, tactile, and aesthetic aspects. Prerequisites, ART 107. 110. 129.

## ART

#### 255 Design and Materials: Textile **Construction (3)**

Knotting, hooking, stitching, and other non-woven constructional techniques with a variety of textile fibers. Prerequisites, ART 107, 110, 129.

#### ART

256 Painting (3)

Beginning oil painting. Prerequisites, ART 107, 110, 129.

## ART

257 Painting (3, max. 6) Oil painting. Prerequisite, ART 256.

## ART

259 Water-Soluble Media (3, max. 9) Prerequisites, ART 107, 110, 129.

## ART

261 Elements of Interior Design (3) Study of basic residential spaces and furnishings. Scale drawings, materials, and color.

#### ART

262 Essentials of Interior Design (2) Illustrated lectures on color, texture, and form in residential space. Prerequisite, Interior De-

## ART

sign major.

265 Intermediate Drawing (3, max. 9) Prerequisites, ART 107, 110, 129.

#### ART

## 268 Anatomical Drawing (3)

Study of the figure's internal structure and its relationship to surface appearance. Drawing from the model and anatomical material. Prerequisites, ART 107, 110, 129.

## ART

272 Beginning Sculpture Composition (3, max. 6)

Fundamentals of composition in the round and in relief. Prerequisites, ART 107, 110, 129.

274 Life Sculpture (3, max. 9) Work in clay from the posed model. Figure composition, discussions, reading, and sketch book. Prerequisite, 6 credits from ART 272.

#### ART

301 Art Education: Crafts (3) Design in leather. Exploration of techniques and processes leading to creative work. Pre-requisites, ART 107, 110, 129.

### ART

302 Art Education: Crafts (3) Bookbinding. The design and construction of books including decorative paper techniques. Prerequisites, ART 107, 110, 129.

## ART

303 Art Education: Crafts (3) Paper techniques and processes. Prerequisites, ART 107, 110, 129.

#### ART

304 Art Education: Crafts (3) Textile techniques and processes. Prerequisites, ART 107, 110, 129.

#### ART

305 Art Education: Crafts (3)

General techniques and processes involved with various materials. Prerequisites, ART 107, 110, 129.

## ART

307 Intermediate Painting (3, max. 6) Prerequisites, 6 credits from ART 257.

#### ART

309 Portrait Painting (3) Prerequisite, 6 credits from ART 307.

#### ART

310, 311, 312 Interior Design (5,5,5) Analysis of interior spaces and furnishings in relation to human needs. Includes study of materials, scale drawings, models, and pre-sensation. Prerequisites, ART 107, 110, 129, 262; Architecture 302, 312; Home Economics 125 for 310; 310 for 311; 311 for 312.

#### ART

313, 314 Fundamentals of Photography (3,3) Basic theory and techniques of photographic reproduction. Lighting, exposure, camera technique, and processing. Application of photographic techniques to the solution of problems in visual presentation. Prerequisite, junior standing in Graphic or Industrial Design for 313; 313 for 314.

## ART

316, 317, 318 Design for Industry (5,5,5) Product design, working drawings, models, presentation drawings, product analysis, dis-play, marketing. Prerequisites, junior standing in Industrial Design for 316; 316 for 317; 317

## for 318. ART

## 319, 320, 321 Furniture Design (5,5,5)

Design for full-scale construction of furniture in the shop, includes working drawings, scale models, and layout. Prerequisites, ART H 283, ART 312 for 319; 319 for 320; 320 for 321.

## ART

## 325 Advanced Drawing (3, max. 9) Study on the advanced level involving history, practice, and theory of drawing as an art form. Prerequisite, 9 credits from ART 265.

## 328 The Film as Art (3)

The historical development of film as an aesthetic medium with an emphasis on pivotal film makers and their unique contribution to the art of film.

## ART

### 332 Intermediate Sculpture Composition (5, max. 15)

Advanced work in various media and tech-niques. Prerequisite, ART 274.

## 335 Metal Casting (3, max. 6)

Introduction to foundry techniques as applied to fine arts casting of nonferrous material. Prerequisite, 3 credits of ART 274.

## ART

## 337 Welding (3, max. 6)

The study and application of welding methods as a sculpture technique making use of oxyacetelyne, electric arc, and heliarc. Pre-requisite, ART 274.

#### ART

## 339 Filmmaking (5, max. 15)

Fundamentals of camera techniques: lens lighting, meter reading, filming speeds, film types, cinematic movement, camera move-ment. Fundamentals of film editing, splicing and timing, sound recording, and synchronizing. Prerequisite, permission.

#### ART

## 340 Design for Printed Fabrics (3)

Hand-block and silk-screen printing; mass-production design. Prerequisite, ART 250.

### ART

#### 350 Introduction to Printmaking (3) Studio problems. Prerequisites, ART 107, 110, 129.

#### ART

# 351 Printmaking (3, max. 6) Continuation of 350. Prerequisite, ART 350.

ART 353 Advanced Ceramic Art (5, max. 15)

Pottery—advanced work in forming, decorat-ing, and glazing. Prerequisite, ART 203.

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## ART

## 356 Glass Blowing (3, max. 9)

Techniques of blowing molten glass through use of the blow pipe. Glass-furnace construction and lectures on glass technology. Prerequisite, permission.

#### ART

## 357 Metal Design (5) MARSHALL

Construction includes processes of raising, soldering, forging in copper, pewter, silver. Lectures and research on historic and con-temporary examples. Prerequisites, ART 107, 110, 129.

## ART

358 Jewelry Design (5)

MARSHALL

Jewelry design and construction, including stone setting and forging in silver and gold. Lectures and research on historic and contemporary examples. Prerequisites, ART 107, 110, 129,

#### ART

## 359 Enameling (5)

MARSHALL Enamel design for metal work or jewelry, champlevé, Plique-à-jour, Limoges, Cloissonné on copper, silver, or gold. Prerequisite, ART 357 or 358.

## ART

360 Life (3, max. 9) Drawing and painting from the model. Pre-requisites, 9 credits from ART 265 and 6 credits from ART 257.

#### ART

366, 367, 368 Graphic Design (5,5,5) Emphasis on the development of visual ideas. Developing proficiency in working with equipment and materials. Prerequisites, ART 206 for 366; 366 for 367; 367 for 368.

## ART

369, 370 Costume Design (2,2) Design of clothing with emphasis on line,

color, materials, use. For Home Economics majors only. (Offered alternate years; offered 1973-74.)

## ART

410 Graphic Design (5) RAND

Composition and history. Prerequisite, ART 368.

#### ART

411 Graphic Design (3 or 5, max. 15) Advanced photography. Emphasis on individ-ual creative projects. Prerequisite, permission.

#### ART

436, 437, 438 Sculpture Composition (5,5,5) Individual compositions in various media in large scale. Prerequisites, 15 credits from ART 332 for 436; 436 for 437; 437 for 438.

#### ART

439 Advanced Filmmaking (5, max. 15) Advanced individual projects in filmmaking. Prerequisites, 15 credits of ART 339 and permission.

#### ART

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## 445, 446, 447 Advanced Industrial Design (5,5,5)

Market analysis and selected professional problems in industrial design. Consultation techniques; psychological, sociological, and economic factors involved in designing for consumer acceptance. Prerequisites, ART 318 for 445; 445 for 446; 446 for 447.

## ART

450 Advanced Printmaking (5, max. 15) Studio problems. Prerequisite, 6 credits from ART 351.

## ART

457 Advanced Metal Design (5) Individual problems in metal design and construction. Prerequisite, ART 357.

#### ART

458 Advanced Jewelry Design (5) Individual problems in jewelry design and construction. Prerequisite, ART 358.

## ART

459 Advanced Enameling (5) Individual problems in enameling. Prerequi-site, ART 359.

#### ART

463 Advanced Painting (3 or 6, max. 18) Development of individuality in painting through creative exercises. Prerequisites, 6 ART 360.

## ART

466, 467, 468 Graphic Design (5,5,5) Expression of ideas in terms of design. Va-

riety of media and reproduction processes. Prerequisites, ART 368 for 466; 466 for 467; 467 for 468.

## ART

472, 473, 474 Advanced Interior Design (5,5,5) Comprehensive problems related to contem-porary needs, both public areas and resi-dences, usually offered in conjunction with off-campus designers. Further research of historic interior masterpieces. Models, materials and their sources, perspective and working drawings. Prerequisites, ART 312 for 472; 472 for 473; 473 for 474.

## ART

479, 480 Graphic Design (3,3) Prerequisites, ART 410 for 479; 479 for 480.

#### ART

485 Advanced Ceramic Art (5, max. 15)

Pottery design and construction, stoneware, clay bodies, glazes. Prerequisite, 15 credits from ART 353.

## ART

## 490 Art Education in the Schools (3)

For school administrators and teachers requiring help in problems relating to the teaching of art. Workshop experiences, lectures, and discussions. No previous art experience necessary. Prerequisite, teaching experience. May be repeated for credit.

#### ART

## 491 Readings in Art Education (3)

Basic readings in art education. A survey of leaders and movements that have contributed to the development of art education, with special attention to social and philosophical factors that have influenced art programs in American schools. Prerequisite, permission.

#### ART

492 Field Study in Art Education (3, max. 9) Individual study of a selected problem in art education within a school setting under the direction of a faculty member. Prerequisite, permission.

## ART

493 Problems in Art Education (3, max. 9) A course designed to consider significant and critical problems in the field of art education. Topic to be announced. Prerequisite, permission.

#### ART

494 Instructional Materials in Art Education (3. max. 9)

The preparation of teaching materials in selected media appropriate to the learner and with concern for subject matter. Prerequisite, permission.

#### ART

495 Graphic Design (5, max. 15) Theory and psychology of advertising and visual communication. Independent and group work. Some assignments and critiques by guest lecturers. Prerequisites, ART 468, 480.

#### ART

497 Study Abroad-Studio Individual Projects (3-10, max. 20) Prerequisite, permission.

#### ART

498 Individual Projects—Painting/Sculpture (3 or 5, max. 15) Prerequisite, permission.

## ART

Individual Projects-Design 499 (3 or 5, max. 15)

Prerequisite, permission.

## **Courses for Graduates Only**

#### ART

## 500, 501, 502 Seminar in Art Education (3 or 5 each)

Special problems related to the teaching of art. Prerequisites, teaching experience and permission.

#### ART 509 Portrait Painting (3)

## ART

512 Seminar in Painting (3, max. 9)

ART

522, 523, 524 Sculpture (3 or 5 each)

ART

530, 531, 532 Design (3 or 5 each)

ART 550, 551, 552 Printmaking (3 or 5 each)

ART

553, 554, 555 Ceramic Art (3 or 5 each)

## ART

- 560 Life Painting (3 or 5, max. 15)
- ART
- 563, 564, 565 Advanced Painting (3 or 5 each)

**Courses for Undergraduates** 

## ART

**ART H** 

600 Independent Study or Research (\*)

201, 202, 203 History of Western Art (5,3,3)

An introduction to major achievements in the

principle media from prehistoric times to the

present. Illustrated lectures. 201: Ancient and

ART

700 Master's Thesis (\*)

## ART HISTORY

Early Medieval; 202: Late Medieval and Renaissance; 203: Baroque and Modern. Prerequisites, sophomore standing for 201; 201 for 202; 202 for 203.

## ART H

#### 204 Study Abroad: Art in London (3-5, max. 15)

General introduction to art and art history through the study of objects in London's museums, of buildings in and near London, and through selected readings and research projects. Specific course content will be announced in Study Abroad bulletins. Prerequisite, permission.

## ART H

230 Black American Art (3)

History of Black American art as reconstructed from colonial times until the present, the African background, and extensions of Black art in the West Indies and in Brazil. (Not offered 1972-73.)

#### ART H

283 History of Furniture and Interior Architecture (3)

Illustrated lectures on the evolution of furniture and interior architecture.

#### ART H

301 Survey of Asian Art (5)

The origins and interplay of the major movements of Asian art.

#### ART H

## 305 Survey of Medieval Art (5)

Art of Europe from the beginnings of Christian art in the late Roman empire to the end of the fourteenth century. The course is designed for the art history major, but is open to any student, and will treat the major monuments and will acquaint the student with the bibliography.

## ART H

306 Survey of Renaissance Art (5) Sculpture, painting, and architecture in Europe from 1300 to 1600, with main emphasis on Italy.

#### ART H

307 Baroque and Rococo Art (5) OPPERMAN

The arts and architecture of Europe from the end of the sixteenth century to the latter half of the eighteenth century. Prerequisite, sophomore standing or permission.

#### ART H

## 308 Survey of Modern Art (5)

The art of Europe and America from the late eighteenth century to the present, with emphasis on stylistic and thematic changes in painting.

#### ART H

#### 331 Tribal Art (5) BRAVMANN

A survey of the arts of Sub-Saharan Africa, Pre-Columbian America (North and South), and the Pacific Islands, including Australia and New Zealand, from pre-historic times to the ethnographic present.

#### ART H

#### 333 Art of the Northwest-Coast Indian (3) HOLM

Northwest Coast Indian art, with emphasis on the structure and style of two-dimensional art of the northern tribes. Offered jointly with the Department of Anthropology as Anthropology 333.

#### ART H

334 Art of the Northwest Coast Indian (3) . HOLM

Three-dimensional art of the Northwest Coast culture area, with emphasis on aesthetic principles, techniques, cultural functions. Offered jointly with the Department of Anthropology as Anthropology 334.

#### ART H

335 Art of the Northwest Coast Indian (3) HOLM

Northwest Coast Indian art as related to drama and dance, with special attention to the Southern Kwakiutl. Offered jointly with the Department of Anthropology as Anthropology 335.

#### ART H

340 Pre-Classical Art and Archaeology (3) EDMONSON

Survey of the art and the other material remains of the civilizations in the Aegean from the Neolithic to the end of the Bronze Age, with special emphasis on Minoan Crete and the Myacenaean kingdoms of mainland Greece illustrated by slides. The history, techniques, and results of significant excavations will be examined. Offered jointly with the Department of Classics as Classical Archaeology 340.

#### ART H

#### 341 Greek Art and Archaeology (3) BLIQUEZ, EDMONSON

A 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 the Department of Classics as Classical Archaeology 341.

#### ART H

342 Roman Archaeology and Art (3) PASCAL, VIGNOLI

Roman architecture, painting, and sculpture, with emphasis on the innovations of the Romans in these areas, illustrated by slides. Offered jointly with the Department of Classics as Classical Archaeology 342.

## ART H

- 381 History of Painting Since the Renaissance (2)
  - MOSELEY

Illustrated lectures. Prerequisite, Art History 203.

#### ART H

## 382 History of Modern Sculpture (2)

Sculpture from the Renaissance to the present; lectures and slides. Prerequisite, Art History 203.

#### ART H

#### 391 History of Pottery (3) KOTTLER

Survey of stylistic and technical history of world pottery. Prerequisite, junior standing in Art.

#### ART H

#### 392 History of Printmaking (3) ALPS

A selective survey of major artists and media in the field of printmaking. Prerequisite, junior standing in art.

#### ART H

#### 401 Oriental Ceramic Art (2) ROGERS

A survey illustrated by specimens in the collection of the Seattle Art Museum. Prerequisite, Art History 301 or major in ceramic art.

#### ART H

## 404 Study Abroad: Art in London

(3-5, max. 15) Advanced or specialized work in art history based on materials available in the museums, private collections, libraries and buildings on London; conducted through lectures, reading and research projects. Specific course content will be determined by the assigned faculty member and will be announced in Study

Abroad bulletins. Prerequisite, permission.

#### ART H

#### 406 Study Abroad: Art in Provence (5, max. 15)

Monuments in and around Avignon. Emphasis upon Roman and Romanesque architecture and sculpture, later medieval French painting, great works of all periods and countries in regional museums, and the Provencal landscape of Cézanne, Van Gogh, and Gauguin. Prerequisite, permission.

#### ART H

## 411 Early Chinese Painting: T'ang to Yüan (3)

WEBB

A study of the changing styles and attitudes accompanying the development of painting (particularly landscape painting) in China from earliest times. Prerequisite, upper-division standing.

#### ART H

## 412 Later Chinese Painting: Yüan through Ch'ing (3)

WEBB ese painting from the

Chinese painting from the time that the study of individual masters becomes the main task at hand. Prerequisite, upper-division standing.

#### ART H

#### 415 Early Japanese Painting: Twelfth to Sixteenth Century (3) WEBB

Yamato-e and the art of the illustrated handscroll of Heian and Kamakura times, and the ink landscape tradition associated with Shubun and Sesshu. Prerequisite, upper-division stand-

#### ART H

ing.

#### 416 Later Japanese Painting: Sixteenth to Nineteenth Century (3) WEBB

A survey of later Japanese painting with emphasis on the art of the Kano, Sotatsu/Korin, Shijo/Maruyama, and Nanga schools. Prerequisite, upper-division standing.

## ART H

## 417 Buddhist Painting of China and Janan (3)

WEBB

A survey of Buddhist painting in China and Japan from the fifth century until circa 1300. Prerequisite, upper-division standing.

## ART H

## 418 Buddhist Sculpture of China and Japan (3)

WEBB

A survey of Buddhist sculpture in China and Japan from the fifth century until circa 1300. Prerequisite, upper-division standing.

## ART H

#### 419 Chinese and Japanese Architecture (3) WEBB

Religious and secular architecture of China and Japan, with emphasis on Japanese temples and shrines. Prerequisite, upper-division standing.

#### ART H

# 420 Study Abroad: Art and Architecture of the Kansai (8)

WEBB

A study, conducted in the field and in lecture/ discussion sessions, of all the important monuments of Japanese art in the temples, shrines, and museums of Kyoto, Otsu, Nara, Osaka, and their vicinities.

#### ART H

#### 421 Art of India (3)

ROGERS

Stylistic and iconographic study of the art of India. Prerequisite, Art History 301 or permission.

#### ART H

#### 431 Primitive Art I (3)

BRAVMANN The arts of Mesoamerica, South America, and Oceania.

#### ART H

432 Primitive Art II (3)

BRAVMÁNN

The arts of New Guinea, Australia, and Africa.

#### ÀRTH

436 Arts of Sub-Saharan Africa I (3) BRAYMANN

The tribal arts of the Western Sudan and the Western Guinea coast with their archaeological antecedents.

#### ART H

437 Arts of Sub-Saharan Africa II (3) BRAVMANN

The tribal arts of the Central Guinea Coast, Nigeria, the Cameroons, and Gabon.

#### ARTH

438 Arts of Sub-Saharan Africa III (3) BRAVMANN

The tribal arts of the Congo, Southern Savannah, and clusters of artistic traditions outside of generally defined artistic maps of Africa.

#### ART H

#### 439 Selected Studies in African Art and Music (3)

An interdisciplinary seminar on specific problems related to the study of art and music in Africa. Prerequisite, Music 427 or Art History 436 or 437 or 438.

#### ARTH

442 Greek and Roman Pottery (3) EDMONSON

Shapes, fabrics, and decorations from the Neolithic period to the sixth century A.D. Offered jointly with the Department of Classics as Classical Archaeology 442. (Offered alternate years; offered 1972-73.)

#### ARTH

#### 444 Greek and Roman Sculpture (3) EDMONSON

History and development of Greek sculpture and sculptors, their Roman copyists, and Roman portraits and sarcophagi. Emphasis will be on Greek sculpture of the fifth century B.C. Offered jointly with the Department of Classics as Classical Archaeology 444. (Offered alternate years; offered 1972-73.)

#### ART H

#### 453 Romanesque Art I (3) CHRISTOFIDES

The history of early medieval art (architecture, sculpture, painting, decorative arts), from Carolingian times through the twelfth century. Prerequisite, upper-division standing.

#### ART H

## 454 Romanesque Art II (3)

CHRISTOFIDES Intensive study of the high Romanesque style, including the art and architecture, with related monuments, of the pilgrimage roads to Compostela. Prerequisite, upper-division standing.

#### **ART H**

#### 461 Early Renaissance Painting (3)

The painting of the fourteenth and fifteenth centuries in Florence and Siena. Prerequisite, familiarity with vocabulary of art or with related history.

#### ART H

**462** High and Late Renaissance Painting (3) The painting of the sixteenth century in Florence and Rome. Prerequisite, familiarity with vocabularly of art or with related history.

## ART H

#### 463 Early Renaissance Sculpture (3) The sculpture of the late thirteenth, four-

The sculpture of the late infreenth, fourteenth, and fifteenth centuries in the Florentine tradition. Prerequisites, Art History 201, 202, or equivalent background.

### ARTH

## 465 Renaissance Architecture and Architectural Theory (3, max. 9)

Architecture in Italy (1400-1600) from Brunelleshi to Palladio, with an emphasis on the development of Renaissance architectural theory from Alberti to Palladio and Vignola. Prerequisites, Art History 202 or 306 or Architecture 350 and 351.

#### ART H

469 Problems in Northern European Art (3, max. 12)

GROSSMANN The evolution of Northern European art during the fifteenth through seventeenth centuries will be treated in such a manner as to direct the attention of students to the many points of iconography, style, and attribution that need clarification. The major artistic traditions of this area will be covered during four academic quarters. Prerequisite, upperdivision standing.

## ART H

470 Problems in the Hispanic Arts (3, max. 9) Various specific areas within the general range of Spanish and Latin American arts in the Renaissance and the Baroque will be dealt with in successive quarters, among them: Mexican colonial architecture; the Renaissance in Spain; the arts of the Spanish Baroque; etc. Prerequisite, Art History 306 or 307, or permission.

#### ART H

#### 471 Masters and Monuments of Counter-Reformation—Rome (3) OPPERMAN

The works and impact of the major architects, sculptors, and painters active in Rome from the death of Michelangelo to the death of Bernini (1564–1680). Concentration upon Caravaggio, Bernini, Pietro da Cortona, Poussin, and Borromini. Prerequisite, Art History 307 or permission of instructor.

#### ART H

## 472 Art in France: Henry IV-Louis XVI (3)

OPPERMAN

Architecture, painting, sculpture, decoration. The classic ideal: formation, zenith, extinction around 1700, and rebirth in the later eighteenth century. Main points: Versailles, Watteau, the decorators of the rocco, and tendencies of the period. Prerequisite, Art History 307 or permission of instructor.

#### ART H

#### 473 Dutch Painting of the Golden Age (3) OPPERMAN

The genesis, development, and decline of painting in the United Provinces from their independence in 1581 to the end of the seventeenth century. Emphasis upon the anti-mannerist reaction in Ultrecht, Frans Hals, Rembrandt, and upon, the origins of Dutch genre traditions. Prerequisite, Art History 307 or permission of instructor.

## **ART H**

## 474 Problems in Eighteenth Century Art (3, max. 12)

Selected problems in the art and art theory of eighteenth-century Europe and America. Different topics will be covered each time the course is offered, among them: Watteau and the French Rococo; Neoclassicism; Central Europe in the eighteenth century; English art. Prerequisite, Art History 307 or permission.

#### ART H

## 481 Origins of Modern Art (3)

KINGSBURY

Stylistic and iconographic study of European painting and sculpture from 1750 to 1848. Prerequisite, Art History 203.

#### ART H

## 482 Impressionism and Post-Impressionism (3)

KINGSBURY

Stylistic and iconographic study of European painting and sculpture from 1848 to 1900. Prerequisite, Art History 203.

## ART H

#### 483 Art of the Twentieth Century (3) KINGSBURY

Painting and sculpture in Europe and America from 1900 to the present. Prerequisite, Art History 203.

#### ART H

### 486 History of American Art—Colonial Period (3)

REED

A survey of architecture, town design, painting, sculpture, and the decorative arts in the United States from original European settlement to the Revolutionary War. Prerequisite, junior standing.

## ART H

**487** History of American Art to 1913 (3) Survey of American art, especially painting, to the Armory Show, with attention to major figures, the American culture context, and parallel European trends. Prerequisite, familiarity with vocabulary of art or with related history or literature.

#### ART H

491, 492, 493 Art History and Criticism (3,3,3)

#### ART H

496 Study Abroad—Art History Individual Projects (3-10, max. 20)

For participants in Study Abroad programs. Prerequisite, permission.

#### ART H

498 Individual Projects—Art History (3 or 5, max. 15) Prerequisite, permission.

## **Courses for Graduates Only**

#### ART H

501, 502, 503 Seminar in the General Field of Art (3 or 5 each)

## ART H

511 Seminar in Chinese Art (3, max. 9) WEBB

A critical appraisal of the principle research methods, theories, and types of literature dealing with the art of China. Prerequisite, permission of instructor.

#### ART H

515 Seminar in Japanese Art (3, max. 9) WEBB

A critical appraisal of the principle research methods, theories, and types of literature dealing with the art of Japan. Prerequisite, permission of instructor.

#### ART H

#### 521 Seminar in Indian Art (3, max. 9) ROGERS

A critical appraisal of the principle research methods, theories, and types of literature dealing with the art of India. Prerequisite, Art History 421.

## ART H

531 Seminar in Tribal Art (3, max. 9) The seminar deals with the methodological and cross-disciplinary problems encountered in the study of the visual arts of Africa, and Pre-Columbian America and Oceania. Prerequisite, permission.

#### ART H

566 Seminar in North European Art (3) GROSSMANN

The seminar will deal with problems of style and iconography of the northern European masters of the fourteenth through fifteenth centuries. Prerequisite, permission of instructor.

## ART H

#### 577 Seminar in Baroque Art (3, max. 9) OPPERMAN

Iconographic and stylistic problems of the art of the baroque period, with emphasis on the principle research methods, theories, and types of literature dealing with the art of the seventeenth and eighteenth centuries in Europe. Prerequisite, permission.

#### ART H

581 Problems in Modern Art (3, max. 9) KINGSBURY

Art-historical problems of the nineteenth and twentieth centuries. Prerequisite, permission.

#### ART H

#### 590 Seminar in Criticism of Contemporary Art (3, max. 9)

Seminar on contemporary art and appropriate critical methodology. Prerequisites, Art History 581.

#### ART H

600 Independent Study or Research (\*)

ART H 700 Master's Thesis (\*)

## ASIAN LANGUAGES AND LITERATURE

## **Courses for Undergraduates**

CHINESE

101, 102, 103 Spoken Cantonese (3,3,3) A,W,Sp

This course in spoken Cantonese is designed to provide students with instruction in a major dialect of Chinese in addition to the traditional courses in the Mandarin dialect. Basic dialogues will be stressed. Prerequisites, 101 for 102; 102 for 103.

#### 111, 112, 113 First-Year Chinese (5,5,5) A,W,Sp

Introduction to Kuō-yü (the national language) by an oral-lingual approach, emphasizing pronunciation, elementary conversation, and basic sentence patterns. Active usage of a minimum of 600 characters will be expected of the students.

## 121 Accelerated Chinese (10) A

NORMAN

Introduction to sounds and structure of modern Chinese (Mandarin) by the inductive method. After acquiring a certain familiarity with the language, students are introduced to the written language.

## 134 Intensive Chinese (15) S

Introduction to sounds and structure of modern Chinese (Mandarin) by the inductive method. After acquiring a certain familiarity with the language, students are introduced to the written language. This course is especially recommended for students (particularly graduates) who plan to devote more time to other subjects during the regular academic year. (Offered Summer Quarter only.)

## 211 Non-accelerated Chinese (5) A

Continuation of 134. Prerequisite, 113 or 134, or permission.

212 Non-accelerated Chinese (5) W Continuation of 211. Prerequisite, 211 or permission.

## 213 Non-accelerated Chinese (5) Sp

Continuation of 212. Prerequisite, 212 or permission.

#### 222 Accelerated Chinese (10) W

NORMAN

Continuation of 121. Prerequisite, 121 or equivalent.

#### 223 Accelerated Chinese (10) Sp

NORMAN Continuation of 222. Rapid learning of Chinese characters and reading of texts. Students should learn about 1,500 characters by the end of the year. Prerequisite, 211 or 222.

#### 300 Advanced Chinese Conversation (1-3, max. 9) AWSp YEN

Participation in the program of the Chinese House or attendance at a noon-hour session supervised by a language informant. Prerequisite, 213 or 223, or equivalent.

#### 311, 312, 313 Readings in Social Sciences (5,5,5) A,W,Sp YEN

Selected readings in modern Chinese litera-

ture, philosophy, history, and political science (including newspaper materials). Prerequisite, 213 or 223, or equivalent.

## 315 Selections of Modern Essays (5) A

This course series, primarily intended for Chinese language and literature majors, will deal with modern essays during Autumn Quarter, short stories during Winter Quarter, and premodern noves during Spring Quarter. Prerequisite, 213 or 223, or equivalent.

316 Selections of Modern Short Stories (5) W This course, primarily intended for Chinese language and literature majors, will deal with modern short stories. Prerequisite, 315 or equivalent.

317 Selections of Pre-Modern Novels (5) Sp This course, primarily intended for Chinese language and literature majors, will deal with premodern novels. Prerequisite, 316 or equivalent.

#### 334 Intensive Chinese (15) S

Prerequisite, 213 or 223, or equivalent. (Offered Summer Quarter only.)

#### 400 Tutorial Chinese (5) AWSp YEN

A refresher course designed for students of Chinese who have completed courses in the language but cannot be properly placed in regularly scheduled courses. Students work at individual maximum speed with a tutor. Placement level will be determined by examination. Prerequisites, permission and ad-. vanced standing.

#### 401, 402, 403 Chinese Dialects (5,5,5) A,W,Sp YEN

Introduction to the sound and structure of one of the following Chinese dialects: (A) Cantonese, (B) Foochow, (C) Amoy, and (D) Shanghai. Prerequisite, 313 or 317.

## 407 Chinese Reference Works and Bibliography (3) A

LO

Introduction to the methodology of Sinology. Prerequisite, 300 or 313 or 317, or equivalent.

## 411, 412, 413 Advanced Contemporary Chinese (5,5,5) A,W,Sp

YEN

Selections from Communist publications where a large amount of new terminology is introduced and a great number of abbreviated characters used. Prerequisite, 313.

## 441, 442, 443 Structure of Chinese (3,3,3) A,W,Sp

YEN Practical phonetics with special application to the problem of articulation improvement. Morphology with application to vocabulary

building, use of particles and syntax. Prerequisite, 313 or 317.

## 444 Intensive Classical Chinese (15) S

An introduction to classical Chinese using the methodologies of philology, comparative semantics, descriptive linguistics, phonology, and literary analysis. Prerequisites, 213, 223, or equivalent.

## 451, 452, 453 Classical Chinese (5,5,5) A,W,Sp

SERRUYS

Syntactical analysis, translation from literary Chinese into English and vice versa. To be taken in sequence only. Prerequisite, 213 or 223, or equivalent.

#### 454 Accelerated Classical Chinese (10) S SERRUYS

Introduction to classical Chinese language, based mostly on pre-Han texts, with special attention to grammatical analysis. Prerequisite, 313.

## 461, 462, 463 Chinese Literature

(5,5,5) A,W,Sp

461: lectures on Chinese literature from earliest times to the end of Han. 462: lectures on Chinese literature from the end of Han to the end of Tang. 463: lectures on Chinese literature since Tang times. Prerequisite, 213 or 223, or equivalent.

492 Readings in Chinese Philosophical Texts
 (5) W
 SHIH

Prerequisite, permission.

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#### 499 Undergraduate Research (3-5, max. 15) AWSpS

For Chinese language and literature majors. Prerequisite, permission.

## HINDI-URDU

201-202, 203 Elementary Hindi-Urdu (5-5, 5) A,W,Sp

SHAPIRO

Introduction to the spoken language. Oral drills emphasizing pronunciation and elementary conversation. Grammatical and syntactical exercises. Introduction to the two writing systems in 203.

301-302, 303 Intermediate Hindi (5,5,5) A,W,Sp

SHAPIRO

Systematic expansion of vocabulary and grammatical forms and structures. Oral and writing practice based on Hindi prose readings. Prerequisite, 203 or equivalent.

## 401, 402, 403 Advanced Hindi (5,5,5)

A,W,Sp Prerequisite, 303 or equivalent.

468 Seminar on Modern Hindi Literature (3)

Genre and contextual analysis of literary forms of a rapidly developing language.

## 499 Undergraduate Research

(3-5, max. 15) AWSpS For Hindi-Urdu language and literature majors. Prerequisite, permission.

#### INDIC

### 100 Introduction to South Asian Languages (3) A

SCHIFFMAN

Introduction to the languages of South Asia. Structures of various language families of South Asia will be examined and compared, as will other linguistic problems of the subcontinent, such as sociolinguistics, language politics, writing systems, and inscriptional decipherment. Special emphasis will be given to the introduction of grammatical terminology that will be encountered in actual language courses.

#### JAPANESE

#### 111, 112, 113 First-Year Japanese (5,5,5) A,W,Sp

NIWA

Introduction to spoken Japanese, pronunciation, oral composition, and grammar; reading of romanized Japanese; conversation, composition, and grammar; introduction to modern written Japanese in 113.

## 134 Intensive Japanese (15) S

NTWA

A beginning course covering the same ground as Japanese 111, 112, 113. Introduction to spoken Japanese, pronunciation, oral composition, and grammar; reading of romanized Japanese; conversation, composition, and grammar; introduction to modern written Japanese. (Offered Summer Quarter only.)

#### 211, 212, 213 Second-Year Japanese (5,5,5) A,W,Sp NIWA

Reading and translation of modern Japanese. Also oral work in Japanese. Prerequisites, 111, 112, 113 or equivalent.

#### 311, 312, 313 Third-Year Japanese (5,5,5) A,W,Sp

HIRAGA

Reading and translation of modern Japanese. Also oral work in Japanese. Prerequisite, 213 or equivalent.

## 331, 332, 333 Intensive Japanese (15,15,15) A,W,Sp

NIWA

331: oral-aural approach to modern Japanese. Requires full-time commitment by the student. Attendance at language laboratory hours required in addition to regular five-hour day. 332: first-year reading Japanese. Reading and translation of modern Japanese. Classes conducted principally in Japanese. Prerequisite, 331 or permission. (Same material covered as in 211, 212, 213.) 333: second-year reading Japanese. Reading and translation of modern Japanese. Classes conducted principally in Japanese. Prerequisite, 332 or permission. (Same material covered as in 311, 312, 313.)

## 405, 406 History of the Japanese Language (3,3) A,W

MILLER

Introduction to the history of Japanese, including phonology, morphology, syntax, and lexicon. Prerequisites, 411, 412, 413, or equivalent.

## 411, 412, 413 Fourth-Year Japanese (5,5,5) A,W,Sp

MILLER Reading, translation into English, and discussions in Japanese of modern written texts on the advanced level; during Winter and Spring Quarters the literary language (bungo) also is

## introduced. 461, 462, 463 Readings in Modern Japanese Literature (3-5,3-5,3-5) A,W,Sp

TAKAYA

Close reading and discussion of representative works of twentieth-century poetry, fiction, and drama in the original text. Prerequisite, permission.

499 Undergraduate Research (3-5, max. 15) AWSpS

For Japanese language and literature majors. Prerequisite, permission.

## KOREAN

## 211-212, 213 Elementary Korean

Introduction to the modern standard Korean spoken and written language.

#### 311, 312, 313 Intermediate Korean (5,5,5) A,W,Sp LUKOFF

Systematic expansion of vocabulary and grammatical forms of standard Korean; introduction of Chinese characters in mixed script. Prerequisite, 213 or equivalent.

## 411, 412, 413 Readings in Contemporary Korean (5,5,5) A,W,Sp

Reading in a variety of modern standard styles, with oral and written practice. Prerequisite, 313 or equivalent.

## 465, 466. 467 Readings in Korean

**Documents (5,5,5).** A,W,Sp 465: Korean bibliography and references. Prerequisite, 413 or permission. 466, 467: Primarily for students in the social sciences majoring in the Korean field. Prerequisite, 465 or permission.

#### 499 Undergraduate Research (3-5, max. 15) AWSpS

For Korean language and literature majors. Prerequisite, permission.

#### MONGOLIAN

NO MONGOLIAN COURSES OFFERED 1972-73,

302 Introduction to Mongolian (5) A Beginner's grammar, easy texts.

## 303 Modern Mongolian Literary

## Language (5) W

Grammar, syntax, and styles of modern Mongolian based on colloquial and Cyrillic alphabet. Prerequisite, 302.

## 304 Colloquial Mongolian (5) Sp

Grammar of the spoken language in Outer and Inner Mongolia. Reading of colloquial texts, translation into English, conversation in Mongolian. Prerequisite, 303.

#### 305 Classical Mongolian (5) A

Grammar, syntax, styles of the Mongolian written language of the seventeenth to twentieth centuries. Prerequisite, 304.

306 Manchu Grammar for Beginners (3) W Students are first introduced to the Manchu alohabet; study phonology, morphology, a brief survey of the history of the language, and then proceed to some simpler reading materials.

## 307 Advanced Manchu Reading (3) So

Students read historical documents originally written in Manchu, with or without parallel texts in Chinese or Mongolian; also read translations from classical and secular Chinese literature such as scongs, romances, and novels. Prerequisite, 306.

#### 402, 403. 404 Intermediate Mongolian (5,5,5) AWSp

Selected readings in modern Mongolian literature, history, political science, and newspaper materials. Prerequisite, 304 or equivalent.

#### 499 Undergraduate Research (3-5, max. 15) AWSp

For Mongolian language and literature majors. Prerequisite, permission.

#### SANSKRIT

#### 301, 302, 303 Introduction to Sanskrit (5,5,5) A,W,Sp

GEROW

Intensive study of the basic grammatical structure of the classical language; reading of elementary texts from the epic and classical periods.

## 401, 402, 403 Intermediate Sanskrit (5,5,5) A,W,Sp

GEROW

Advanced classical grammar; rapid reading of

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(5-5,5) A,W,Sp LUKOFF ntroduction to the moder a kāvya text or texts, ordinarily a drama or major prose work. Prerequsite, 303.

#### 411, 412, 413 Advanced Sanskrit (5,5,5)

A,W,Sp

GEROW, POTTER

Intensive reading and analysis of classical texts, chosen from the sastraic or belletristic literatures. Prerequisite, 403 or permission.

493 Introduction to Vedic Study (5) Sp GEROW

Reading of selected Vedic hymns, with extensive linguistic and historical analysis; problems of comparative grammar in relation to Sanskrit. Prerequisite, 403.

#### 494 Readings in Religious Classics of India (5) Sp

GEROW. POTTER

Introduction to the older religious literature, with emphasis on the Upanisads, the dharmasastras, and the Bhagavad Gita. Rapid reading of the texts, plus content analysis of the developing religious forms. Prerequisite, 402.

499 Undergraduate Research (3-5, max. 15) AWSp AWSp

For Sanskrit language and literature majors. Prerequisite, permission.

TAMIL

201-202, 203 Elementary Tamil (5-5,5) A,W,Sp

SCHIFFMAN

An intensive introduction to the modern spoken language. Transformation drills will be emphasized. The writing system and literary dialect will be introduced at a suitable stage.

## 301-302, 303 Intermediate Tamil (5-5,5) A,W,Sp

SCHIFFMAN

Intensified use of the modern spoken language, beginning with moderately difficult conversation and drills, and working up to more advanced materials, including radio, plays, continuation of work with written language. Prerequisite, 203.

401, 402, 403 Advanced Tamil (5,5,5) A,W,Sp SCHIFFMAN

Readings in modern literary Tamil. The modern novel and short story as seen in the writings of such writers as Jeyakanthan, Putumaippittan, Vayyavan, Janakiraman, Sundara Ramaswamy, and Ramamirthan. Laboratory sessions will continue practice in the colloquial dialect. Prerequisite, 303.

#### 455 Structure of Dravidian (3) SCHIFFMAN

Comparative description of the phonological and syntactic system with emphasis on areal features and shared rules of Tamil, Telugu, Kannada, or Malayalam. As appropriate, contrasting examples will be taken from the lesser Dravidian languages, particularly those of the northern Dekkan. Dravidian group as a source of a major set of borrowings of linguistic features by the North Indian (Indic) language group. (Offered upon demand.)

#### 499 Undergraduate Research (3-5, max. 15) AWSpS

For Tamil language and literature majors. Prerequisite, permission.

#### THAI

150 Intensive First-Year Thai (15) S COOKE

A beginning course covering the same ground

as 301, 302, 303. Introduction to spoken Thai: pronunciation, grammar, conversation. Introduction to the written language: reading and writing.

#### 301, 302, 303 Basic Thai (5,5,5) A,W,Sp COOKE

Introduction to the structure of modern spoken and written Thai. One hour lecture and five hours intensive oral practice (in Thai) per week. Prerequisites, none for 301; 301 for 302; 302 for 303.

## 401, 402, 403 Intermediate Thai (5,5,5) A,W,Sp

COOKE

Reading of more complicated material in preparation for classes conducted in Thai where material is discussed. Review of structure. Prerequisites, 303 or equivalent for 401; 401 for 402; 402 for 403.

411, 412, 413 Readings in Thai (5,5,5) A,W, Sp COOKE

Readings in a variety of modern styles with oral and written practice. Prerequisite, 403 or equivalent.

499 Undergraduate Research (3-5, max. 15) AWSpS

For Thai language and literature majors. Prerequisite, permission.

## TIBETAN

401, 402, 403 Colloquial Tibetan

(5,5,5), A,W,Sp

Introduction to phonology, morphology, and syntax of spoken Tibetan (Lhasa dialect) by the inductive method.

404, 405, 406 Literary Tibetan (3,3,3) A,W,Sp WYLIE

Introduction to the phonology, grammar, and syntax of written Tibetan. Materials selected for rapid development of reading knowledge.

414 Readings in Tibetan (3, max. 9) AWSp NORNANG, WYLIE

Selections from various Tibetan materials. Prerequisite, 406 or equivalent.

421, 422, 423 Advanced Colloquial Tibetan (5,5,5) A,W,Sp

NORNANG

Instruction and drill in advanced colloquial sentence patterns and syntactical constructions.

499 Undergraduate Research (3-5, max. 15) AWSpS

NORNANG, WYLIE

For Asian languages and literature majors. Prerequisite, permission.

#### TURKIC

<sup>4</sup> 301, 302, 303 Introduction to Uzbek (3,3,3) A,W,Sp

CIRTAUTAS Introduction to the modern Uzbek written and spoken language. Conversation in Uzbek.

343 Introduction to a Second Turkic Language of Central Asia (3) Sp CIRTAUTAS

Introduction of phonology, morphology, and syntax of a second modern Turkic language of Central Asia. Alternately: Kirghiz, Kazakh, Tatar, Turkmen, Azerbaijani. (Offered alternate years; offered Spring 1973.)

#### 401, 402, 403 Intermediate Uzbek (3,3,3) A,W,Sp

CIRTAUTAS

Continuation of Turkic 301, 302, 303. Oral work, grammar, and readings in Uzbek litera-

ture on the advanced level. Prerequisites, 301, 302, 303, or permission.

404 Survey of Turkic Languages (3) A CIRTAUTAS

Linguistic outlines of modern Turkic languages. Brief phonetical, morphological, and syntactical analysis of selected materials. Of interest to students of Turkic, anthropology, and linguistics.

499 Undergraduate Research (3-5, max. 15) AWSpS

For Turkic language and literature majors. Prerequisite, permission.

## LITERATURE COURSES IN ENGLISH

Chinese 352 Classical Chinese Literature in English (5) W

General survey of classical Chinese literature, based on available sources in English. Knowledge of Chinese language not required. (Offered alternate years; offered 1973.)

## Chinese 361 Genres in Chinese Literature (5) A

WANG

Depth study of works from the major Chinese literary genres and analysis of their characteristic features. Examination of the relationship between similar genres in Chinese and Western literary traditions. Works will be read in translation. (Offered 1973-74.)

## Chinese 362 Modern Chinese Literature in English (5) W

WANG

A general survey with special attention to historical, philosophical, and cultural background; emphasis upon modern literary movements stimulated by China's contact with the West. No knowledge of the Chinese language is required. (Offered alternate years; offered 1973-74.)

#### Chinese 472 Modern Chinese Poetry (3) W WANG

Survey of Chinese poetry in classical Chinese and the vernacular since the late nineteenth century. Prerequisite, adequate language preparation. (Offered alternate years; offered 1974.)

#### Chinese 473 Conventions in Chinese Poetry (5) A

WANG

A survey of important conventions in the genres of traditional Chinese poetry, from earliest times to the end of the Sung dynasty. Where possible, comparisons will be drawn with reference to Western poetic usage. Open to majors and nonmajors. Knowledge of Chinese language not required. (Offered alternate years; offered 1972-73.)

#### Indic 420 Classical Indic Literature in English (5) A

A general survey with special attention to historical, philosophical, and cultural background. No knowledge of the Sanskrit language is required. (Not offered 1972-73.)

#### Indic 421 Modern Indic Literature in English (5) W

A general survey of the contemporary literature with special attention to the fusion of modernistic trends with tradition. No knowledge of an Indic language is required. (Not offered 1972-73.)

## Japanese 421 Japanese Literary Tradition in English (5) A

TAKAYA

A broad inquiry into the literary heritage of Japan through reading and discussion of repre-

## ARTS AND SCIENCES

sentative works available in English in prose. poetry, and drama from early beginnings to mid-nineteenth century.

## Japanese 422 Tokugawa Literary Tradition in English (5) W

TAKAYA

A survey course in Japanese literature covering the period between 1600 and 1867 when the rise and development of popular literature and theater among the common people had reached the highest peak through men like Chikamatsu, Saikaku, and Basho. Readings and discussion of representative works in prose, poetry, and drama up to the beginning of Meiji period.

## Japanese 423 Modern Japanese Literature in English (5) Sp

TAKAYA

Discussion and analysis of representative works, especially of fiction, from the late nineteenth and twentieth centuries.

# Japanese 441 Studies in Japanese Poetry in English (5) A

MC KINNON

Traditions and techniques; systematic investigation of the major poetic forms, focusing on representative poets and their works.

## Japanese 442 Studies in Japanese Prose in English (5) W

MC KINNON

Close examination of a select number of works that trace the development and diversity of Japanese prose literature, from eighthcentury prototypes to the experimental present.

## Japanese 443 Studies in Japanese Drama in English (5) Sp

MC KINNON

Principal forms, techniques, and theory of No, Kyogen, Joruri, and Kabuki; also the contemporary theater. Aspects of the stage, costume, masks, and other accoutrements of the theater will be discussed along with its principal playwrights and performers.

Korean 320 Korean Literature in English (5) Sp

Hitsorical development of Korean literature. Special consideration to the relationship with Chinese and Japanese literature.

#### Mongolian 320 Mongolian Literature in English (5) Sp

(Not offered 1972-73.)

#### Turkic 320 Eastern Turkic Literature in English (3) A CIRTAUTAS

Covers both the historical (Chaghatai XV-XIX Centuries) and the modern (mainly Uzbek) periods of Eastern Turkish literature. History, types of literary works, and char-acteristic elements of prose and poetry will be presented by using selected material translated into English.

## **Courses for Graduates Only**

## **ASIAN LANGUAGES AND LITERATURE** ASIAN

600 Independent Study or Research (\*) AWSpS

700 Master's Thesis (\*) AWSpS

800 **Doctoral Dissertation (\*) AWSpS** 

## CHINESE

#### 500 Chinese for Field Work (5) WSp YEN

This course is designed to prepare the advanced graduate student for oral communication at a high academic level for studying or doing research in Taiwan or other overseas Mandarin-speaking communities. Prerequisite, three years of Chinese.

## 511, 512, 513 Modern Chinese Readings (5,5,5) A,W,Sp

HSII

Selections from learned journals and scholarly books in intermingled styles (colloquial and literary Chinese). Prerequisite, 313 or 317.

#### Seminar on Chinese Linguistics 540 (3, max. 9) WSp NORMAN

Advanced phonology, problems of archaic Chinese, dialectology; descriptive and his-torical treatment of Sinitic languages. For advanced students of Chinese or of linguistics. Prerequisite, permission.

#### 541 Chinese Phonology (3) A NORMAN

#### 542, 543 Introduction to Texts in Ancient Script (3,3) W,Sp SERRUYS

Structure of Chinese characters. Development of Chinese script and related problems. Selected texts of inscriptions, 542: Shuo Wen. 543: Bronzes I. Prerequisite, permission. (Offered alternate years; offered 1973-74.)

#### 545, 546 Introduction to Texts in Ancient Script (3,3) W,Sp SERRUYS

Structure of Chinese characters. Development of Chinese script and related problems. Selected texts of inscriptions. 545: Bronzes II and Bone Inscriptions I. 546: Bone Inscriptions II. Prerequisites, completion of 543 and permission. (Offered alternate years; offered 1972-73.)

## 551, 552, 553 Readings in Classical

Chinese (5,5,5) A,W,Sp

SERRUYS

#### 560 Seminar in Chinese Literary Criticism and Poetics (4, max. 12) W SHIH

Intensive literary criticism seminar. Students will be required to work in original Chinese texts. Prerequisite, permission. (Offered alter-nate years; offered 1973-74.)

#### 561, 562, 563 Studies in Chinese Literature (5,5,5) A,W,Sp SHIH

561: literature of the Chou and Han periods. 562: literature from Wei to T'ang times. 563: literature since the end of T'ang. (Offered 1972-73.)

#### 572 Seminar in Chinese Poetry (5) W

WANG May be repeated for credit. (Offered 1972-73.)

#### 580 Seminar in Modern Chinese Fiction (5) A SHIH

Studies of representative works of major Chinese fiction writers from 1918 to 1949. (Offered alternate years; offered 1973-74.)

#### 581 Seminar in Chinese Prose (5) Sp

May be repeated for credit.

WANG

#### 582 Seminar in Chinese Literary Techniques (3) Sp SHTH

Investigation of euphonic and rhythmical features of the Chinese poetic phrase, of the problems of parallelism and other structural features of traditional Chinese poetry. Prerequisite, 453 or equivalent. (Offered alternate years; offered 1972-73.)

## 583 Seminar in Chinese Drama and Novel

(5) Sp WANG

Study of the origin and development of the Chinese drama and novels. May be repeated for credit.

## 591, 592, 593 Readings in Chinese Political

Thought and Institutions (5,5,5) A,W,Sp For students wishing to develop proficiency in using Chinese source material. Different texts each quarter, selected primarily on basis of students' needs. Prerequisite, permission.

## JAPANESE

### 501 Readings in Bibliographical Materials (5) W

HIRAGA

Intensive reading and discussion of materials from principal bibliographical sources in the social sciences and the humanities pertaining to Asia. Reports on selected topics and problems. Prerequisite, 413 or permission.

## 505, 506, 507 Readings in Documentary Japanese (5,5,5) A,W,Sp

HIRAGA

505: Introduction to Kambun. 506: Readings in documents of ancient and medieval periods. 507; Readings in documents since the beginning of the Tokugawa period. Prerequisite, permission.

#### 547 Seminar on Japanese Linguistics (3) Sp MILLER

Directed study in problems in the history and structure of the Japanese language. Prerequisites, 405, 406, or permission.

#### 551, 552, 553 Readings in Classical Japanese Literature (3-5, 3-5, 3-5) A,W,Sp MC KINNON

Readings in prose, poetry, and drama, antiq-uity to nineteenth century. Prerequisite, permission.

## 560 Seminar in Japanese Theater

(3-5, max. 15) AWSp MC KINNON

Designed to deal with the major Japanese theatrical traditions through the examination of primary and secondary sources for developing a deeper appreciation and understanding of the theater as a vital element in Japanese culture. Prerequisite, Japanese theater courses in English or advanced courses in Japanese or permission. (Offered alternate years; offered 1972-73.)

#### 580 Colloquium in Japanese Literature (3-5, max. 15) A

MC KINNON, TAKAYA

Advanced course in Japanese literature where the students may have the opportunity of studying under scholars and specialists from Japan who will be affiliated with the Department on a temporary basis. Prerequisite, permission. (Not offered 1972-73.)

#### 590 Seminar in Japanese Literature (3-5, max. 15) AWSp MC KINNON

Close examination of selected periods, writers, or genres, including problems of literary criticism in Japanese literature. Prerequisite, 15 credits in 462 or 553. (Offered alternate years; offered 1973-74.)

### KOREAN

501, 502, 503 Seminar in Korean (3-5, 3-5, 3-5) A,W,Sp LUKOFF

521, 522, 523 Modern Korean Literature (5,5,5) A.W,Sp SUH

Readings in important works in Korean literature of the twentieth century. Prerequisite, 413 or permission. (Offered alternate years; offered 1973-74.)

## 531, 532, 533 Classical Korean Literature (5,5,5) A,W,Sp SUH

Selected works, primarily in Hangul up to the twentieth century, including representative authors in prose, poetry, and drama. Prereq-uisite, permission. (Offered alternate years; offered 1972-73.)

#### 541, 542, 543 Readings in Hanmun Texts (5,5,5) A,W,Sp SUH

Readings from representative authors from the fifteenth to the late nineteenth century. Prerequisites, Korean 413, Chinese 451 or Japanese 413, or permission. (Offered alternate years: offered 1973-74.)

550, 551, 552 Seminar in Korean Literature (3-5, 3-5, 3-5) A,W,Sp SUH

Close examination of selected periods, writers, or genres, including literary criticism, in Korean literature. Prerequisite, 543 or 523, or permission. (Offered alternate years; offered 1972-73.)

#### MONGOLIAN

NO MONGOLIAN COURSES OFFERED 1972-73.

521 Ancient Mongol: hPhagspa Script (3) A . Script and grammar of hPhagspa texts; read-ing and translation. Prerequisite, 305.

#### 522 Mongol: Ancient Texts (3) W

Grammar and reading of Mongol texts of the fourteenth to seventeenth centuries. Histori-cal texts are emphasized. (Offered alternate years.)

579 Comparative Altaic Linguistics (3) Comparative phonology and morphology of Mongol and Turkic and other related languages. Offered jointly with Linguistics 579 Prerequisite, permission.

#### SANSKRIT

#### 550 Seminar on Sanskrit Literature (3, max. 9) AWSp GEROW

Close examination of selected authors, periods or traditions, within the context of Indian literary history. Prerequisite, 403. (Offered alternate years; offered 1972-73.)

#### 555 Seminar on Sanskrit Grammar (3, max. 6) WSp GEROW

Selected problems relating to the history of the Sanskrit language; reading and critical examination of the methodology of Pānini's grammar. Prerequisite, 403 or permission; 550 recommended. (Offered alternate years; offered 1973-74.)

#### 560 Readings in Philosophical Sanskrit (3, max. 9) AWSp POTTER

Intensive reading and analysis of Hindu or

Buddhist philosophical texts. Prerequisite, 494 or permission.

#### TAMIL

501, 502, 503 Studies in Tamil Literature (3,3,3) A,W,Sp SCHIFFMAN

An introduction to Tamil literature, beginning with Sangam poetry and culminating in modern post-independence fiction. Prerequisites, 401, 402, 403 or permission.

#### TIBETAN

500 Advanced Literary Tibetan (3, max. 9) AWSp

NORNANG, WYLIE

Reading of manuscripts and xylographs with emphasis on biographical, historical, and geographical material. Prerequisite, 406 or equivalent.

534 Buddhistic Tibetan (2, max. 6) AWSp NORNANG, WYLIE

Reading of Buddhist literature in translation and original Tibetan compositions. Prerequisite, 406 or equivalent.

544 Ancient Tibetan Documents (2, max. 6) AWSn WYLIE

Reading of selections from ancient documents, inscriptions, and annals. Prerequisite, 406 or equivalent.

#### TURKIC

#### 542, 543 Comparative and Historical **Grammar of Turkic Languages** (3.3) W.Sp

CIRTAUTAS

Classification of the Turkic languages; alphabets used; phonology, morphology, and syntax; lexical composition; structure changing developments. Prerequisites, Turkic 303 or 404, or Turkish 103. (Offered alternate years; offered 1973-74.)

#### Old Turkic (3) W 546

CIRTAUTAS

Introduction to Runic script; phonology, morphology, and syntax of the oldest form of Turkic; reading and translation of seventhand eighth-century inscriptions, of importance for the history of the Turks during this period. Prerequisite, permission. (Offered alter-nate years; offered 1973-74.)

#### 547 Old Uighur (3) Sp CIRTAUTAS

Introduction to script systems; phonology, morphology, and syntax. Reading and translation of mainly Buddhist texts in Uighur script, eighth through the eleventh centuries. Prerequisite, permission or background in Old Turkic or a Modern Turkic language. (Offered alternate years; offered 1973-74.)

## 561, 562 Middle Turkic (3,3) A,W

CIRTAUTAS

Introduction to the phonology, morphology, and syntax of the Middle Turkic languages; reading and translation of texts in Karakhanid (eleventh-twelfth centuries), Khorazmian Turkic (thirteenth-fourteenth centuries), Kipchak (thirteenth-fourteenth centuries), and Chagatai (fifteenth-sixteenth centuries). Prerequisites, 301, 302, 303 or 542, 543 or 546, 547. (Offered alternate years; offered 1972-73.)

563 Seminar on Turkic Literature (5) Sp CIRTAUTAS

Oral literature (epic, tales, songs); written literature; traditions and techniques. Special consideration is given to the relationship between oral and written literature, and the influences of foreign literatures (Persian, Arabic, Russian). Prerequisite, permission. (Offered alternate years; offered 1972-73.)

#### VIETNAMESE

521, 522, 523 Survey of Vietnamese

Literature (3,3,3) A,W,Sp History of literary activities in Viet Nam. Analysis and discussion of typical texts. Prerequisite, 403 or equivalent.

## 531, 532, 533 Seminar in Vietnamese Literature (3,3,3) A,W,Sp

Intensive study of key topics in Vietnamese literature. Analysis and discussion of texts. (Alternates with 521, 522, 523; offered 1970-71.)

600 Independent Study or Research (\*) AWSp

700 Thesis (\*) AWSp

800 Doctoral Dissertation (\*)

## ASTRONOMY

## **Courses for Undergraduates**

101 Astronomy (5) AWSp

BOHM, HODGE The solar system, stars, galaxies, and cosmology.

## 102 Introduction to Astronomy (5) Sp

Survey of the solar system, stars, galaxies, and cosmology. Prerequisite, one year of high school physics or Physics 101-102 or 110, 111, 112.

#### 301 Astronomy for Scientists and Engineers (3)

Introduction to astronomy for students in the physical sciences. Prerequisite, Physics 123.

321, 322, 323 Basic Astronomy (3,3,3) A,W,Sp Intended for physical scientists, this course gives a mathematically-oriented treatment of the planets and interplanetary medium, the sun and other stars, star clusters, the Galactic system, galaxies, and cosmology. Prerequisites, Physics 123 and calculus.

#### 431, 432, 433 Stellar and Interstellar Astrophysics (3,3,3) A,W,Sp

Stellar spectra, luminosity, radii, and temper-atures. Stellar structure, energy sources and compositions. Interstellar gas and dust, its temperature, density, distribution in the Galaxy and interaction with stars. Prerequisite, Physics 322 or 325.

#### 499 Undergraduate Research (\*, max. 15) AWSp

Current or special astronomical problems. Prerequisite, permission.

## **Courses for Graduates Only**

#### 501 Solar System Astrophysics (3) HODGE

Atmospheres, surfaces, and interiors of planets. Natural satellites, asteroids, comets, meteors, meteorites. Meteorite craters, micrometeorites, and meteoritic dust. Interplanetary medium. Prerequisite, modern physics.

#### 502 Seminar in Solar System Problems (2) HODGE

Origin of the solar system, as inferred from its dynamical, astrophysical, and chemical prop-Proerties. Emphasis on current research. requisite, modern physics.

503 Seminar on Planetary Atmospheres (2)

## ARTS AND SCIENCES

#### 507 Physical Foundations of Astrophysics I (3)

Survey of thermodynamics from an astronomer's point of view: black body radiation, basic radiative transfer, equation of state, degenerate gases, crystallization of high density, introduction to hydrodynamics and gas dynamics for astronomers: turbulence, convection, shock waves, radiation gas dynamics.

#### 508 Physical Foundations of Astrophysics II (3)

Introduction to magnetohydrodynamics, basic theorems and application to stellar and interstellar magnetic fields; introduction to plasma physics, waves in a plasma, kinetic theory and transport phenomena in astrophysics. Prerequisite, Physics 513 or equivalent.

#### 511 Galactic Structure (3)

HODGE

Kinematics, dynamics, and contents of the galaxy. Spiral structure. Structure of other galaxies. Evolution of galaxies. Prerequisite, modern physics.

#### 512 Extragalactic Astronomy (3) HODGE

Types of galaxies. Integrated properties, content, and dynamics. Extragalactic distance scale, groups and clusters. Radio sources. Observational cosmology. Prerequisite, modern physics.

## 513 Cosmology (3)

BARDEEN, BOYNTON Homogeneous isotropic models. Microwave

and X-ray background radiation, radio galaxies, quasars. Nucleosynthesis, galaxy formation.

## 521, 522 Stellar Atmospheres (3,3)

BOHM, BOHM-VITENSE Theory of continuous radiation and spectral line formation. Applications to the sun and stars. Prerequisite, Physics 421 or equivalent. (Offered 1971-72.)

#### 531 Stellar Interiors (3) BOHM

The physical laws governing the temperature, pressure, and mass distribution in stars. Equation of state, opacity, nuclear energy generation. Models of main sequence stars. Prerequisite, Physics 421 or equivalent. (Offered 1972-73.)

#### 532 Stellar Evolution (3)

BOHM

Theoretical and observational approaches to stellar evolution. Prerequisite, 531. (Offered 1972-73.)

#### 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.

## 551 Stellar Dynamics (3)

BARDEEN

Kinematics and dynamics of stars in clusters and galaxies. Prerequisites, classical mechanics and differential equations.

## 561 High Energy Astrophysics (3)

BARDEEN Observed properties of Supernovae, X-ray stars, radio sources, quasars. Theories explaining such objects. Origin of cosmic rays.

597 Topics in Observational Astrophysics (1-5) 598 Topics in Theoretical Astrophysics (1-5)

600 Independent Study or Research (\*)AWSp

700 Master's Thesis (\*) AWSp

800 Doctoral Dissertation (\*) AWSp

## **ATMOSPHERIC SCIENCES**

## **Courses for Undergraduates**

101 Survey of the Atmosphere (5) AWSp Composition and structure of earth's atmosphere; relation of earth to sun and consequent geographical temperature distribution; processes within the atmosphere which produce rain, snow, and other condensation phenomena; tropical and extratropical storms, thunderstorms. chinooks, and cold waves.

#### 201 Introduction to the Atmosphere (3) W A survey of the most important topics in

meteorology designed for beginning premajors or majors in physical science, engineering, and other technical fields. Composition and structure, radiative processes, water substance and processes, air motions. Prerequisites, one year of high school physics and Mathematics 124.

## 301 Introduction to Atmospheric Sciences (5) W

REED

Composition and structure of the atmosphere. Solar and terrestrial radiation. Water substance and processes. Thermodynamic processes. Air motions. Physical properties and processes of the upper atmosphere. Prerequisites, Mathematics 124 and Physics 123, or equivalent.

#### 321 Physical Climatology (5) A CHURCH

Analysis of effects of latitude, altitude, mountains, ocean currents, wind systems, and various surfaces on the distribution of air temperatures, precipitation, and other climatic elements. Statistical reduction and interpretation of climatic data. Prerequisite, 101 or 201 or 301.

#### 322 Regional Climatology (5) W CHURCH

Principles of several climatic classifications. Description of elements of climatic types of continents, emphasizing North America, and adjacent ocean areas based on the Koeppen and Thornthwaite classification systems. Prerequisite, 101 or 201 or 301.

## 329 Microclimatology (3) Sp

FRITSCHEN

Climatic characteristics in the lower layers of the atmosphere. Soil temperatures and their relation to temperatures of overlying air. Vertical temperature, moisture, wind speed, and wind direction gradients. Effects of plane, concave, and convex surfaces, and vegetal covering on temperature and wind distribution. Offered jointly with the College of Forest Resources as Forest Resources 329. Prerequisite, 101 or 201 or 301, or permission.

#### 340 Introduction to Atmospheric Physics (5) Sp

BUSINGER, HOBBS Earth's field of gravity. Atmospheric thermodynamics; properties and distribution of atmospheric gases. Introduction to cloud physics.

## Prerequisite, Mathematics 125 or permission. 351 Atmospheric Observations and

Analysis (5) A BADGLEY, REED, WALLACE

Methods of using common meteorological in-

struments for measuring precipitation, temperature, pressure, humidity, winds, including upper-air observations. Thermodynamic diagrams. Analysis of surface and upper-level charts and vertical cross sections. Prerequisites, one year of calculus and general physics.

#### 390H Tutorial in Atmospheric Sciences (\*, max. 6) Sp

Review and discussion of selected problems in atmospheric sciences. Introduction to research methods. Presentation of a research paper. Prerequisites, Mathematics 224, Physics 123.

#### 431 Atmospheric Physics (5) A BUSINGER

Properties of cloud particles, solar and terrestrial radiation, transfer processes and applications. Prerequisites, 340 or Physics 222, and Mathematics 327 or equivalent.

## 432 Atmospheric Physics (3) W

Electromagnetic principles and application to the atmosphere, properties of waves, atmospheric probing, natural signal phenomena, radar effects of nuclear explosions. Prerequisites, 340 or Physics 222 or equivalent, and Mathematics 327 or equivalent.

#### 435 Introduction to Cloud Processes (3) Sp FRASER, HOBBS

Emphasis on the qualitative aspects of cloud formation and processes. Moist adiabatic processes; dew point equation. Condensation nuclei. Thermodynamics and dynamics of convection. Development of precipitation in warm clouds. Ice nuclei; growth of ice particles in clouds. Orographic clouds and precipitation. Artificial modification. Severe storms. Prerequisite, 340 or permission.

## 441, 442 Atmospheric Motions (5,5) A,W

HOLTON, REED, WALLACE 441: preliminary mathematics, vector operations, fundamental equations, simple manipulations of equations, circulation and vorticity, the role of friction. Prerequisites, Mathematics 327 or Atmospheric Sciences 340, 442: numerical weather prediction, barotropic and baroclinic wave theory, the general circulation. Both courses include laboratory exercises. Prerequisite, 441 for 442.

## 450 Atmospheric Data Analysis (5) W

REED, WALLACE Statistical and other methods employed in atmospheric data analysis. Frequency distributions, sampling theory, linear correlation, elementary time-series analysis, objective map analysis. Prerequisites, 351, Engineering 141, or equivalent.

#### 452 Forecasting Laboratory (5) Sp REED, WALLACE

Daily practice in map analysis and forecasting, using current weather data. Severe storm forecasting. Statistical methods. Prerequisites, 351 and 441.

#### 462 Sea-Air Transfer Processes (6) S BADGLEY, FLEAGLE

Classroom work and field observations relating to the physical processes occurring at ocean-atmosphere boundary. Transfer of energy, momentum, and moisture and their effects on small-scale and large-scale phenomena, including fog formation, convection, modification of air masses. Prerequisite, 442 or permission.

## 492 Readings in Meteorology or

Climatology (\*) AWSp Prerequisite, permission.

#### 493 Special Problems in Meteorology or Climatology (\*) AWSp Prerequisite, permission.

## **Courses for Graduates Only**

510 Physics of Ice and Snow (3) A HOBBS

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. Offered jointly with Geophysics as Geophysics 510. Prerequisite, permission.

#### 511 **Glaciology I: Formation of Snow and** Ice Masses (3) W

HOBBS, UNTERSTEINER

Snow climatology. Transport of snow by wind. Transfer of radiative, sensible, and latent heat at the surface of snow and ice. Freezing of natural water bodies. Heat and mass budget of ice masses. Theories of ice ages. Offered jointly with Geophysics as Geophysics 511. Prerequisite, 510 or permission.

## 512 Glaciology II: Dynamic Glaciology

(3) Sp MEIER. RAYMOND

Rheology of ice. Internal deformation and sliding of glaciers. Thermal regime of glaciers. Steady flow, dynamic response to changing climate, and surges. Deformation and drift of sea ice. Snow and avalanche dynamics. Offered jointly with Geophysics as Geophys-ics 512. Prerequisites, 510, 511, or permission.

#### 513 Glaciology III: Structural Glaciology (3) A

RAYMOND, UNTERSTEINER

Snow metamorphism and primary layering. Dynamic metamorphism, flow structures, and relation to ice deformation. Structure of river, lake, and sea ice. The role and behavior of foreign matter. Physical processes of structural change and relationship between structures and bulk physical properties. Offered jointly with Geophysics as Geophysics 513. Prerequisites, 510, 511, 512, or permission.

#### 514 Field Glaciology (6) Sp

LA CHAPELLE

Structure and metamorphism of snow cover. Energy exchange at melting snow and ice surfaces. Deformation and flow of glaciers. Climatology and mass budgets. Glacier fea-Emphasis on instrumentation, field tures. techniques, and data analysis. Offered jointly with Geophysics as Geophysics 514. Prerequisite, 511 or 512 or permission.

#### 522 Advanced Regional Climatology (3) W CHURCH

Intensive study of the characteristics of climatic elements for a selected region or climatic type and a statistical analysis of the elements studied. Prerequisite, 322 or permission.

#### 525 Seminar in Atmospheric Problems Associated with Air Pollution (2) W BADGLEY, CHARLSON

Seminar for both engineers and atmospheric scientists in the atmospheric problems related to air pollution. A wide variety of topics is covered. Offered jointly with the College of Engineering as CEWA 525. Prerequisite, 301 or permission.

#### 531 The Upper Atmosphere (3) A LEOVY

Structure, composition, and dominant physical and photochemical processes. Sound propagation, aurora; air glow, ionosphere, and Van Allen belts. Role of the sun, planetary atmo-spheres: Prerequisites, Mathematics 238 and Physics 320, or permission.

## 532 Atmospheric Electricity (3) W

Formation and disappearance of atmospheric ions. Normal air electrical field. Lightning and its causes. Earth magnetic field. Prerequisite, 531 or permission.

533 Atmospheric Radiation (3) Sp LEOVY

Solar spectrum. Atmospheric scattering, spectra of water vapor and other gases. Albedo of earth and atmosphere. Radiative heat balance. Prerequisites, Physics 320 and Mathematics 238. (Offered alternate years; offered 1971-72.)

#### 534 Weather Sensing by Satellites (3) Sp LEOVY

Flight characteristics of spacecraft. Physical laws of remote sensing, using micro-, infrared, and visible waves. The importance of surface parameters (temperature, emissivity, sea state). The inversion principle of atmospheric sounding. Comparison of weather analysis from earthbound and from satellite data. Prerequisites, 431 and 531, or permission.

535 The Physics of Clouds (3) W

FRASER, HOBBS Study of the microphysical processes leading to the formation of clouds and production of rain, snow, and thunderstorm electrification. Prerequisite, 340 or permission.

#### Structure and Dynamics of Upper 539 Atmosphere (3) Sp DICKINSON, LEOVY

Properties of the ionosphere, electromagnetic wave propagation, the dynamics of the iono-sphere. Offered jointly with the Geophysics Group as Geophysics 539. Prerequisite, 542 or permission.

541, 542 Dynamic Meteorology (3,3) W,Sp FLEAGLE, HOLTON

541: basic equations of dynamic meteorology, general theorems, scale analysis. Prerequisites, Mathematics 328, Aeronautics and Astronautics 567 or equivalent. 542: hydrostatic balance, geostrophic balance, anelastic balance. Prerequisite, 541.

#### 543, 544 Planetary Fluid Dynamics (3,3) A,Sp

FLEAGLE, HOLTON

543: perturbation equations in Eulerian and Lagrangian form, simple wave motions in incompressible and compressible fluids, linear baroclinic theory. Prerequisites, 541 or Oceanography 511, or equivalent. 544: theorems on baroclinic instability, the equations of motion in spectral form, nonlinear inter-actions, laboratory analysis, the general circu-lation. Prerequisite, 543.

## The General Circulation of Atmosphere (3) W 545

WALLACE

Requirements of the global angular momentum heat, mass, and energy budgets upon atmospheric motions as deduced from observations. A study of the physical processes through which these budgets are satisfied. Prerequisite, 442 or permission.

# 546, 547, 548 Atmospheric Turbulence (3,3,3) A,W,Sp

BADGLEY, BUSINGER

546: laminar and turbulent flow; analogy between kinetic theory of gases and turbulence theory; Reynolds averaging; dissipation of energy; statistical descriptions of turbulent flow. Prerequisite, 442 or permission. 547: turbulent flux of heat, momentum, and moisture in the layer of the atmosphere next to the earth; Richardson's stability criterion; free convection. Prerequisite, 546. 548: diffusion of matter in the atmosphere; application of Fickian and statistical theories of diffusion; use of Lagrangian and Eulerian correlation functions. Prerequisite, 546.

#### **Advanced Atmospheric Analysis** 551

(3, max. 10) Sp REED, WALLACE

Selected advanced nonroutine types of analysis. Exercises in objective map analysis and numerical weather prediction. Prerequisite, 442 or permission.

## Theory of Meteorological Instruments (3) W 560

BADGLEY, BUSINGER

Physical theory of operation of meteorological instruments. New and specialized research instruments and more difficult problems in-volving standard instruments. Prerequisites, one year of calculus and permission.

#### Laboratory in Experimental Meteorology 593

(3, max. 6) Sp The role of controlled-model experiments in meteorology. Laboratory study of cloud formation and modification; convection cells, turbulent air motion; thermally induced air drainage; flow over obstacles; wave motion; surface of discontinuity; atmospheric circulation. Prerequisite, 542.

600 Independent Study or Research (\*)

Master's Thesis (\*) 700

800 Doctoral Dissertation (\*)

## BIOLOGY

The courses in biology listed below are ad-ministered by several departments. Other courses in biology are listed under such headings as Biochemistry, Biological Structure, Botany, Genetics, Microbiology, and Zoology.

## **Courses for Undergraduates**

100 Introductory Biology (5) AWSpS Introduction to biological principles, concepts, and data; application of biological knowledge to broader human problems. Offered by the Departments of Botany, Genetics, and Zool-ogy. Emphasis is determined by staff member offering course.

## 101-102 General Biology (5-5) A,W

ILLG, KOHN, KRUCKEBERG, MEEUSE,

ORIANS, PALKA

Principles of living systems as viewed at levels from the subcellular to the community. Emphasis on structural and functional analysis of biological organization-its adaptedness, its genetic diversity, its energetics-leading to an evolutionary synthesis. The position of man in the biological world. For nonmajors and teaching majors in biology. (Credit will not be given for 101-102 if any two of the following courses, or their equivalents, have previously been taken: Zoology 111-112; Botany 111, 112.)

# 210, 211, 212 Introductory Biology (5,5,5) AW,WSp,SpA

An introduction to the phenomena of life for students intending to go on to more advanced biology courses and into preprofessional programs. Emphasis is placed on features common to all living things: molecular and subcellular phenomena; cellular structure, metabolism and energetics; genetic regulation of development; the nature, functional properties, and evolution of plant and animal organisms and groups of organisms. Pre-requisite, one year of college chemistry or permission. Organic chemistry should be taken concurrently.

## 401 Cell Biology (3) W

CONRAD, WHITELEY Structure and function of the cell. Prerequisites, Zoology 301, Genetics 451, or permission.

#### 402 Cell Biology Laboratory (2) W

CONRAD, WHITELEY Prerequisites, 401, which must be taken concurrently, and permission.

#### 454 Evolutionary Mechanisms (3) KRUCKEBERG

Evolutionary change as determined by mutation, recombination, and selection. Effects of the genetic system, isolating mechanisms, hybridization, and polyploidy on speciation. Examples of micro- and megaevolutionary changes from plant and animal kingdoms. For advanced undergraduate and graduate students in the biological sciences. Prerequisite, Genetics 451 or equivalent. (Offered alternate years; offered 1972-73.)

## 472 Principles of Ecology (3) W

EDMONDSON, ORIANS, DEL MORAL Population biology, interactions between or-ganisms in biological communities, relation-ship of community to environment, principles of natural selection. Prerequisites, 15 credits in biological sciences and upper-division standing, or permission. Students may be required to share a portion of the costs of field trips.

#### 473 Limnology (3) A

EDMONDSON

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.

#### 474 Ecology Laboratory (3) Sp

EDMONDSON

Prerequisites, 472 and permission. Students may be required to share a portion of the costs of field trips.

#### Limnology Laboratory (2) A 475

EDMONDSON Examination of biota of fresh waters, survey

of limnological methods, and analysis of data. Prerequisites, 473 and permission.

## **Courses for Graduates Only**

501 Advanced Cytology (5) Sp Detailed study of the structure and function of the cell. Prerequisite, permission.

#### 508 Cellular Physiology (3) Sp

WHITELEY

The cell membrane and permeability, cyto-plasmic physiology, intracellular energetics and biosynthesis, physiology of cell division, cell movement. (Biology 508 and 509 may be elected separately, or in either sequence.) Prerequisite, 401 or permission.

#### 509 Cellular Physiology (3) Sp

WHITELEY Chemistry and physiology of the interkinetic and dividing nucleus, nucleocytoplasmic inter-actions, physiology of differentiated cells. (Biology 508 and 509 may be elected separately, or in either sequence.) Prerequisite, permission.

#### **Cellular Physiology Laboratory (2) Sp** 510 WHITELEY

Prerequisites, concurrent registration in Biology 508 or 509, and permission.

#### 573 Topics in Limnology (3) W

EDMONDSON Readings in the literature of limnology, with detailed discussion of modern problems. Prerequisite, permission. May be repeated for credit.

## 575 Topics in Physical and Chemical Limnology (3) W

STUIVER

Current limnological problems; among others, the sulfur, carbon, and nitrogen cycles, sedimentation rates, and temperature determinations. Some emphasis on the use of isotopes. Prerequisite, 473 or permission.

## 586 Analysis of Development (3) A

An analysis of structural, physiological, and molecular levels of developmental processes including gametogenesis, fertilization, cell and tissue movements, induction, and cytodifferentiation. Prerequisites, Zoology 456 and Biochemistry 442, or permission.

#### 587 **Analysis of Development Laboratory** (1-5, max. 5) AWSp

A series of intensive workshops in developmental biology, each extending over seven to ten days. Each will be based on problems under study in the laboratory of the instructors involved, using materials, methods, and approaches characteristic of that laboratory. Prerequisites, 586 and permission.

#### 591 Problems in Biological Instruction (1) AWSp

A seminar in biological instruction; teaching techniques, course and curricula planning.

## BOTANY

## **Courses for Undergraduates**

110 Plants in Man's Environment (5) A STUNTZ, WALKER

basic course on plants, emphasizing the diversity of organisms, the economic impor-tance of plants, and the function of plants in vegetation systems and human communities.

## 113 Elementary Plant Classification (5) Sp

An introduction to plant classification; field study and laboratory identification of the common plant families and the conspicuous flora of western and central Washington. Two full-day field trips required of all students.

#### 201, 202, 203 Plant Propagation (2,2,2) A,W,Sp

MUHLICK

201: hardy bulbs; broadleaf and conifer cuttings; operation of a small greenhouse. 202: tender bulbs, orchids, grafting. 203: care and treatment of seeds and seedlings; division and layering; care of the home grounds. Intended for students desiring knowledge of the principles involved in growing plants in the greenhouse and garden. Prerequisites for each course, Biology 101-102 or permission.

## 220 The Plant Kingdom (5) WSp

BLASER, NOBRIS, WAALAND An introduction to the major groups of the plant kingdom. Structure and reproduction and the theories of evolutionary relationships of the phyla are considered. Prerequisites, Biology 101-102 or equivalent.

#### **311 Lower Plants: Form and Function**

(5) A HASKINS

A study of structure and function of representative plants. Laboratory culture, growth studies, and experimental manipulations of plant materials. Intended for upper-division students with basic biological background. Prerequisites, Biology 101-102, 210.

313 Introductory Taxonomy (5) A Principles of classification; rules of nomenclature; botanical exploration (western North America). Field and laboratory study of Washington flora, concentrating on largest and most important groups, especially grasses, and the sunflower family. Not open to stu-dents who have taken Botany 113. Prerequisites, 10 credits in biological science or junior standing, and permission. (Offered alter-nate years; offered 1972-73.)

#### 331 **Ornamental Plants (3) Sp**

KRUCKEBERG

Identification, recognition, and use of cultivated trees and shrubs. Emphasis on laboratory and field study of woody species used in Northwest landscapes; plant exploration and origins of ornamentals. Prerequisite, 113 or 10 credits in biological science. For nonmajors, teaching majors in biology, and students in forestry and landscape design.

#### 350 Introduction to Plant Geography (3) W DEL MORAL, KRUCKEBERG, TSUKADA

Patterns of world vegetation distributions; the relationships between vegetation and climate; introduction to general theories of plant dis-tribution. An emphasis will be upon the affinities between vegetation in different parts of the world.

## 360 General Mycology (5) W

STUNTZ, WHISLER General survey of the fungi with emphasis on life cycles, structure, physiology, economic importance. Prerequisite, 10 credits in biologi cal science or permission.

## 371 Elementary Plant Physiology (5) Sp

HALPERIN, WALKER

Study of nutrition, assimilation, transport, growth, photosynthesis and cellular respiration in plants, with the aid of simple physical and chemical principles. For nonmajors. Not open to those who have had 216. Prereq-uisites, Biology 212 or 101-102, and Chemistry 102, or permission.

## 421 Bryology (3)

Taxonomy of the mosses, with emphasis on the moss flora of the Pacific Northwest. In-, tensive practice in identification of mosses in laboratory. Field study for collections, recog-nition, and natural history of mosses. For undergraduate and graduate majors in botany and related fields. (Offered upon demand.)

#### 431, 432 Taxonomy (5,5) W,Sp

Morphology and phylogeny of families of seed plants; flora of western North America. Prerequisite, 113 or equivalent. (Offered alternate years; not offered 1972-73.)

#### 443 Freshwater Algae (5)

NORRIS Morphology, life-histories, systematics, and ecology of freshwater algae, with emphasis on the local flora. Opportunities provided for students to learn basic cytological, morpho-logical, and physiological characteristics of the freshwater algae. Studies will be made on algae collected in the field and on specimens grown in laboratory culture. Students will be given the opportunity to isolate and grow laboratory cultures of certain local algae. Prerequisite, 220 or 311, or permission.

#### 444 Plant Anatomy (5) A BLASER

Study of the origin and differentiation of tissue systems; practice in interpretation of histology of plant materials. Prerequisite, Biology 101-102 or Biology 212.

#### 446 Algology (5) Sp

NORRIS, WAALAND Examination of algal phyla from the view-point of morphological and physiological characteristics important to their systematics. Points emphasized are: phylogeny of various lines of evolution in algae, relationships between algae and other parts of plant and animal kingdoms, algal geography and species of economic importance. Prerequisite, 220 or 311, or 20 credits in biology.

#### 447 Phytoplankton Morphology and Taxonomy (4) A NORRIS

Advanced discussion of phytoplankton morphology with emphasis on characteristics important to their taxonomy. Emphasis placed on cytology of the organisms, their life his-tories, adaptive morphological characteristics, and isolation and culture of phytoplankton organisms. Prerequisite, 445 or 446, or per-mission. (Offered alternate years; offered 1972-73.)

#### 448 Marine Algal Ecology (4) A WAALAND

The marine environment in relation to the distribution of marine algae, zonation of benthic algae, interactions of algae and animals and the biological basis for phycogeography. Prerequisite, 445 or 446, or permission. (Of-fered alternate years, offered 1971-72.)

#### 450 Terrestrial Plant Ecology (3) Sp DEL MORAL

Relationships of populations to their environments; interactions between plants; theories of vegetation. Prerequisite, Biology 472 or permission.

#### 451 Plant Ecology Laboratory (2) Sp DEL MORAL

Laboratory, greenhouse, and field study; reports on original observations will be required. Prerequisite, concurrent registration in 450. (Offered alternate years; offered 1972-73.)

#### 454 **Palynology and Quaternary** Phytogeography (5) A TSUKADA

A 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 through lectures and practical experiences in the laboratory and field. Two full-day (Friday and Saturday) field trips required of all students. Prerequisite, 113 or 313, Biology 472, or permission.

## 462 Basidiomycetes (5) A

STUNTZ

Structure and classification of the Basidiomycetes. Prerequisite, 360 or permission.

#### 463 Phycomycetes and Related Fungi (5) Sp WHISLER

Life history, development, taxonomy, and physiology of slime molds and Phycomycetes. Prerequisites, 360, Microbiology 400, or per-

(Offered alternate years; offered mission. 1972-73.)

#### 464 Ascomycetes (5) Sp STUNTZ

Structure and classification of the Asco-mycetes. Prerequisite, 360 or permission. (Offered alternate years; not offered 1972-73.)

466 Rusts, Smuts, and Fungi Imperfecti (5) Structure, classification, and biology of rusts, smuts, and imperfect fungi, with particular emphasis on the role of these fungi in plant pathology. Prerequisite, 360 or permission. (Offered upon demand.)

#### Development in Lower Plants (5) W 469 WHISLER

A comparative study of growth and differentiation in the higher protista, with emphasis on sporogenesis, sexuality, nutrition, and cellwall development in the fungi and algae. Prerequisite, 220 or permission. (Offered alternate years; not offered 1972-73.)

## 472 Plant Physiology (5) A

CLELAND, MEEUSE

Covers the same field as Botany 371, but stresses biochemical approaches. Recommended for biology majors. Not open to those who have taken 371. Prerequisites, Biology 101-102, or 212, and completion of, or concurrent registration in, Chemistry 232, or permission.

## 476 Mineral Nutrition (3) A

WALKER

Absorption, translocation, and utilization of essential mineral elements. The soil culture and solutions as nutrient media for the growth of plants considered in theory and practice. Prerequisite, 371 or 472, or equivalent. (Offered alternate years; offered 1972-73.)

## 478 Plant Morphogenesis (3) W

HALPERIN

Course progresses from a general review of the subcellular machinery controlling development (information storage, macromolecular assembly, metabolic regulation, cell cycle, etc.), as studied in micro-organisms, animals, and plants, to a study of development at the cell, tissue, and organ level in multicellular plants. Reading based on primary sources. Prerequisites, Biology 212 or Botany 371 or equivalents. (Offered alternate years; offered 1973-74.)

#### 479 Plant Morphogenesis Laboratory (2) HALPERIN

Laboratory study of selected experimental systems, with emphasis on independent research. Prerequisite, Botany 478, which may be taken concurrently.

480 Plant Cytology (3) W HASKINS

Analysis of structure and function of plant cells. Emphasis will be placed on the ultrastructure of plant cells and cell components. Prerequisites, 15 credits in biological science and permission.

#### 481 Plant Cytology Laboratory (2) W HASKINS

Bright-field and phase-contrast microscopy; cytochemical methods; demonstration of optical equipment; individual projects. Prerequisite. 480.

#### 490 Undergraduate Seminar (1) AW

Presentation and discussion of advanced topics in botany. Graduate students nearing completion of research or those presenting papers at national meetings will provide the major subject matter. Faculty member will act as coordinator.

#### 498 Special Problems in Botany (1-15) AWSp

Students with suitable background in botany may enroll to do special study in algology, anatomy, bryology, cytology, morphology, physiology, or taxonomy. Prerequisite, per-mission of instructor.

## **Courses for Graduates Only**

520 Seminar (1) AWSp

## Prerequisite, permission.

## Topics in Plant Physiology (2, max. 10) W CLELAND, HALPERIN

Modern trends and methods in plant physiology. Prerequisite, permission.

#### 522 Seminar in Morphology and Taxonomy (2, max. 10) A BLASER, KRUCKEBERG

Current research and trends in morphology and taxonomy of higher plants. Comparison of classical with modern approaches and concepts. Prerequisite, permission.

523 Selected Topics in Mycology

(2, max. 10) Sp

STUNTZ, WHISLER

Selected topics from all phases of mycology. Prerequisite, permission.

Topics in Algology (2, max. 10) W 524 NORRIS

Selected topics from all phases of algology. Prerequisite, permission.

525 Topics in Plant Ecology

(2, max. 10) W

DEL MORAL, KRUCKEBERG

Selected topics from various phases of plant ecology. Prerequisite, permission of instructors.

#### 526 Topics in Palynology (2, max. 6) Sp TSUKADA

Discussion and review of literature in pollen structure, deposition in sediments, and paleoecology. Prerequisite, permission.

545 Marine Algology (6) S

NORRIS, WAALAND Morphology, life histories, systematics, and ecology of marine algae, with emphasis on the local flora. Opportunities provided for students to learn basic morphological and physiological characteristics of marine algal phyla and to apply this knowledge in studying in the field and laboratory cultures. (Consult "Announcement of the Friday Harbor Laboratories" for the year offered.) Prerequisite, 220 or 311, or permission.

## 551 Field Ecology (3) Sp

DEL MORAL Field studies of ecological processes and emergent ecosystem properties. Emphasis is on the significance of changes that occur during ecosystem development. Current ecological dogma will be tested under field conditions. Prerequisites, 450, which may be taken concurrently, or any ecology course beyond Biology 472; qualified seniors by permission and petition to the Graduate School. (Offered al-

## ternate years; not offered 1972-73.) 565 Marine Mycology (6) S

WHISLER Taxonomy and morphology of aquatic fungi with emphasis on marine forms, collection, and culture methods. (Consult "Announcement of the Friday Harbor Laboratories" for the year offered.) Prerequisite, 220 or 311 or 360 or 20 credits in biology.

## 570 Plant Metabolism (3) W

Metabolism of organic compounds, with emphasis on photosynthesis and cellular respiration. (Offered alternate years; offered 1972-73.) Prerequisites, 472, and Chemistry 232 or equivalent, and permission.

#### 571 Plant Metabolism Laboratory (2) W MEEUSE

Prerequisite, concurrent registration in 570.

#### 572 Water Relations (3) W WALKER

Permeability and water relationships, with special emphasis on influences affecting behavior of plants in the field. (Offered alternate years, not offered 1972-73.)

## 573 Water Relations Laboratory (2) WALKER

Prerequisite, concurrent registration in 572. (Offered alternate years; not offered 1972-73.)

## 575 Problems in Algal Physiology (6) S

Metabolic activity of the algae. (Consult "Announcement of the Friday Harbor Laboratories" for year offered.) Prerequisites, 472 or 371, Chemistry 232, and permission.

577 Plant Growth and Development (3) Sp CLELAND

Control of growth, development, and differentiation in higher plants. Prerequisite, 472 or permission. (Offered alternate years; offered 1972-73.)

## 578 Plant Growth and Development Laboratory (2) Sp

CLELAND

Experimental methods for studying plant growth and development. Must be accompanied by 577.

600 Independent Study or Research (\*) AWSp

700 Master's Thesis (\*) AWSp

800 Doctoral Dissertation (\*)

## CHEMISTRY

## **Courses for Undergraduates**

## 100 Chemical Science (5) ASp

Atoms, molecules, and chemical reactions. A survey of fundamental principles. Designed as a terminal course for nonscience majors. No credit given to those who have had one unit or more of high school chemistry.

## 101 General Chemistry (5) AWS

For nonscience and nonengineering majors who plan to terminate their study of chemistry with 101 or 102. Molecular theory, quantitative relationships in chemical processes, solutions, ionic equilibria, acids, bases, and salts. Chemistry of common metals and nonmetals.

#### 102 General and Organic Chemistry (5) WSpS

Organic compounds; hydrocarbons, alcohols, aldehydes, ketones, ethers, acids, aromatics, fats and oils, proteins, and carbohydrates. Students who plan to take 231 should not take 102. Prerequisite, 101 or qualifying examination.

## 140 General Chemistry (4) AWSpS

For science, engineering, and other majors who plan to take a year or more of chemistry courses. Chemical reactions, basic principles, equilibrium systems, structure and bonding, properties of matter. Prerequisites, high school chemistry or physics or Chemistry 100 and qualification for Mathematics 105.

### 145 General Chemistry (4) À

Parallels 140. Students with an A or B grade in high school chemistry and a strong aptitude for science (e.g., upper quartile in mathematics or Washington Pre-College Test) should register for 145 instead of 140.

#### 147H General Chemistry Honors Laboratory (4) A

Introduction to quantitative chemistry with laboratory emphasis. Prerequisite, permission.

150 General Chemistry (4) AWSpS

Continuation of Chemistry 140. Prerequisite, 140 or 145.

151 General Chemistry Laboratory (2) AWSpS

Experiments illustrating quantitative relationships in chemistry. Prerequisites, concurrent registration in, or prior completion of, 150 or 155.

155 General Chemistry (4) W

## To follow 145. Parallels 150. Prerequisite, 145. 157H General Chemistry Honors Laboratory

(4) W Elementary physical and quantitative chemis-

try with laboratory emphasis. Prerequisite, 147H.

## 160 General Chemistry (4) AWSpS

The chemistry of representative elements, metals, and nonmetals. Introduction to organic and nuclear chemistry. Prerequisite, 150 or 155.

### 167H General Chemistry Honors Laboratory (4) Sp

Elementary physical, quantitative, and qualitative chemistry with laboratory emphasis. Prerequisite, 157H.

## 170 Qualitative Analysis (3) SpS

Semimicroqualitative analysis for common cations and anions; separation and identification procedures. Prerequisites, 151 and 160 (170 may be taken concurrently with 160).

## 198, 198H Tutorial Study (1, max. 3)

For chemistry majors only. Discussion in small groups of aspects of chemistry of current interest to undergraduates. Prerequisites, permission of chemistry adviser and gradepoint average of 3.00 for freshmen, 2.50 for sophomores. Not to be taken concurrently with 199. (Not offered 1972-73.)

#### 199, 199H Special Problems (1; max. 6) AWSp

Problems relating to experimental chemistry. For chemistry majors only. Prerequisites, permission of chemistry adviser and a chemistry grade-point average above 3.00.

## 221 Quantitative Analysis (5) AWSpS

Volumetric and gravimetric. Prerequisite, 160 or 155. Not for students who have completed 167H.

## 231 Organic Chemistry (3) AWSpS

For students planning two or three quarters of organic chemistry. Structure, nomenclature, reactions, and synthesis of the main types of organic compounds. Prerequisite, 150 or 155.

## 232 Organic Chemistry (3) AWSpS

Continuation of 231 for students planning only two quarters of organic chemistry. Prerequisite, 231.

#### 235 Organic Chemistry (3) WSpS

Continuation of 231 for those desiring three

quarters of organic chemistry. Further discussion of transformations or organic molecules, especially aromatic systems. Introduction to organic reaction mechanisms. Prerequisite, 231.

## 236 Organic Chemistry (3) ASpS

Continuation of 235 for those desiring three quarters of organic chemistry. Consideration of polyfunctional compounds and natural products. Study of sugars, amino acids, and heterocycles. Prerequisite, 235.

#### 241 Organic Chemistry Laboratory (2) AWS

Usually to accompany 231. Preparation of representative compounds. Prerequisites, 147H, 221 or 151 and 231, which may be taken concurrently.

#### 242 Organic Chemistry Laboratory (2) WSpS

Usually to accompany 232 or 236. Preparations and qualitative organic analysis. Prerequisites, 232 or 236, which may be taken concurrently, and 241.

## 335H Honors-Organic Chemistry (4) A

For chemistry majors and other qualified students planning three or more quarters of organic chemistry. Structure, nomenclature, reactions, and synthesis of organic compounds. Theory and mechanism of organic reactions. Prerequisite, 160 or 155.

336H Honors-Organic Chemistry (4) W Continuation of 335H. Prerequisite, 335H.

337H Honors—Organic Chemistry (4) Sp Continuation of 336H. Prerequisite, 336H.

346H Organic Chemistry Honors Laboratory (2) W

Usually to accompany 336H. Prerequisite, 336H, which may be taken concurrently.

## 347H Organic and Qualitative Organic

Honors Laboratory (2) Sp

Continuation of 346H. Usually to accompany 337H. Prerequisites, 337H, which may be taken concurrently, and 346H.

**350 Elementary Physical Chemistry (3) WS** Survey of some major topics in physical chemistry. Prerequisites, two quarters of chemistry, Physics 116, and Mathematics 125 or 157.

351 Elementary Physical Chemistry (3) SpS Continuation of 350. Prerequisite, 350.

401 Principles of Chemistry (3, max. 6) S Primarily for high school teachers. Principles of chemistry, atomic and molecular nature of matter, periodic system, stoichiometry, chemical reactions, modern terminology and nomenclature.

# 402 Techniques of Chemistry (2 credits in a given quarter or 3 credits in a given quarter) S

Primarily for high school teachers. Discussion and demonstration of fundamental techniques, determination of composition and structure, analysis and synthesis, separation and purification processes, electrochemical processes, use of stable and radioactive isotopes.

## 410, 410H Radiochemical Techniques and

Radioactivity Measurements (3) Sp An introductory general service course for students planning further work in nuclear or tracer applications. Safety procedures, detection and measurement of nuclear radiations, radiochemical and tracer techniques. Prerequisites, 160 or 155, Mathematics 124 and Physics 116, or permission.

#### 414 Chemistry of the Main Group Elements (3) A

The elements and their compounds in relation to the periodic system. Prerequisite, 351 or 457.

#### 415 The Chemical Bond (3) W

The nature of the chemical bond. Prerequisite, 455.

## 416 Chemistry of the Transition Metal Elements (3) W

Prerequisite, 457 or 351.

## 418 Radiochemistry (3) W

Natural radioactivity, nuclear systematics and reactions, radioactive decay processes, decay laws, statistical considerations, applications of radioactivity. Prerequisites, 157H or 170, 455, or permission.

## 426 Instrumental Analysis (3) Sp

Introduction to electrical and optical methods of analysis. Prerequisite, 221 or 167H. (Not offered 1972-73.)

#### 427 Advanced Quantitative Theory (3) A CRITTENDEN

Principles of analytical chemistry. Prerequisites, 221 or 167H, 232 or 337, and 457, or permission.

## 455, 455H Physical Chemistry (3) AWS Introduction to quantum chemistry, statistical

mechanics, kinetic theory of gases. Prerequisites, 160 or 165, Mathematics 126, and college physics.

#### **456, 456H** Physical Chemistry (3) AWS Thermodynamics, phase equilibria, colligative properties of solutions, electrolytes, and electrochemistry. Prerequisite, 455.

## 457, 457H Physical Chemistry (3) Sp

Chemical kinetics, transport properties, molecular structure, the solid state, surfaces, and macromolecules. Prerequisite, 456.

#### 460 Physical Measurements in Chemistry (4) ASp

Observation and interpretation of infrared, ultraviolet, NMR, and mass spectra with emphasis on the determination of structure of polyatomic molecules. Noise rejection and small signal problems, statistics, feedback and control, data processing, and design of experiments. Prerequisites, 2 quarters of organic chemistry, Chemistry 350 or 455, which may be taken concurrently, or permission.

#### 461 Physical Chemistry Laboratory (2-3) AWSp

Physical measurements in chemistry. Vacuum and high-temperature techniques, calorimetry, spectroscopic methods, electrical measurements. Prerequisites, Chemistry 455, 457 or 351, or permission; 460 is recommended.

#### 462 Techniques of Synthetic Chemistry (2-3) AWSp

Techniques of synthetic chemistry with examples from organic, inorganic, and biological chemistry. Vacuum line synthesis, photochemical reactions, radiochemical synthesis, etc. Prerequisites, 347H or 242, or permission.

## 463 Separations and Analysis (2-3) AWSp

Techniques for the separation and analysis of complex chemical mixtures. Vapor and liquid phase chromatography, electrochemical and spectrochemical analysis, etc. Primarily for students in the physical and biological sciences who need competence in a variety of analytical techniques. Prerequisite, 460, which may be taken concurrently.

#### 498 Teaching Experience in Chemistry (1, max. 6) AWSp

Students will be trained as assistants in laboratories and quiz sections. For chemistry majors. Prerequisites, permission, grade-point average above 3.00, and upper-division standing.

### 499, 499H Undergraduate Research (\*, max. 12) AWSpS

For qualified chemistry majors in the prescribed curriculum, especially those planning graduate work. Prerequisites, permission and grade-point average above 3.00 in chemistry.

## **Courses for Graduates Only**

508 Advanced Inorganic Chemistry (3) Sp Discussion of selected applications of nuclear magnetic resonance spectrometry, electronic, infrared, and Raman spectroscopy, magnetic susceptibility measurements, Mössbauer spectrometry and isotope replacement studies in the understanding of structure and bonding in inorganic compounds. (Offered 1973-74.)

## 510 Current Problems in Inorganic and

Nuclear Chemistry (2, max. 12) Sp For doctoral candidates in inorganic chemistry. Current topics, e.g., acid-base theory; halogens; hydrides; groups III and IV; interstitial, chelate, and high-temperature chemistry; inorganic free radicals. (Offered 1972-73.)

## 513 Advanced Nuclear Chemistry

(2, max. 6) A Nuclear reactions, fission, complex radioactive decay, low-level techniques, geochemistry, cosmochemistry, chemistry of the synthetic elements. Prerequisite, 418 or permission.

#### 520 Current Problems in Analytical Chemistry (2, max. 12) AWSp

For doctoral candidates in analytical chemistry. Current topics, e.g., electrochemistry, trace analysis, methods of data treatment, analytical instrumentation theory.

#### 526 Advanced Instrumental Analysis (3) Sp Absorption and emission spectrocopy, polarography, potentiometry, and dielectric properties as applied to problems in analytical chemistry. Prerequisite, 426 or permission. (Offered alternate years; offered 1973-74.)

530 Advanced Organic Chemistry (3) A Electronic mechanisms in organic chemistry. An introduction to the theory of organic reactions. Prerequisite, 337 or equivalent.

#### 531 Advanced Organic Chemistry (3) W

Discussion of the principal reactions of synthetic organic chemistry, with emphasis on practical methods. Transformation of functional groups. Prerequisite, 530 or permission.

#### 532 Advanced Organic Chemistry (3) Sp

Kinetics and equilibria as related to the mechanisms of organic reactions. Absolute rate theory. Stereochemistry and the steric course of reactions. Prerequisite, 531 or permission.

#### 540 Current Problems in Organic Chemistry (3, max. 18) AWSp

For doctoral candidates in organic chemistry. Discussions of topics of current interest and importance, e.g., sesquiterpenes, acyclic and cyclic compounds (Andersen); nonclassical aromatic compounds; small ring heterocycles (Andersen): carbohydrates, amino acids, peptides (Chilton); catalytic action, enzyme and model-enzyme catalysis, molecular rearrangements, kinetic deuterium isotope effects (Pocker); acid-base catalysis, solvent and substituent effects (Schubert); natural products, biosynthesis, application of physical methods to structural problems (Stout); synthesis of proteins, natural product studies (Weinstein); heterocyclic compounds, peptide syntheses (Woodman). See the department for instructor and topic during any particular quarter.

#### 550, 551 Introduction to Quantum Chemistry (3,3) A,Sp

Solutions of the Schrödinger equation for simple systems; approximate methods; angular momentum and spin; electronic structure of atoms, group theory; electronic vibrational, and rotational levels in molecules; spectroscopic selection rules. Prerequisite, 455 or permission for 550; 550 or permission for 551.

## 552, 553 Statistical Mechanics (3,3) WSp

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.

## 599 Chemical Kinetics (3) Sp

Modern experimental methods and fundamental theories of reaction rates. Role of vibrational excitation in unimolecular and biomolecular reactions. Energy transfer. Nonequilibrium systems and microscopic rate parameters. Prerequisite, 457 or 552, or permission. (Offered 1973-74.)

#### 560 Current Problems in Physical Chemistry (3, max. 18) ASp

For doctoral candidates in physical chemistry. A discussion of topics selected from active research fields, e.g., electronic structure of molecules, electron correlation, density matrices, semiempirical methods (Davidson, Gouterman); vibrational and rotational analysis of molecular spectra including applications of symmetry, normal coordinates, force constants; interaction of rotation with vibration, anharmonic effects (Eggars); macromolecules, biopolymers (Eichinger); lattice dynamics, chemistry of the solid state (Slutsky). See the department for instructor and topic during any particular quarter.

## 581 Topics in Inorganic Chemistry

(3, max. 18) AWSp Open only to students accepted for doctoral work in chemistry.

## 582 Topics in Analytical Chemistry

## (3, max. 18) AWSp

Open only to students accepted for doctoral work in chemistry.

## 583 Topics in Organic Chemistry

(3, max. 18) AWSp

Open only to students accepted for doctoral work in chemistry.

## 585 Topics in Physical Chemistry

(3, max. 18) AWSp Open only to students accepted for doctoral work in chemistry.

- 590 Seminar in General Chemistry (1, max. 18) AWSpS
- 591 Seminar in Inorganic Chemistry (1, max. 18) AWSpS
- 592 Seminar in Analytical Chemistry (1, max. 18) AWSpS

## ARTS AND SCIENCES

- 593 Seminar in Organic Chemistry (1, max. 18) AWSpS
- 594 Seminar in X-Ray Crystallography (1, max. 18) AWSpS
- 595 Seminar in Physical Chemistry (1, max. 18) AWSpS
- 600 Independent Study or Research (\*) AWSpS
- 700 Master's Thesis (\*) AWSpS
- 800 Doctoral Dissertation (\*)

## CLASSICS

## **Courses for Undergraduates**

#### GREEK

101-102, 103 Elementary Greek (5-5,5) A,W,Sp

101-102: an intensive study of grammar, with reading and writing of simple Attic prose; 103: reading of selections from classical Greek literature.

201, 202 Attic Prose (3,3) A,W

MACKAY Selections from Attic prose, including Plato's *Republic*, Book I, Plato's *Apology*, and the orations of Lysias. Prerequisites, 103 for 201; 201 for 202.

203 Homer (3) Sp

Selections from the Iliad or Odyssey. Pre-requisite, 202.

207, 208 Grammar and Composition (2,2) A,W

Systematic review of grammatical principles; exercises in prose composition. To be taken concurrently with 201 and 202.

209 Survey of Greek Literature (2) Sp A brief history of Greek literature, with an introduction to the materials and methods of classical scholarship. Prerequisite, 202.

300, 301 Greek Language, Accelerated (3,3) A,W

Intensive introduction to Attic Greek. Not accepted as upper-division credit toward a major in Greek or Classics. Prerequisites, for 300, junior standing and permission; 300 for 301.

- 310, 311, 312 Advanced Grammar and Composition (1,1,1) A,W,Sp Prerequisite, 208.
- 413 The Pre-Socratic Philosophers (3) A MCDIARMID

(Offered alternate years; offered 1972-73.)

414 Plato (3) W

MACKAY

(Offered alternate years; offered 1972-73.)

415 Aristotle (3) Sp

MACKAY (Offered alternate years; offered 1972-73.)

422 Herodotus and the Persian Wars (3) A BLIQUEZ

(Offered alternate years; offered 1973-74.)

424 Thucydides and the Peleponnesian War (3) W BLIOUEZ

(Offered alternate years; offered 1973-74.)

426 Attic Orators (3) Sp BLIQUEZ

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(Offered alternate years; offered 1973-74.)

442, 443, 444 Greek Drama (3,3,3) A,W,Sp MCDIARMID

(Offered alternate years; offered 1973-74.)

- 449 Greek Epic (3) A
- MACKAY (Offered alternate years; offered 1972-73.)
- 451 Lyric Poetry (3) W GRUMMEL
- (Offered alternate years; offered 1972-73.)
- 453 Pindar: The Epinician Odes (3) Sp MCD'ARMID
- (Offered alternate years; offered 1972-73.)
- 490, 490H Supervised Study (\*, max. 18) AWSp

Special work in literary and philosophical texts for graduates and undergraduates.

499 Undergraduate Research (\*, max. 18) AWSp

- LATIN
- 101-102, 103 Elementary Latin (5-5,5) A,W,Sp

101-102: an intensive study of grammar, with reading and writing of simple Latin prose; 103: reading of selections from classical Latin literature.

201 Intermediate Latin: Introduction to Latin Literature (3) A

Readings in prose and poetry from various Latin authors. Prerequisite, two years of high school Latin or 103.

202 Intermediate Latin: Cicero and Ovid

Readings from the orations of Cicero and the elegiac verse of Ovid. Prerequisite, 201.

203 Intermediate Latin: Vergil (3) Sp Selections from the first six books of the Aeneid. Prerequisite, 202.

206, 207, 208 Grammar and Composition (2,2,2) A,W,Sp

Systematic review of Latin vocabulary, forms, and grammatical principles; exercises in prose composition. To be taken concurrently with 201, 202, and 203. Prerequisites, two years of high school Latin or 103; 206 for 207; 207 for 208.

300, 301 Latin Language, Accelerated (3,3) W,Sp

Intensive introduction to classical Latin. Not accepted as upper-division credit toward a major in Latin or Classics. Prerequisites, for 300, junior standing and permission; 300 for 301.

305, 306, 307 Survey of Latin Literature (3,3,3) A,W,Sp READ

Survey of Latin literature from its origins to the end of the second century A.D. 305, Republic; 306, Augustan Age; 307, Silver Age. Prerequisite, four years of high school Latin or 203.

- 310, 311, 312 Advanced Grammar and Composition (1,1,1) A,W,Sp
  - READ .

Prerequisite, 208.

401 Medieval Latin (3) Sp

PASCAL Prerequisite, permission.

- 412 Lucretius (3) A
- GRUMMEL
- (Offered alternate years; offered 1973-74.)
- 413 Cicero's Philosophical Works (3) W GRUMMEL
- (Offered alternate years; offered 1973-74.)

- 414 Seneca (3) Sp GRUMMEL
- (Offered alternate years; offered 1973-74.)
- 422 Livy (3) A
- VIONOLI (Offered alternate years; offered 1972-73.)
- 423 Cicero and Sallust (3) W
- HARMON (Offered alternate years; offered 1972-73.)
- 424 Tacitus (3) Sp
  - EDMONSON (Offered alternate years; offered 1972-73.)
  - 447 Roman Lyric (3) A VIGNOLI

(Offered alternate years; offered 1973-74.)

449 Roman Elegy (3) W GRUMMEL

(Offered alternate years; offered 1973-74.)

451 Roman Satire (3) W

VIGNOLI (Offered alternate years; offered 1973-74.)

457 Roman Drama (3) A

PASCAL (Offered alternate years; offered 1972-73.)

- 458 Roman Epic (3) W
- GRUMMEL

(Offered alternate years; offered 1972-73.)

459 Roman Pastoral (3) Sp GRUMMEL

(Offered alternate years; offered 1972-73.)

#### 475 Improvement of Teaching: Latin (3) S READ

Examination and evaluation of the various methods of teaching Latin; audio-visual aids; testing materials; textbooks; relation of Latin to other languages; Latin derivatives in English vocabulary. Offered jointly with the College of Education as Education Curriculum and Instruction EDC&I 438.

#### 476 Caesar for High School Teachers (3) S READ

Interpretation of Caesar's works in the light of their historical, political, literary, and geographical background, with special reference to the problems of high school teaching. Offered jointly with the College of Education as Education Curriculum and Instruction EDC&I 439.

#### 490, 490H Supervised Study (\*, max. 18) AWSp

Special work in literary and philosophical texts for graduates and undergraduates.

499 Undergraduate Research (\*, max. 18) AWSp

101 Latin and Greek in Current Use (2)

Designed to improve and increase English vo-

cabulary through a study of the Latin and Greek elements in English, with emphasis on

words in current literary and scientific use.

210 Greek and Roman Classics in English (5)

An introduction to classical literature through

a study of the major Greek and Latin authors

in modern translation. Lectures will be given

HARMON, MACKAY, MC DIARMID, PASCAL,

No knowledge of Latin or Greek required.

BLIQUEZ, EDMONDSON, GRUMMEL,

## CLASSICS COURSES IN ENGLISH

AWSD

AWSD

READ, VIGNOLI

by various members of the staff.

#### 422 Greek Historians and Philosophers in English (3)

The development of Greek writing from mythical and poetic formulations to logical argument and scientific classification; based on a study of Hesiod, Hippocrates, the Pre-Socratic philosophers, Herodotus, Thucydides, and Plato's *Republic*.

## 426 Greek and Roman Epic in English (3) A HARMON

A study of the *Iliad*, the *Odyssey*, the *Aeneid*, and selections from other ancient epics.

#### 427 Greek and Roman Tragedy in English (3) W MC DIARMID

A study of the development of Greek and Roman tragedy, with extensive readings in representative plays of Aeschylus, Sophocles, Euripides, and Seneca.

#### 428 Greek and Roman Comedy in English (3) Sp PASCAL

Readings from the comedies of Aristophanes, Menander, Plautus, and Terence.

430 Greek and Roman Mythology (3) AWSp GRUMMEL, HARMON, PASCAL

The principal myths found in classical and later literature.

435 The Ancient Novel (3) W ViGNOLI

A study of the origins, growth, and tradition of the romantic novel in Greek and Latin antiquity.

#### 440 Greek and Roman Critics in English (3) A

GRUMMEL

Literary theories of the Greeks and the Romans as seen in the writings of Plato, Aristotle, Longinus, and other major classical authors. Attention will be given to their influence on modern literary critics.

#### CLASSICAL ARCHAEOLOGY

340 Pre-Classical Art and Archaeology (3)

EDMONSON

Survey of the art and the other material remains of the civilizations in the Aegean from the Neolithic 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 will be examined. Offered jointly with the School of Art as Art History ART H 340.

### 341 Greek Art and Archaeology (3) W BLIQUEZ, EDMONSON

A survey of the material remains and the developing styles in sculpture, vase-painting, architecture, and the minor arts from the Geometric to the Hellenistic period, 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 the School of Art as Art History ART H 341.

#### 342 Roman Art and Archaeology (3) W PASCAL, VIGNOLI

Roman architecture, painting, and sculpture, with emphasis on the innovations of the Romans in these areas, illustrated by slides. Offered jointly with the School of Art as Art History ART H 342.

#### 442 Greek and Roman Pottery (3) A EDMONSON

Shapes, fabrics, and decorations from the Neolithic period to the sixth century A.D. Offered jointly with the School of Art as Art History ART H 442. (Offered alternate years; offered 1972-73.)

#### 444 Greek and Roman Sculpture (3) W EDMONSON

History and development of Greek sculpture and sculptors, their Roman copyists, and Roman portraits and sarcophagi. Emphasis on Greek sculpture of the fifth century B.C. Offered jointly with the School of Art as Art History ART H 444. (Offered alternate years; offered 1972-73.)

#### 446 Greek Architecture (3) Sp EDMONSON

A detailed study of Greek architecture from its beginnings, with special emphasis on the Periclean building program in fifth-century Athens. (Offered alternate years; offered 1972-73.)

## **Courses for Graduates Only**

## CLASSICS

800 Doctoral Dissertation (\*)

## GREEK

520 Seminar (3, max. 27) AWSp.

The courses numbered 580-589 are graduate reading courses. In them, students read extensively in texts appearing on the Ph.D. Greek reading list.

580 Greek Tragedy (3) A (Offered alternate years; offered 1972-73.)

582 Herodotus and Thucydides (3) W (Offered alternate years; offered 1972-73.)

584 Plutarch, Xenophon, Demosthenes (3) Sp (Offered alternate years; offered 1972-73.)

585 Plato, "Republic" (3) A (Offered alternate years; offered 1973-74.)

587 Aristotle, "Politics" or "Ethics" (3) W (Offered alternate years; offered 1973-74.)

589 Aristophanes (3) Sp

(Offered alternate years; offered 1973-74.)

- 590 Supervised Study (\*, max. 18) AWSp
- 600 Independent Study or Research (°) AWSp

## 700 Master's Thesis (\*) AWSp

LATIN

520 Seminar (3, max. 27) AWSp

The courses numbered 580-589 are graduate reading courses. In them, students read extensively in texts appearing on the Ph.D. Latin reading list.

580 Roman Rhetoric (3) A

(Offered alternate years; offered 1972-73.) 582 Augustan Poetry (3) W

(Offered alternate years; offered 1972-73.)

584 Survey of Latin Poetry (3) Sp (Offered alternate years; offered 1972-73.)

585 The Civil War: Caesar, Cicero, Lucan (3) A

(Offered alternate years; offered 1973-74.)

587 Roman Comedy, Menander, Petronius (3) W

(Offered alternate years; offered 1973-74.)

**589 Prose of the Roman Empire (3) Sp** (Offered alternate years; offered 1973-74.)

590 Supervised Study (\*, max. 18) AWSp

600 Independent Study or Research (\*) AWSp

700 Master's Thesis (\*) AWSp

## CLASSICAL ARCHAEOLOGY

#### 511 Mycenaean Archaeology (3) A EDMONSON

The art, architecture, and culture of Greece in the late Bronze Age, with emphasis on recent archaeological and linguistic discoveries. (Offered alternate years; offered 1973-74.)

513 Athenian Topography (3) W

#### EDMONSON

Detailed consideration of the topography and monuments of ancient Athens from the beginning through the Roman period. (Offered alternate years; offered 1973-74.)

## 515 Attic Epigraphy (3) Sp

EDMONSON Study of Athenian inscriptions with emphasis on their historical value. The classification and editing of inscriptions, epigraphical techniques, and special problems are treated in detail. (Offered alternate years; offered 1973-74.)

## CLASSICAL LINGUISTICS

501 Comparative Phonology of Greek and Latin (3) A

The phonological developments of Greek and Latin from Indo-European to the classical periods of both languages.

503 History of the Greek Language (3) W The morphological and syntactical development of the Greek language from Homer through the New Testament; the development of prose and poetic style.

505 History of the Latin Language (3) Sp The morphological and syntactical development of the Latin language; the development of Latin as a literary language.

## 506 Italic Dialects (3) A

The principal remains of the non-Latin languages and dialects of ancient Italy.

#### 508 Greek Dialects (3) W

The non-Attic dialects of ancient Greek, based on a study of inscriptions and the literary remains.

510 Mycenaean Greek (3) Sp

A study of the Linear-B tablets found in Crete and on the Greek mainland.

## COMMUNICATIONS

## **Courses for Undergraduates**

COMMUNICATIONS

150 The Mass Media (5) AWSp

CLARKE, PEMBER, SAMUELSON, YERXA Organization, operation, and control of the mass media in America; social functions of mass communication; characteristics of media audiences. Open to nonmajors.

200 The Communication Process (5) AWSp

CLARKE, PARKER, PYSZKA, SAMUELSON An examination of the functions of communication. Open to nonmajors.

## 201 Communications Today (2)

An elementary course in the communications process and a survey of contributions of the various disciplines as applied to mass media,

## ARTS AND SCIENCES

news, advertising, and editorial interpretations. A critical study of language use. Open only to nonmajors.

#### 202 History of the Press in America (2)

A study of the men and ideas which shaped the development of the press in America. Open only to nonmajors.

203 The Press in Contemporary America (2) A study of responsibility of the mass media in relation to the political and economic spheres of society. Special emphasis on ethics of journalism. Open only to nonmajors.

## 226 Introduction to Advertising (3)

Economic and social aspects; organizational structure; comparison of major media; and the elements of creating and producing advertising. Open only to nonmajors.

250 Survey of Radio and Television (3) GODFREY, SHADEL

History of the media, organization and regulation of the industry, commercial aspects, educational use, programming. Open only to nonmajors.

#### JOURNALISM

291 Photography (3) AWSp

CONRAD Elementary news photography, photo processing, and picture editing. Prerequisite, 150. Open only to majors.

The Role of the Magazine in America 314 (3) A SMITH

The significance of specialized periodicals as vehicles of popular expression. Open to nonmajors.

## 316 Contemporary Affairs (3)

YERXA

Background and significance of international, national, and local newsworthy events. Primarily a discussion course. Open to nonmajors.

#### 320 Legal Aspects of Communications (5) AŴ

PEMBER

Regulations governing publications in the mass media. Open to nonmajors. (Formerly 220.)

321 News Writing (4) AWSp

JOHNSTON, PEMBER, YERXA

Structure of news and feature stories. Prerequisites, 150, 200, 320, and reasonable proficiency in the use of the typewriter. Open to nonmajors by permission.

# 322 Reporting Contemporary Affairs (4) AWSp

SHADEL, YERXA

Reporting of contemporary news scene with special emphasis on national affairs. Prerequisite, 321. Open only to majors.

#### 323 Reporting Urban Affairs (4) AWSp JOHNSTON, YERXA

Advanced reporting of the urban area. Emphasis on social change, city government, and court procedures. Prerequisite, 321. Open only to majors.

## 324 Critical Writing for the Mass Media

(4) ASp JOHNSTON, YERXA

Interpretive, persuasive, and analytical writing for the mass media with emphasis on edi-torials; reviewing of books, films, the arts; concepts of editorial responsibility; a study of outstanding critics. Prerequisite, 321. Open only to majors.

#### 325 Copy Editing (4) AWSp SAMUELSON

Decision-making in the newsroom. An analysis of criteria for selection and display of news. Training in the making of editorial judgments, writing of headlines, editing of copy, handling of photos, and dummying of pages. Prerequisite, 321. Open only to majors.

#### 326 Magazine Article Writing (3) W

DANIEL Nonfiction writing for national magazines and specialized publications. Prerequisite, permission. Open to nonmajors.

#### 328 Reporting Minority Affairs (3) W HOLIFIELD

Problems in advanced reporting designed to communicate minority views to the larger society. Open to nonmajors.

#### 329 **Reporting Minority Affairs Laboratory** (2) W

Newswriting laboratory in problems of ad-vanced reporting designed to communicate minority views to the larger society. Must be taken concurrently with Communications 328. Prerequisite, 321. Open to nonmajors.

#### PUBLIC RELATIONS

338 Public Relations (3) ASp RIS

Principles and practice of public relations in business, industry, government, and social agencies; policy and conduct as fundamentals in good business relationships. Open to nonmajors.

#### 339 Problems in Public Relations (3) W RIS

Group application of principles to the field problems of local business or agencies, with reports and recommendations. Prerequisite, 338. Open to nonmajors.

## ADVERTISING

340 Introduction to Advertising (3) A

The institutions and the major functional components of advertising. Advertising's role in the marketing mix. Prerequisite, 150, 200, and Marketing 300 or permission. Open to nonmajors by permission; not open to students who have taken Communications 226.

### 341 Advertising Copywriting (5) AWSp

RIS Development of an appreciation and understanding of the theory and methodology of writing advertising copy for newspapers, radio, television, and direct mail. Attention is also given to copy formats required by various media as well as an understanding of the relationships between graphics and written words. Prerequisite, 340. Open only to majors.

343 Layout and Production (3) ASp

ANDRUS Theory and problems in the design and production of advertisements for printed media. Prerequisite, 340 or 226. Open only to majors.

#### Advertising Campaigns (5) WSp 345

PYSZKA, RIS, ROLLER Advanced consideration of communication problems relevant to advertising efforts. Preparation of an advertising plan for a product or a service, including objectives, strategy, and tactics for copy, media, and research. Prerequisites, 341, 346, and 348, or permission. Open to nonmajors by permission.

#### 346 Advertising Media Planning (3) WSp ROLLER

Characteristics and evaluation of media and

the writing of media plans for specific advertising campaigns. Emphasis is on the planning phase of media from a management point of view. Prerequisite, 340. Open only to majors.

## 348 Advertising Research (3) W

PYSZKA Consideration of research problems and methods of investigation relevant to advertisers; emphasis on conceptualization of advertising problems in the broader context of communication processes and effects; review of existing research sources, but special emphasis on original research. Prerequisite, 340. Open only to majors.

## **RADIO-TELEVISION AND**

## **BROADCAST JOURNALISM** 349 Radio and Television Advertising

(5) AW CRANSTON

Principles of broadcast media as they apply to advertisers; planning a radio or television campaign; developing radio-television com-mercials. Prerequisite, 340 or 370 or Marketing 411. Open to nonmajors by permission of instructor.

#### 353 Radio and Television News Writing (3) AWSp

WIKE

Gathering, writing, editing, and programming news for the broadcast media, including visual treatment for television and film. Prerequisite, 321 or 370. Open to nonmajors by permission of instructor.

### 354, 355 Television News Film Techniques (2,2) A,W

HATCH, WIKE

Development of skills in the use of the motion-picture camera; a study of the use of film in news and public affairs programming; emphasis on writing for film purposes and de-veloping editorial judgment. Prerequisite, 353 or permission of instructor.

## 356, 357, 358 News Broadcasting (3,3,2) AŚp,AW,WSp

SHADEL, WIKE

Preparation and presentation of news broadcasts; progression from editing radio news program to use of visuals and performance in television newscasts. Prerequisite, 353. Open only to majors.

## 360 Radio Production (5) AWSp

BROUGHTON

Studio and microphone setups; timing, use of sound effects and incidental music; performance. Prerequisites, for majors, 150, 200; for nonmajors, permission of instructor.

#### Television Production (5) AWSp 361 GODFREY

The tools and crafts of production of television programs, culminating in closed-circuit presentation and recording of student-created programs subject to critical evaluation. Prerequisites, for majors, 150, 200, and permis-sion; for nonmajors, permission of instructor.

#### 365 Television Workshop Laboratory (2-4, max. 8) WSp

GODFREY

Laboratory under on-air conditions at educational station, assignments and duties increasing in complexity as student's growth indicates. Prerequisites, 361 and permission of instructor. Open to nonmajors.

#### 370 Elements of Radio Writing (5) AWSp BROUGHTON

Principles of writing for listeners. Prerequisites, 150, 200, 320, and reasonable profi-

PYSZKA, RIS, ROLLER

ciency in the use of the typewriter. Open only to majors.

#### 371 Laboratory Work on KUOW (3) Sp WIRTZ

Supervised practice in the various departments of the University's FM radio station, KUOW. Prerequisites, 360 and 370. Open only to majors.

## 373 Television Writing (3) W CRANSTON

Principles and techniques of writing material for television production. Practice in writing programs, with consideration of camera, direction, and production problems. Open to nonmajors.

#### 374 Advanced Television Writing (3) Sp CRANSTON

Development of an original television script of professional production caliber. Prerequisite, 373. Open to nonmajors.

#### 377 The Documentary (3) ASp CRANSTON

Historical development of the documentary. Background, aims and creative aspects. Function of documentary in mass media. Open to nonmajors.

#### 379 Seminar in Broadcast Problems (3) BROUGHTON, CRANSTON, GODFREY

try, projected against basic legal, ethical, social, and economic principles of station operation. Open only to majors with senior standing.

## Courses for Undergraduate and Graduate Students

## 400 Communication Theory (3) W

Analysis of the factors affecting communication and its results, including relevant research in psychology, sociology, linguistics, and anthropology, together with significant studies in mass communications. Prerequisite, 200 or permission. Open to nonmajors.

#### 402 Government and Mass Communication (3) W

PEMBER, YERXA

The Anglo-American concept of freedom of communication; its evolution under United States federal and state constitutions; present tension areas; judicial decisions; statutes and administrative regulations affecting publishing, broadcasting, etc. Open to nonmajors.

#### 406 Social Control and the Mass Media (5) A

CLARKE

An analysis of relationships between the social structure, political power, and the mass media, and the influence of the media on popular culture. Prerequisite, 200 or permission. Open to nonmajors.

## 411 Mass Communications Research (5)

Recent developments in the study of mass communications content and audience, with emphasis on the printed media. Prerequisite, 150 or permission. Open to nonmajors.

#### 414 History and Communications (5) ASp AMES

The growth and development of the press, with emphasis on journalism in the United States, its social, political, and ethical responsibilities. Prerequisite, 5 or more credits in American history or permission. Open to nonmajors.

# 443 The Social Functions of Advertising (3) Sp

PYSZKA, RIS

An examination of the social and economic functions of advertising as an institution in contemporary society, with special attention to controls over advertising. Emphasis is on current issues. Prerequisite, 340 or equivalent. Open to nonmajors by permission.

## 447 Communication and Consumer Behavior (5)

PYSZKA

Examination of behavioral science contributions to the understanding of consumer communication and purchasing behaviors; contributions from psychology, sociology, and anthropology. Emphasis is on the application of findings to the preparation and the placement of the advertising message. Prerequisites, 200, 340, and 348, or their equivalents. Open to nonmajors by permission.

## 449 Advertising Seminar (3)

CRANSTON, PYSZKA, RIS, ROLLER Seminar in problems and procedures in advertising, incorporating presentations by industry professionals concerning current practices. Prerequisites, 345, senior standing in the advertising sequence, and permission. Open only to majors.

## 450 Broadcast Programming (3) W

GODFREY

A critical study of the nature, range, and structure of broadcast programming and of the forces that shape it. Open to nonmajors who have completed 250.

#### 459 Television in the Schools (3) S DILWORTH

Television programs to supplement classroom work; the development of the American system of broadcasting; the development and significance of educational television, and the contribution schools can make to broadcasting. Open to nonmajors; not open to graduate students in Communications. Offered jointly with the College of Education as Educational Curriculum and Instruction EDC&I 488.

## 463 Television Production Workshop for Teachers (2½) S

GODFREY Working in University studios, under laboratory conditions involving production and oncamera methods, teachers learn to present instructional subject matter through television. Especially for those who expect to work with television as instructors or as supervisors of school-oriented television activities. Open only to nonmajors. Offered jointly with the College of Education as Educational Curriculum and Instruction EDC&I 489.

#### 470 Theory and Criticism of Broadcasting (3) A SHADEL

The development of social, economic, and critical standards of broadcasting and the function of radio-television in the mass communication process. Prerequisite, 150 or 250, or permission of instructor. Open to non-majors.

## 473 Television Drama Production Seminar

(3) AW CRANSTON, WHITE

broduction of a professional quality television dramatic program involving writing, acting, and videotaping. Open to students who have had Communications 373 or 361 (for writers and producers), or Drama 351, 352, 353 (for actors). Offered jointly with the School of Drama as DRAMA 454. Prerequisite, permission.

## 474 The Educational Role of the Mass Media (21/2) S

AMES

A critical study of the role the mass media have served in providing the individual with the information necessary for fulfillment of his major responsibilities as a citizen, as an economic unit, as a moral force, and as a cultural entity. Open only to nonmajors.

#### 480 Public Opinion and Propaganda (5) A EDELSTEIN

The analysis of public opinion and propaganda as a communication process. An integration of behavioral, historical, and political concepts of public opinion, propaganda, and communication. Prerequisite, 200 or permission. Open to nonmajors.

## 485 Comparative Communication Systems (5) Sp

PARKER

The structure and functions of communication systems. The role of communication in social change, e.g., politicization, modernization, and other forms of social and political development. Country and regional studies of the structure, control, content, audiences, and effects of communication. Prerequisite, 200 or permission. Open to nonmajors.

## 495H, 496H, 497H Honors Seminar in Communications (3,3,3) A,W,Sp

AMES, CLARKE

Analysis of the contributions to communications of the behavioral sciences (first quarter) and the humanities (second quarter), in preparation for the writing of an honors thesis in Communications 497H. Prerequisite, senior honors standing. Open to nonmajors; not open to graduate students in Communications.

#### 498 Problems of Communications (1-5, max. 10) AWSpS

Research and individual study. Prerequisites, permission of Director and staff.

## **Courses for Graduates Only**

## 500, 501 Seminars in Theory of

Communication (5,5) W,Sp CARTER

Major points of view—general semantics, persuasion and effects, and communication systems. Examination of communication concepts in the empirical literature. Prerequisite, 400 or 508. Open to nonmajors.

#### 502 Seminar in Government and Mass Communication (3) Sp

PEMBER, YERXA

Directed independent research into, and analysis of, legal problems in mass communication, institutional and media operations. Prerequisite, 402. Open to nonmajors.

## 505 Communication and Politics (3) W CLARKE

Study of the primary literature dealing with communication and American political behavior. Prerequisite, 406. Open to nonmajors.

#### 506 Communication and Leisure (3) Sp CLARKE

Study of the mass media as popular entertainment, including analysis of content and audience gratification. Prerequisite, 406. Open to nonmajors.

## ARTS AND SCIENCES

#### 507 **Computer Applications in Communica**tion Research (3)

Potentialities of the computer and the use of the computer in the behavioral sciences. Prerequisites, elementary programming and elementary statistics. Open to nonmajors.

## 508, 509 Communication Research (5,5) A,W CARTER, SAMUELSON

Development of the rationale and methods of behavioral science in the context of communication research and theory. Prerequisites, 508 and statistics through analysis of variance for 509. Open to nonmajors.

#### Seminar in Communication Research (3, max. 15) AWSp

Prerequisites, 508 and permission. Open to nonmajors.

#### 512, 513, 514 Seminar in History and Communications (3,3,3) A,W,Sp AMES, PEMBER

The development of the historical approach to communications research. Study of his-torical method, bibliography, and criticism. Open to nonmajors.

## 550-551 Advanced Communication Methods (2-4)-(2-4, max. 6) A,W

SHADEL, YERXA

Directed individual projects in the design and organization of a complex mass communication, of a level of accomplishment suitable for professional quality print or broadcast media. Advanced techniques of research and production analyzed and applied. Prerequisite, bachelor's degree in Communications or equivalent. Open only to majors.

#### 570 Seminar in the Theory and Criticism of **Broadcasting (3) W** SHADEL

Evaluation and criticism of the function and operation of broadcasting in the mass communication process. Use of primary 'sources, including data gathering and analysis. Pre-requisite, 470. Open to nonmajors.

#### Seminar in Public Opinion and 580 Propaganda (3) W

EDELSTEIN

Directed reading and research in the analysis of public opinion and propaganda. Prerequisite, 480. Open to nonmajors.

581 Seminar in International **Communications (3) Sp** EDELSTEIN

The analysis of international communications. Directed research in intercultural communication. Prerequisite, 580. Open to nonmajors.

#### 583 Regional Communication Systems (5) PARKER

Analysis of communication problems of regional economic associations, and theory of political community, and examination of empirical research on regional communication. Special emphasis will be given Western Europe and the North Atlantic area. Prerequisites, 480, 485, or equivalent, or permission. (Offered alternate years with 585.) Open to nonmajors.

#### 584 **Research Seminar in Regional** Communication Systems (3) W EDELSTEIN, PARKER

Directed research in communication factors in regional integration in a determined region of the world. Prerequisite, 583. (Offered alternate years with 586.) Open to nonmajors.

#### 585, 586 Seminar in Comparative Communication Systems (3,3) W,Sp PARKER

The analysis and comparison of communication systems. Directed research in comparative systems and into the role of communications in national development. Prerequisite, 485. (Offered alternate years with 583, 584.) Open to nonmajors.

#### 597 **Practicum in Communication Research**

(1-5, max. 10) AWSpS Individual participation by a qualified graduate student in an on-going research project under the direction of a faculty member. Prerequisites, 501, 509.

598 Selected Readings (1-5, max. 10) AWSpS Open to qualified graduate students by permission of director and staff.

- 600 Independent Study or Research (\*) AWSpS
- 700 Master's Thesis (\*) AWSpS

800 Doctoral Dissertation (\*) AWSp

## **COMPARATIVE LITERATURE**

## **Courses for Undergraduates**

## 257 Literature and Film (3-5, max. 10)

Examination of 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 will be shown as an integral part of the course. Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered.

#### 261, 262, 263 Modern African Literature (3-5, 3-5, 3-5) A,W,Sp

A survey course in African literature from the colonial period to the present with specific references to the themes of nostalgia, rebellion, and humanism. Readings, discussion of, and reports on, representative works in prose, poetry, and drama. Among authors studied: Achebe, Mphahlele, Oyono, Paton, Senghor, Soyinka, Tutuola.

#### 300 World Classics of Western Europe (5) A JONES

Great works of English, French, Italian, and Spanish poetry, drama and fiction, from the Middle Åges to the twentieth century, read in English and taught by specialists in English and Romance literature. Prerequisite, junior standing.

#### 301 World Classics of Germany, Russia, and Scandinavia (5) W

Great works of Danish, German, Icelandic, Norwegian, Russian, and Swedish poetry, drama and fiction, from the Middle Ages to the twentieth century, read in English and taught by specialists in German, Scandinavian, and Slavic literature. Prerequisite, junior standing.

#### 302 World Classics of the Orient (5) Sp MCKINNON

Great works of Chinese, Japanese, and Korean literature and thought, read in English and taught by specialists in Asian literature. Prerequisite, junior standing.

#### 400 Heroic Poetry (5) W

JONES Ancient, medieval, and Renaissance epic poems, read in English. The Gilgamesh epic, Iliad, Odyssey, Metamorphoses, Aeneid, The Song of Roland, and Jerusalem Delivered.

#### 401 Modern European Drama (5) A REINERT

Selected plays, read in English, by Ibsen, Strindberg, Chekhov, Pirandello, Brecht, Camus, Durrenmatt, the absurdists, and others, representing naturalism, expressionism, theatricalism, and other movements that have shaped the modern European theater. Prerequisite, junior standing.

### 410 Literary Motifs (3-5, max. 10)

Examination of important fictional figures, situations, and plots that, through their re-peated recurrence in world literature, appear to have a profound and universal significance for the human imagination. Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered. Foreign language texts will be read in English translation.

#### 415 The Comic in Literature (5) BLLRICH

A study of masterpieces of comic literature emphasizing various modes and uses of the comic. Prerequisites, junior standing and at least 10 credits of literary study.

## 430 Modern Greek Literature (3-5)

Modern Greek literature from the early nineteenth century to the present, with selected readings in translation from a number of writers. Special emphasis will be placed on the transmission and adaptation of themes, images, and language from Homer, classical Greece, the Alexandrian poets, the Byzantine era, and folk literature, as they have been in-corporated into vernacular works. It will in-clude such authors as Palamas, Solomos, Cavafy, Seferis, and Kazantzakis. Prerequisite, junior standing.

## 440 The Novel (3-5, max. 10)

Examination of the novel as a genre, taking into consideration such matters as narrative technique, characterization, and the manifold ways in which prose fiction reflects the world view of the individual artist and of the society that has produced him. Material of the course will vary with the various faculty members who offer it, but, normally, the larger techni-cal, social, and philosophical questions will be illustrated through intensive study of novels by two or more writers from different national cultures. Consult Comparative Literature office for details. Non-English works may be read in translation, and thus no foreign language knowledge is required.

#### 450 Afro-Occidental Literary Relations (3-5, max. 10)

Examination of selected works of African literature, with particular attention being paid to some of the varied relations of influence and affinity existing between them and certain typical works of occidental literature, e.g., French and American. Course content will vary; consult Comparative Literature office for specific details each time course is offered. A foreign language is sometimes required.

## 472 Studies in Narrative (3-5, max. 10)

Narrative styles and developments from antiquity to the present. Course content will vary; consult department each quarter for specifics. (Formerly 572.)

#### 480 Modern European Poetry (5) Sp JONES

Selected works read in English, by French, German, Italian, and Spanish poets from the Romantic period to the present. Prerequisite, junior standing.
### 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.

## 496 Special Studies in Comparative

Literature (5, max. 10)

To be offered occasionally by visitors or resident faculty. Consult department each quarter for specific information.

## **Courses for Graduates Only**

Consult department for information on the quarter and year the courses below will be offered.

### 510 Theories and Methods of Comparative Literary History (5, max. 10) JONES, WARNKE

Lectures on comparative theory and practice from Vico to the present; seminar papers on comparative topics relevant to the student's fields of concentration.

### 511 The Art of Translation (5, max. 10) JONES

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.

### 513, 514 History of European Literary Theory and Criticism (3,3) E. BEHLER

A two-quarter seminar concerned with the analysis of the main concepts of literary theory and literary criticism in the western world as they have developed from the Middle Ages to the present. Emphasis will be placed on the philosophical background from which the literary ideas emerged.

### 515 Recent Trends in Literary Criticism (3) KERN

A study of some of the recent trends in literary criticism; in particular, structural and philosophical approaches. Prerequisites, advanced graduate standing and facility in reading French.

### 522, 523 Existentialism and Literature: Form and Content (3,3)

KERN

### A study of the effects of existential and phenomenological thought on literary themes and techniques. Prerequisite, graduate standing.

### 525 The Baroque in Criticism and Literature (3-5, max. 15)

KERN, LEINER, WARNKE

An investigation into the origins and history of the term as used in literary criticism, accompanied by a study of representative Baroque literature in various countries. Included are such works as *Don Quixote*, *Phedre*, and French, Spanish, Italian, and German poetry available in translation, but preferably to be read in the original.

### 530 Comparative Study of French and German Courtly Epic (3) HRUBY

Three major works of the German and French courtly epic, *Erec, Perceval*, and *Tristan*, will be systematically compared. Prerequisite, permission.

### 535 Poetic Forms (3-5, max. 15)

A seminar concerned with the evolution, dissemination, and function of metrical and stanzaic forms in various literatures. Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered. Prerequisite, ordinarily, reading knowledge of one foreign language.

### 540 Eighteenth-Century European Aesthetics

### (3) E. BEHLER

An analysis of important works of eighteenthcentury aestheticians in England, France, and Germany. Prerequisite, facility in reading either French or German.

### 545 Studies in Renaissance and Baroque Epic Poetry (3)

WARNKE

A study of renaissance and baroque epic poetry, including works of Ariosto, Tasso, Spenser, Milton, and others. Prerequisite, reading knowledge of either French, Italian, Spanish, or Portuguese.

546 Studies in the Renaissance (3-5, max. 10) An examination of various aspects of Western European literature during the Renaissance. Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered. Prerequisite, reading knowledge of at least one European language.

### 547 Classical Tradition in Medieval and Renaissance Europe (3-5, max. 15)

Intensive study of a single topic or genre. Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered. Prerequisite, reading knowledge of Latin or Greek, and French or Italian.

### 550 European Realism (3)

Seminar study of works of European Realism (Balzac, Flaubert, Turgenev, Dostoevski, Tolstoy, the representative Victorians, and the writers of "poetic realism") in connection with various aesthetic doctrines and subsequent critical appraisals. Prerequisite, graduate standing.

## 555 Studies in Irony (3)

E. BEHLER

A seminar examining irony in literary, philosophical, and satirical masterpieces from the classical period to contemporary literature.

### 560 Classical Rhetoric and Literature (3) LEINER

A seminar exploring the influence and the importance of classical rhetoric in European literary works of the seventeenth and eighteenth centuries. Texts and examples to be chosen in English, French, Italian, and German literatures. Prerequisite, reading knowledge of French, Italian, or German.

565 Studies in Nineteenth-Century Literature (3-5, max. 15)

Seminar examining various aspects of nineteenth-century European literature: Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered. Prerequisite, ordinarily, reading knowledge of one foreign language.

## 570 Studies in the Novel (3-5, max. 15)

Two two-hour seminars comparing two or more novels of varying national literatures. Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered. Prerequisite, reading knowledge of one foreign language.

## 571 Studies in the Lyric (3-5, max. 15)

An examination of central questions in the study of the lyric genre as approached from an international point of view. Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered. Prerequisite, ordinarily, reading knowledge of one foreign language.

## 573 Studies in the Drama (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 will vary; consult Comparative Literature office for specific details each quarter the course is offered. Prerequisite, ordinarily, reading knowledge of one foreign language.

### 574 Literary Motifs (3-5, max. 10)

Examination of important fictional figures, situations, and plots that, through their repeated recurrence in world literature, appear to have a profound and universal significance for the human imagination. Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered. Normally, a reading knowledge of at least one foreign language will be required.

### 575 Intercultural Relationships in Literature (3-5, max. 15)

Seminar or seminars examining significant relationships among the literatures of various national cultures during various historical periods. Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered. Prerequisite, reading knowledge of one foreign language.

### 576 Non-Western Literary Traditions (3-5, max, 15)

This course is intended to provide those with a background in Western literary criticism an awareness of features characterizing wholly separate, long, and strongly sustained critical traditions in other areas (China, for example). Normally translations will be assigned for nonreaders of the foreign language or languages concerned. Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered.

### 580 Literary Relations (3-5, max. 15)

A seminar that will examine relationships or parallels between two, or among more than two, important writers from different national literatures. Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered. Prerequisite, ordinarily, reading knowledge of one foreign language.

581 Literature and Psychology (3-5, max. 10) Seminar exploring ideas, critical procedures, and problems in this interdisciplinary area. Though various psychological viewpoints will be discussed, special attention will be given to those concerned with unconscious mental processes. Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered. Neither previous course work in psychology nor knowledge of a foreign language is required.

### 585 Literature of Islam and Europe (3-5, max. 15)

A seminar examining the mutual influences between Islamic literature and culture (chiefly Arabic and Persian) and European. Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered. Prerequisite, ordinarily, reading knowledge of one foreign language.

### 592, 593 The European Romantic Movement (3,3) BEHLER

Analysis of the chief works of the Romantic movement in England, Germany, and France, and their repercussions in America.

## 596 Special Studies in Comparative

Literature (3-5, max. 15) To be offered occasionally by visitors or resident faculty. Course content will vary; consult Comparative Literature office for specific details each quarter the course is offered.

### 600 Independent Study or Research (\*) AWSpS

Prerequisites, permission and notification of Comparative Literature office.

700 Master's Thesis (\*) AWSpS

800 Doctoral Dissertation (\*)

### DÁNCE

Other courses in dance are listed under Physical and Health Education in this section of the catalog.

101, 102, 103 Beginning Dance Techniques (3, max. 6; 3, max. 6; 3, max. 6) A,W,Sp BORIS, GREEN, SKINNER

Basic foundation for all special dance techniques; emphasis on flexibility, strength, balance, endurance, sensory perception, rhythmic awareness. Prerequisites, 101 for 102; 102 for 103, or permission.

251, 252, 253 Intermediate Contemporary Dance Technique (3, max. 6; 3,3) A,W,Sp SKINNER

Study and practice of established modern dance techniques; analysis through practice of specific styles. Prerequisites, 103 for 251; 251 for 252; 252 for 253, or permission.

256, 257, 258 Intermediate Ballet Technique (3, max. 6; 3,3) A,W,Sp BORIS, GREEN

Amplification of basic foundation; increased vocabulary, terminology refinements; adage, allegro, pirouettes, tours, battri, tours de force. Prerequisites, 103 for 256; 256 for 257; 257 for 258, or permission.

# 280 Basic Movements for Theatre Disciplines (1, max. 3)

Basic body actions, unified through structure and improvisation; foundation for coordinated, articulate physical requirements in theatre disciplines; preliminary to period movement and manners studies. Prerequisite, permission.

290 Structure of Music in Relation to Dance (2-5, max. 5)

DE CEUNYNCK

Study of structural parallels between organized sound and organized movement; emphasis on time-space relationships. Prerequisite, permission.

351, 352, 353 Advanced Ballet and

Contemporary Dance Techniques (5, max. 10; 5,5) A,W,Sp BORIS, GREEN

Amplification of intermediate material; increased vocabulary; analysis and practice of specific choroeographic styles. Prerequisites, 253 and 258 for 351; 351 for 352; 352 for 353, or permission.

### 490 Special Studies in Dance (1-3, max. 15) Pointe technique, partnering techniques, period and character dance. Prerequisite, permission.

## DRAMA

## **Courses for Undergraduates**

101 Introduction to the Theatre (5) AWSp WOLCOTT

An introduction to 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. Open to nonmajors.

102, 103 Play Analysis (3,3) W,Sp

Descriptive analysis of plays, both modern and historical, to provide tools for the student to read a text critically and creatively.

### 121, 122, 123 Movement for the Actor (2,2,2) MILLER

Movement for the actor based on Lecoq techniques. 121: improvisation for development of sensory-motor skills; 122: re-education of muscular efforts and coordination; 123: use of masks for characterization. Prerequisite, acceptance for the Bachelor of Fine Arts program.

### 141, 142, 143 Voice Training for the Actor (3,3,3) A,W,Sp PARKS

141: relaxation, limbering, and centering of the voice; 142, 143: vocal dramatic styles (Jacobean texts). Prerequisite, acceptance for the Bachelor of Fine Arts program.

146 Theatre Voice and Speech (3) AWSp Stage vocal techniques and exercises in practical application. Open to nonmajors.

151, 152, 153 Acting (3,3,3) A,W,Sp Theory and practice of fundamentals. 151: development of fundamental aptitudes in acting (focus, recall, sense memory) through improvisation and basic scene work; 152: analysis and development of characterization; 153: advanced analysis, character rhythm, extended scene work. Prerequisites, 151 for 152; 152 for 153.

### 155, 156, 157 Acting (5,5,5) A,W,Sp MILLER, ROSS

Acting for the professionally-oriented student. 155: improvisation, the fundamentals of acting theory, practice; 156, 157: acting styles, Elizabethan. Prerequisite, acceptance for the Bachelor of Fine Arts program. '

### 181, 182, 183 Play Analysis for the Actor (2,2,2) A,W,Sp ROSS

Play analysis from the point of view of the actor; 181: the principles of method and their imaginative integration for the actor; 182: application of analysis method to Elizabethan plays; 183: application to Jacobean plays. Prerequisite, acceptance for the Bachelor of Fine Arts program.

### 201 Introduction to Black Theatre (5) A MOBLEY

Intensive lecture-laboratory course in the theory and practice of Black theatre productions, with emphasis on the works of Black playwrights. Critical analysis of Black plays.

# 202 Introduction to Black Theatre: Historical Plays (3) W

Intensive laboratory course in the theory and the practice of Black theatrical productions, with emphasis on the work of Black playwrights. Prerequisite, 201.

### 203 Introduction to Black Theatre: Contemporary Plays (3) Sp MOBLEY

Continuation of 202. Prerequisite, 202.

### 210, 211, 212 Theatre 'Technical Practice (2 or 4, 2 or 4, 2 or 4) W,A,Sp CRIDER, DAVIS, LOUNSBURY

Intensive lecture, laboratory course in basic theories, techniques and equipment of stage scenery, lighting, costumes and scene painting. 210: scene construction and scene painting; 211: costumes; 212: lighting and technical stage procedures. Crew work required in addition to scheduled class hours.

## 221, 222, 223 Movement for the Actor (2,2,2) A,W,Sp

MILLER

221: advanced mask work, comedy characterization, animal improvisation; 222: Commedia Del Arte techniques, stage fencing; 223: advanced commedia. Prerequisite, completion of first year of the Bachelor of Fine Arts program.

# 230 Introduction to Children's Drama (2) W

HAAGA, VALENTINETTI Survey of children's drama with an emphasis on philosophies and practices. Includes children's theatre, creative dramatics, and puppetry. Open to nonmajors.

## 241, 242, 243 Voice Training for the Actor (3,3,3) A,W,Sp

ROSS

241: Vocal dramatic styles, Elizabethan; 242: Vocal dramatic styles, Jacobean; 243: Vocal dramatic styles, Moliere and Restoration. Prerequisite, completion of first year of the Bachelor of Fine Arts program.

### 251, 252, 253 Acting (4,4,4) A,W,Sp ROBERTS, WHITE

Intensive course-sequence in acting with integrated laboratory work in movement and voice. Improvisation, mime, scene analysis, and emphasis on realistic acting with introduction to styles and genres. Majors only. Prerequisites, audition for 251; 251 for 252; 252 for 253, and DANCE 101, 102, 103, which must be taken concurrently.

## 255, 256, 257 Acting (5,5,5) A,W,Sp

MILLER, ROSS, ZASLOVE

255: Elizabethan and Jacobean styles; 256: Restoration styles; 257: Moliere and Commedia Del Arte. Prerequisite, completion of first year of the Bachelor of Fine Arts program.

### 271, 272, 273 Seminar in Theatre and Drama (2,2,2) ROSS

Prerequisite, completion of first year of the Bachelor of Fine Arts program.

### 275, 276, 277 Development of Dramatic Art (3,3,3) A,W,Sp

LORENZEN

Drama and critical theory from the classic to the modern. 275: Greek and Roman; 276: Mediaeval and Renaissance; 277: eighteenth, nineteenth, and twentieth centuries. Prerequisites, 275 for 276; 276 for 277.

## 298, 498 Theatre Production

(1, max. 6; 1, max. 3) AWSp, AWSp Laboratory courses for students participating in School of Drama productions. Prerequisite, being cast in a production.

### 316 Theatrical Make-Up (2) AWSp DAVIS

Basic principles, with intensive practice in

application of make-up for use on proscenium and arena stages. Open to nonmajors.

### 324 Children's Theatre (3) WSp

Theory and techniques, play selection and analysis, and rehearsal procedures. Emphasis on directing.

## 325, 326 Play Production (5,5) Sp,W

DAVIS, GRAY

325: fundamentals of scenery, lighting and costume design and construction; 326: fundamentals of directing, especially for high school, with some acting. Open to nonmajors.

## 331 Puppetry (3) AWSp

### VALENTINETTI

Introduction to puppetry; construction and use of simple puppets as a visual aid in education, recreation, and therapy.

# 336 Drama in the Elementary School (3) A

Theory and practice of fundamentals of playacting as they relate to teaching children through improvisation and problem solving, emphasizing child development; correlation with language arts. Prerequisites, 151 and Educational Psychology EDPSY 304, and permission.

## 338 Creative Dramatics (3) AWSp HAAGA, SIKS

Analysis of basic principles and techniques of the creative process in informal drama; observation of children and youth.

### 351, 352, 353 Advanced Acting (4,4,4) A,W,Sp

LOPER, WHITE

Theory and practice of period styles: 351: Shakespeare; 352: Moliere and Restoration; 353: classical and nonrealistic modern. Prerequisites, 253 for 351; 351 for 352; 352 for 353.

### 371, 372, 373 Special Studies (2,2,2) A,W,Sp ROSS

Specialized and individualized work related to the main curriculum of the third year of the Bachelor of Fine Arts program. Prequisite, completion of two years in the Bachelor of Fine Arts program.

### 375, 376, 377 History of the Western Theatre (3,3,3) A,W,Sp

WOLCOTT

History of the theatre in the West, from classical times to the present. Focus on physical development of scene design, costuming, and acting; on the relationship between the theatre and the society in which it flourished; and on the relationship of the physical theatre to the dramas produced within it. Prerequisites, 275 for 375; 276 and 375 for 376; 277 and 376 for 377.

### 410, 411, 412 Advanced Theatre Technical Practices (3, max. 9; 3, max 9; 3, max. 9) AWSp, AWSp, AWSp

CRIDER, DAVIS, LOUNSBURY

Apprenticeship, under faculty-staff supervision in theories, techniques, and equipment of stage scenery, lighting, costumes, and scene painting, 410: scene construction and scene painting; 411: costumes; 412: lighting and technical stage procedures. Prerequisites, 210 for 410; 211 for 411; 212 for 412.

### 413 Advanced Scene Construction and Drafting (5) W

DAVIS, LOUNSBURY

Special problems in scene construction and rigging with laboratories in working drawings and scenic models. Prerequisite, 210 or equivalent.

### 414 Scene Design (3, max. 6) AW DAVIS

Theory, practice, and rendering of scene designs. Repeat of course involves intermediate designs, models, etc. Prerequisites 210, Art 109 and Art History 203, or equivalent.

### 415 Stage Costume Design (3, max. 6) ASp CRIDER

Theory, practice, and rendering of costume designs for the theatre. Repeat of course involves intermediate designs. Prerequisites, 211, Art 109 and Art History 203 or equivalent; 411 for repeat of course.

### 416 History of Clothing and Costume (5) A CRIDER

Survey history of clothing and theatrical costume; emphasis on the dress of the audience and the actor in historic periods of theatrical activity. Prerequisites, 211 and Art History 203 or equivalent, or permission.

### 417 Advanced Stage Costume Construction (3) W

### CRIDER

Techniques of costume construction, including study of fabrics, color, and fundamentals of pattern making and draping for historic clothing reconstruction. Prerequisite, 211 or permission.

## 418 Scene Painting (3) A

DAVIS

Pigments, color mixing, and techniques of application to stage scenery. Prerequisite, 210 or permission.

### 419 Stage Lighting (3) Sp LOUNSBURY

Theories and methods of lighting with emphasis on lighting plots. Laboratories consist of analysis of lighting instruments and control, color experiments, and basic circuitries. Prerequisite, 212 or equivalent.

## 431 Fundamentals of Puppetry (2) Sp

VALENTINETTI

Puppetry as a theatre art; construction and use of puppets and marionettes for formal presentations; basic principles of playwriting and staging. Prerequisite, 331 or permission.

### 432 Advanced Puppetry (2, max. 4) AWSp VALENTINETTI

Projects and participation in formal theatre productions or field work in hospitals, clinics, and special schools. Prerequisite, 331 or permission.

### 435 Children's Theatre (3) W

Theory and technique, play selection and analysis, and rehearsal procedures. Practical experience in the laboratory. Prerequisite, 460.

### 436 Drama in the Elementary School (3) Sp SIKS

Theory and practice of fundamentals of playmaking and producing plays by children for children, employing improvisation, adaptation, interpretation, and communication. Prerequisites, 336; 325 or 210, 211, and 212; and permission.

### 437 Laboratory in Teaching Drama to Children (1) AWSp

SIKS

Practical experience in teaching drama to children. Prerequisites, 336, 438, and permission.

### 438 Creative Dramatics and Laboratory (3) ASp HAAGA

Application of basic principles and techniques

of creative dramatics through leadership experience. Open to nonmajors. Prerequisite, 338.

### 451, 452, 453 Rehearsal and Performance (3,3,3) A,W,Sp

Prerequisite, 353 or permission.

### 454 Television Drama Production Seminar (3) AW

CRANSTON, WHITE

Production of a professional quality television dramatic program involving writing, acting, and video taping. Open to students who have had Communications 373 or 361 (for writers and producers), or DRAMA 351, 352, 353 (for actors). Offered jointly with the School of Communications as Communications 473. Prerequisite, permission.

### 455 Historic Manners and Movement (2)

A laboratory course on the fundamentals of body movement for the stage and a survey of historic manners and movement, with particular attention to the interrelationship with historic costume. Open to nonmajors. Prerequisites, 253 and 211, or permission.

### 459 Intensive Rehearsal and Performance (6, max. 18) AWSp

Prerequisite, completion of two years in the Bachelor of Fine Arts program.

## 460 Introduction to Directing (3) A

FALLS, SYDOW Student is introduced to the art of the stage director.

### 461, 462 Elementary Directing (3,3) W, Sp FALLS, SYDOW

An elementary study of the art of the stage director. Prerequisites, 460 with grade of B or above for 461; 461 with grade of B or above for 462 or permission.

## 463 Intermediate Projects in Directing

(2) AWSp Falls, sydow

Prerequisite, 462 or permission.

464 Musical Comedy Direction (3)

### 474 History and Aesthetics of the Motion Picture (3) Sp

GALSTAUN

Lectures and exhibition of important and representative films, foreign and American. illustrating the evolution of this art form. Open to nonmajors. Prerequisite, junior-senior standing.

## 476 Seminar in History of the American Theatre (5) Sp

WOLCOTT

A study of the American theatre, its playhouses, managers, and artists, from colonial to modern times. Open to nonmajors, with permission.

## 477, 478, 479 History of Far Eastern Theatre and Drama (3,3,3) A, W, Sp

CONWAY

An inquiry into the origins and history of theatre and drama of Japan, China, and India and the conventions of their production. Classic and modern dramas will form the basis of the study.

490 Special Studies in Acting-Directing (1-6, max. 6) AWSp

Prerequisite, permission.

491 Special Studies in Design-Technical (1-6, max. 6) AWSp

Prerequisite, permission.

### 492 Special Studies in Children's Drama (1-6, max. 6) AWSp Prerequisite, permission.

# 493 Playwriting (3, max. 9) AWSp

A professional course. Prerequisites, English 374, 375, and permission.

494 Innovations in Teaching Drama (12) S Intensive, practical seminar in theatre and drama, stressing innovations in content and teaching approach in various special fields— acting, directing, design, and theatre history and criticism. Emphasis will be on student participation in projects guided by a team of teachers, with a view to expanding the horizons of teachers and potential teachers be-yond the conventional modes of thought about drama. For advanced undergraduates and graduates only. Prerequisite, permission.

### 495 Special Studies in the Theatre Arts of Asia (3, max. 9)

MCKINNON AND VISITING ARTISTS

Fundamentals in the theory and practice of the theatre arts of Asia. The study of a given form or tradition of theatre art in any one quarter will depend on the visiting artists and the idioms of their choice.

### 496 Stage Costume Problems (2, max. 8) AWSp

A series of specialized courses directed to specific areas and problems of stage costume design and execution: accessories, textiles, masks, wigs, and analysis of construction of historic clothing and/or specialized clothing. Prerequisites, 211, 416, and permission.

### 497 Theatre Organization and Management (2) Sp FALLS

A theoretical and practical examination of the professional theatre organization and management: legal structures, funding, business practice, and operational procedures. Open to nonmajors.

499 **Undergraduate Research** 

(1-5, max. 15) AWSp

Prerequisite, permission.

### **Courses for Graduates Only**

### 501 Nature of Graduate Study in Drama (2) A LORENZEN

Prerequisite, graduate standing.

510 Seminar in Production (3) AWSp Discussion of aesthetic unity and the potential

of physical space in the problems of theatrical production and the limitation of representative types of stages and their supporting equipment and facilities. Prerequisite, permission.

511 Design Studio (3, max. 9) AWSp Artistic principles and techniques as a basis for creative work in theatre design. Studio work in composition, color, line, space, and light and shade. Reports and outside reading may be required.

#### Technical Direction (3, max. 9) AWSp 513 LOUNSBURY

Practical experience in mounting scenery for a current production. Prerequisites, 413 and permission.

### 514 Advanced Scene Design (3, max. 6) AWSp CONWAY

Prerequisites, 4 credits in 414 or equivalent and 9 credits in 511.

### 515 Advanced Stage Costume Design (3, max. 6) AWSp CRIDER

Prerequisites, 4 credits in 415 or equivalent and 9 credits in 511.

## 517, 518 Studies in Historic Design (5,5)

CONWAY, CRIDER investigation of artistic principles and The modes which influenced the art, architecture, furniture, and decor of selected historic periods. Prerequisite, 517 for 518.

### **Advanced Theatre Practicum** 520 (1-5, max. 15)

Graduate student apprenticeship with professional theatre shops—scenery, lighting, scene painting, or costume. Prerequisites, 513 or 514 or 515, and permission.

#### 530 Seminar in Children's Drama (5) W SIKS

Critical study of philosophies and practicespast and present-of the children's drama movement in the United States; examination of current problems in children's drama education. Prerequisite, permission.

# 551-552-553 Teaching of Acting (2-2-2) AWSp, WSp, Sp •Prerequisites, 353 and permission.

### 561 Directing Apprenticeship (5, max. 15) AWSp

### FALLS. SYDOW

Apprenticeship with professional director or association with thesis director. Prerequisite, graduate standing.

#### 562 **Advanced Directing Projects**

(3, max. 6) AWSp Prerequisites, 5 credits in 561 and 2 credits in 563 or equivalent, and permission.

### Seminar in Directing (2, max. 12) 563 AWSp

SYDOW

Seminar discussion on working problems of major productions in which the student is involved; examination of problems of the stage director on the advanced level. Prerequisite, graduate standing.

# 571, 572, 573 Problems in Theatre History Research (3,3,3) A, W, Sp LORENZEN, WOLCOTT

Methods and techniques of research in theatre history. Relationship of theatre arts to other arts and society in major periods of theatre history. Prerequisites, 571 for 572; 572 for 573.

### 575, 576, 577 Seminar in Theatre History (3,3,3) A,W,Sp

LORENZEN, WOLCOTT

Prerequisites, 571, 572, 573.

### 581, 582, 583 Seminar in Drama (3,3,3) A,W,Sp

## FALLS, LOPER

Seminar inquiring into the relationships between scholarship, criticism, and theatre art. Prerequisite, permission.

#### 599 **Advanced Studies in Theatre Arts** (1-5, max. 10) AWSp

Independent projects or group study of spe-cialized aspects of theatre arts. Prerequisites, graduate standing and permission.

#### Independent Study or Research (\*) 600 AWSp

700 Master's Thesis (\*) AWSp

## **ECONOMICS**

## **Courses for Undergraduates**

### INTRODUCTORY COURSES

200 Introduction to Economics (5) AWSp NORTH, THOMAS, WORCESTER

Introduction to economic reasoning. The development of the basic tools of economic theory and their application to contemporary problems. No more than 5 credits from 200 and 211 may be counted toward any degree.

#### 201 **Introduction to Microeconomic** Theory (5) AWSp

A study of the allocation of resources and the distribution of income with emphasis on a market system. Some basic theoretical tools are developed and used to analyze a variety of problems of current interest. Prerequisite, 200 or equivalent, or permission.

### 211 General Economics (3) AWSp HUBER, WORCESTER

Survey of basic principles of economics: determination of national income, price analysis, and allocation of resources. Primarily for engineering and forestry students. Other stu-dents by permission. No credit if 200 has been taken.

#### 260 American Economic History (5) AWSp HIGGS, M. D. MORRIS, THOMAS

An analysis of American economic growth and change interpreted as part of the general expansion of the North Atlantic economy. Stresses the historical background to contemporary American economic problems.

### 312 Current Economic Problems (5) S

Designed primarily for secondary school teachers of social studies with limited knowledge of economics. Emphasis on analysis of major economic problems and policies rel-evant to high school courses in contemporary social problems. Prerequisite, 200 or equivalent, or permission.

### **GENERAL THEORY**

300 Intermediate Price Theory (5) AWSp Fundamental concepts and principles. Demand, supply, market price, and the determination of price under competitive and monopolistic conditions; relationships between price and costs. Prerequisites, 201 and Mathematics

## 157 or 124, or equivalent, or permission. 301 National Income Analysis (5) AWSp BASSETT, OBST

Analysis of the determinants of the aggregate level of employment, output, prices, and in-come of an economy. Prerequisites, 201 and Mathematics 157 or 124, or equivalent, or permission.

### 306 Development of Economic Thought (5) W

From the early modern period to the present, with some discussion of its relation to natural science and other social sciences. The main subjects treated will be Adam Smith and the classical school, Karl Marx, later Marxism, and the transition to J. M. Keynes. Prerequisites, 200, 201, or equivalent, or permission.

### 400 Fundamentals of Micro-theory (3) AW BROWN, EYSENBACH

Fundamentals of micro-theory with emphasis on applications to public policy. Designed primarily for graduate students majoring in fields other than economics. No credit if Economics 300 has been taken for credit. Prerequisites, 200 or equivalent is recommended, and permission.

### 401 Fundamentals of Macro-theory (3) W BASSETT

Fundamentals of macro-theory with emphasis on applications to public policy. Designed primarily for graduate students majoring in fields other than economics. No credit if Economics 301 has been taken for credit. Prerequisite, 200 or equivalent is recommended.

### 406 Undergraduate Seminar in Economics (5) AWSp

EYSENBACH, MILLER

Seminar provides the undergraduate student an opportunity to apply the tools of economic analysis in a critical examination of theoretical and empirical work. A list of topics for the seminars is available in the office of the Department of Economics. Class size is limited (fifteen), preference given to majors in their junior or sophomore years. Prerequisites, 300 and permission.

# 410 Introduction to Mathematical Economics I (5) A

OBST, SILBERBERG Introduction to mathematics as an economic tool and an aid in the development of logical thought. Introduction to differential and integral calculus, as well as sets, sequences, and mappings with applications to economics. (No credit given if Mathematics 124 has been taken.)

### 411 Introduction to Mathematical Economics II (5) W OBST, SILBERBERG

Introduction to functions of several variables with applications to economics. Partial derivatives, the implicit function theorem, theory of minima and maxima. Economic applications include the Slutsky equations of consumer theory and an elementary mathematical investigation of neoclassical production theory. Prerequisite, 410 or Mathematics 124.

### 412 Introduction to Mathematical Economics III (5) Sp OBST, SILBERBERG

Theory and application of linear algebra and matrix methods with special emphasis on problems originating in economic theory. Prerequisite, 411 or Mathematics 124.

### 416 Urban Economics (5) ASp

The application of economic analysis to urban trends and problems and prescriptions, such as changing urban form and function, urban public finance, housing and renewal, poverty and race, transportation, and environmental problems. Offered jointly with the Department of Geography as Geography 416. Prerequisite, 300 or 400, or equivalent.

## MONEY, BANKING, AND CYCLES

320 Money and Banking (5) S CRUTCHFIELD

Nature and functions of money; the banking system, other credit-granting institutions, and the relationship of money and bank deposits to the economy. Prerequisites, 200 and 201, or permission.

### 421 Money, Credit, and the Economy (5) S CRUTCHFIELD

Supply and the use of money, bank deposits, and bank reserves. Relationship of Treasury, Federal Reserve, and commercial bank policies, and the value of money. Factors gen-erating flows of money income. Prerequisites, 300, 301, and 320 or equivalent, or permission.

### **GOVERNMENT REGULATION AND** INDUSTRIAL ORGANIZATION 330 Government and Business (5) AWSp

MUND Study of government and business relations, centering on (1) an analysis of market structures, conduct, and performance, and (2) the application of public policies designed to secure desired economic performance. Micro-economics is given a realistic institutional and empirical content. Special consideration is given to federal antitrust legislation and its application to mergers, business concentration, and restrictive business practices. Prerequisite, 200 or equivalent, or permission.

## 404 Industrial Organization and Price

Analysis (5) A CRUTCHFIELD, MC GEE

Study of selected market structures. Directed toward developing more precise predictive techniques and more adequate bases for analy-sis of public policy. Prerequisite, 300 or equivalent, or permission.

### 435 Natural Resource Utilization and Public Policy (5) AW BROWN, CRUTCHFIELD

Special emphasis on elements of economic theory relating to resource-oriented industries. Case studies in the theory and practice of resource management dealing with both stock and flow resources. Benefit-cost analysis and the evaluation of multipurpose resource projects. Prerequisites, 200 and 201, or per-

### LABOR ECONOMICS

mission.

### 340 Labor Economics (5) AWSp GILLINGHAM, RAHM

Analysis of labor markets with emphasis upon factors determining the size of the labor force. unemployment, distribution of income between labor income and other shares, and related problems. Analysis of public policies, trade union activity, and collective bargaining upon the effectiveness of labor markets and the performance of the economy. Some attention is paid to the noneconomic aspects of trade union activity. Prerequisites, 200 and 201, or permission.

### 346 Economics of Health Care (3) Sp MC CAFFREE

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, or permission.

### **Union-Management Relations (5) ASp** 441 GILLINGHAM

The collective-bargaining process, with special reference to economic implications. Pre-requisites, 201 and 340, or equivalent, or permission.

### 442 The American Labor Movement (5) S GILLINGHAM

Analysis in historical perspective of the American labor movement, its organizational structure, ideology, programs, and policies. Comparison with labor movements in other countries. Prerequisite, 200 or 211, 340 or equivalent, or permission.

### 443 Labor Market Analysis (5) Sp

MC CAFFREE, RAHM Factors which determine wage rates and employment levels in the firm, industry, and economy. Emphasis upon the union in the labor market. Prerequisite, 300 or equivalent, or permission.

### 445 Income Distribution and Public Policy MC CAFFREE

Income distribution implications and economic effects of public policies toward unemployment, illness, industrial accidents, old age, poverty, and discrimination from age, sex, or race. Prerequisites, 200 and 201, or permission.

### PUBLIC FINANCE

### 350 Public Finance (5) AWSp MILLER

An elementary treatment of the theory of public finance: theory of nonmarket decisions; welfare and allocative effects of taxation; principles of fiscal policy; problems of the public debt. Prerequisites, 201 or equivalent, or permission.

# 450 Theory of Public Finance and Fiscal Choice (5) A

An advanced treatment of the theory of taxation and public spending. Designed for undergraduates majoring in economics and for graduate students majoring in fields other than economics. Prerequisite, 300 or equivalent, or permission.

## 451 State and Local Public Finance (3) W

Analysis of state and local government revenue sources and consequences of their use. Includes taxation, user charges, debt finance, and inter-governmental fiscal relations. Emphasis on metropolitan area finance problems. Prerequisite, 400 or equivalent.

# 452 Economic Approaches to Political Analysis (5) W

Application of economic theory and method-ology to political phenomenon. Emphasis on theory construction with application in the American context. Offered jointly with the Department of Political Science as Political Science 416. Prerequisites, 201, 400 or equivalent

### ECONOMIC HISTORY

460 Economic History of Europe (5) W M. D. MORRIS

The origins of the modern European economy: historical analysis of economic change and growth from medieval times that stresses the preconditions and consequences of indus-trialization. Offered jointly with the Depart-ment of History as General History 481. Economics 200, 201 recommended.

# 462 Economic History of the United States to the Civil War (5) W THOMAS

A systematic study of the changing pre-Civil War economic conditions and the consequences of these changes for the American society. Prerequisite, 201 or equivalent, or permission.

463 Economic History of the United States from the Civil War to the Present (5) Sp A systematic study of the changing economic conditions since the Civil War and the con-sequences of these changes for the American society. Prerequisite, 201 or equivalent, or permission.

Economic History of South Asia (5) 465

Sp M. D. MORRIS

Historical analysis of economic structure and the phenomenon of economic stagnation in the region. Examines the impact of imperialism and the international economy on the area in the nineteenth and twentieth centuries.

Focuses on problems of economic change and growth as they bear on current efforts at economic development. Prerequisite, permission; 200, 201 recommended.

### INTERNATIONAL TRADE

### 370 Introduction to International Economics (5) AWSp

HUBER, MAH

International trade, commercial policy, and the balance of payments are studied in a theoretical context and used to examine current problems such as international monetary reform, trade and less-developed countries, and regional economic cooperation. Prerequisite, 201 or permission.

### 471 International Economics (5) AW HUBER, MAH

Income and price theory applied to international trade and finance. Analysis of balance of payments adjustments and alternative international monetary and commercial policies. Role of foreign trade and investment in economic growth. Prerequisites, 300, 301, or permission.

### COMPARATIVE SYSTEMS AND DEVELOPMENT

### 390 Comparative Economic Systems (5) WSp

THORNTON, WORCESTER

A study of resource allocation, growth, and income distribution in capitalist, market socialist, and centrally planned economies. The theoretical models of these systems are developed and then illustrated by case studies of selected countries. Prerequisite, 201 or equivalent, or permission.

### 391 Economic Development (5) Sp EYSENBACH

Critical appraisal of theories and problems of growth with emphasis on the less-developed countries of the world today. Prerequisite, 201 or permission.

### 493 Economy of Modern China (5) Sp MAH

Analytical survey of economic development of modern China, with special emphasis on the objectives, performance, and problems of the mainland Chinese economy under Communism. Prerequisites, 200 and 201, or permission.

### 495 The Economy of Soviet Russia (5) AS THORNTON

Analytical survey of techniques of planning and resource allocation in the Soviet economy. Criteria for evaluating economic performance, growth, and efficiency. Prerequisite, 300 or equivalent, or permission.

### STATISTICS AND ECONOMETRICS

### 281 Introduction to Economic Statistics (5) AWSp DOWDLE

Basic statistical concepts; characteristics of economic data; statistical analysis of economic data. Prerequisites, 200 and 201.

### 481 Economic Statistical Analysis (5) AW RAO

Applications of statistical techniques to economic problems. Prerequisites, 201 and 281, or equivalent, or permission.

### 482 Advanced Economic Statistical Analysis (5) Sp MILLER

Advanced applications of statistical techniques to economic problems. Prerequisite, 481 or equivalent, or permission. GENERAL

# 408 Problems of Peace and Conflict Resolution (3) W

Study of factors involved in conflict and in conflict resolution; application to international and other problems. Lectures, discussions and readings in social psychology, political science, and economics. Offered jointly with the Department of Political Science as Political Science 408.

### 496H Honors Seminar (5) A

THOMAS

Honors and other superior students will be given opportunity to develop research techniques, pursue topics in breadth and depth and apply their tools of economic analysis to selected topics in economic theory and to current issues of national and international economic policy. To be taken in the senior year. Prerequisite, permission.

# 497H Honors Directed Study (5) W

Students will individually arrange for independent study of selected topics in economic theory and its application under the direction of a member of the economics faculty. The research paper, if accepted, will be the student's senior thesis. Prerequisite, permission.

## 498 Special Topics: Undergraduate Theory (5) Sp

PARKS

The course will introduce to advanced undergraduate students current research going on in economic theory and its application to contemporary problems. Prerequisites, 300, 301, and permission.

### 499 Undergraduate Research

(1-6) AWSp

cox May not be applied toward an advanced degree. Prerequisite, permission.

## **Courses for Graduates Only**

## GRADUATE CORE PROGRAM

### 500 Micro-Economic Analysis I (5) AW CHEUNG, SILBERBERG

Elements of choice theory. Value and demand, cost and supply, and the implied resource allocation under different constraints of competition. Prerequisites, 300, 301, and 410, or Mathematics 124, or permission.

### 501 Micro-Economic Analysis II (5) WSp CHEUNG, PARKS

The theory of marginal productivity and the implied wealth distribution. The theory of capital and the implied resource allocation over time. Prerequisite, 500.

# 502 Macro-Economic Analysis I (5) AW

SILBERBERG

Analysis of theories of income, employment, and output under static conditions; quantity theory of money; relation of monetary and "real" theories; stability and instability of income over time; growth of the economy. Prerequisites, '300, 301, and 410 or Mathematics 124, or permission.

### 503 Macro-Economic Analysis II (5) WSp HADJIMICHALAKIS

Recent developments. Prerequisite, 502 or permission.

### 505 Micro-Economic Theory: Problems and Applications (3) WS PARKS

Seminar for graduate students who have com-

pleted 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.

### ECONOMIC THEORY AND HISTORY OF ECONOMIC THOUGHT

507 History of Economic Thought (3) Sp Classical and neoclassical economics with emphasis upon the latter.

### 511 Advanced Micro-Economic Theory:

Selected Topics (3, max. 12) W Seminar in advanced micro-theory. Selected topics of special interest and significance. Prerequisites, 500, 501, 502, and 503.

### 512 Advanced Macro-Economic Theory:

Selected Topics (3, max. 12) S Seminar in advanced macro-theory. Selected topics of special interest and significance. Prerequisites, 500, 501, 502, and 503.

### 520 The Economics of Property Rights (3) W

CHEUNG

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; resources allocation and income distribution implied by diferent property right and transaction cost constraints. Prerequisites, 500, 501, or permission.

### 555 Economics of Location (3) A

HIGGS

The application of economic theory in the explanation of spatial interrelationships, including the location of individual producers and consumers, spatial economic organization within regions and within cities, and locational aspects of economic growth. Prerequisites, 300 and 301.

### GOVERNMENT REGULATION AND INDUSTRIAL ORGANIZATION

### 530 Government Regulation of Business (3) A

MUND

Public policy in the United States with respect to industrial organization and business conduct. Recent issues in public control of business.

### 533 Price Policy and Industrial Organization (3) Sp

CRUTCHFIELD, MC GEE

Advanced analysis of market structures and industry performance; selected empirical studies; principles of conservation and benefitcost analysis; issues in public policy. Prerequisite, 500 or permission.

### 535 Economics of Natural Resources (3) Sp CRUTCHFIELD, BROWN

Pricing, allocation, and utilization of natural resources; externalities; public investment criteria; technological relationships; alternative strategies of public decision making; benefitcost analysis; case studies. Prerequisites, 400 or 500, or permission.

### LABOR ECONOMICS

541 Labor Economics (3) Sp

GILLINGHAM

Selected topics in labor economics. Prerequisite, permission.

### 542 Labor Economics (3) A

MC CAFFREE, RAHM Selected topics in labor economics. Prerequi-

site, permission.

## 546 Economic Studies of Health Care (3) W MC CAFFREE

Analysis of economic studies of health care, including demand, manpower shortages, licensure price discrimination, optimum size practices, cost indices and productivity, research, economic growth and health expenditures, and current national health policies. Offered jointly with the School of Public Health and Community Medicine as Health Services PCHS 546. Prerequisites, 400 or equivalent, and permission.

556 Seminar in Urban Economics (3) W The use of economic theory to explain land-

use trends, transportation, housing and renewal, the ghetto, and the public economy in urban areas. Offered jointly with the Department of Geography as Geography 556. Prerequisites, 300, 301, or equivalent.

## PUBLIC FINANCE AND TAXATION 550 Public Finance I (3) W

Theory of collective action: welfare economics, with special emphasis on public goods and external effects; theory of property rights, constitutions, and nonmarket decisions. Pre-requisite, 500 or permission.

## 551 Public Finance II (3) Sp

The welfare, allocative, and stabilization effects of taxation and public spending: theory of shifting and incidence of taxation; analysis of fiscal policy; problems of the public debt; allocative and welfare consequences of inflationary finance. Prerequisites, 500, 502, and 550, or permission.

### 553 **Economic Analysis and Government** Programs (3) Sp

Applications of economic analysis to public enterprises and programs. Prerequisites, 400, 401, or equivalent.

### ECONOMIC HISTORY

### 504 Economic History and Economic Development (3) A HIGGS

Analysis of determinants of long-run development, emphasizing institutional, demographic, and technological changes; consideration of both theoretical and empirical studies. Prerequisite, 300 or equivalent.

#### European Economic History (3) W 561 MORRIS, NORTH, THOMAS

The economic growth of the western world since the decline of the Roman Empire. Prerequisites, 504 and permission.

#### 562 American Economic History (3) Sp HIGGS, NORTH, THOMAS

Analytical methods; sources and reliability of data: consideration of some major issues in current research. Prerequisites, 500 and 504, or permission.

### INTERNATIONAL TRADE

### 571 International Trade Theory I (3) Sp HADJIMICHALAKIS

Modern developments in general equilibrium theory and welfare economics, with relation to international trade. Prerequisite, permission.

### 572 International Trade Theory II (3) W HUBER

Problems of foreign trade and exchange con-

trols, and international monetary policies. Prerequisite, permission.

### ECONOMIC SYSTEMS AND DEVELOPMENT

504 Economic History and Economic **Development (3) Sp** See Economic History above.

590 **Theory and Practice of Economic** 

Planning (3) W THORNTON

Theoretical issues and success criteria: models, techniques, and applications of planning in the allocation of economic resources. Prerequisite, permission. (Offered alternate years.)

### Theoretical Issues in Economic Development (3) W EYSENBACH

Analysis of theoretical issues in economic development with application to the lessdeveloped countries of the world today. Prerequisite, 504.

## 595 Soviet Economics (3) Sp

THORNTON

Analysis of problems of economic measurement, economic development, resource allocation, planning and decentralization in the Soviet Union. Prerequisite, permission. (Offered alternate years.)

## **MATHEMATICAL ECONOMIĆS**

### 513 Mathematical Economics: Activity Analysis (3) A OBST, SILBERBERG

Linear programming. Theory of convex bod-ies. Input-output models. Competitive equilibrium and Pareto optimum. Linear activity analysis of production and applications. Prerequisites, 412, 500, or permission.

## 514 General Equilibrium Analysis (3) W

BASSETT, HADJIMICHALAKIS, SILBERBERG study of the existence, uniqueness, and stability of general equilibrium models under the assumptions of competition. Emphasis is upon recent developments in the literature with consideration given to both positive and and normative economics.

#### 515 **Special Topics in Mathematical** Economics (3) Sp

Seminar will cover selected topics in mathematical economics. Emphasis is upon providing access to existing literature, and upon developing the logical thought and the techniques necessary if one is to contribute to the field. Prerequisite, permission.

### 517 Foundations of Economic Analysis (3) A BASSETT, SILBERBERG

A study of the sources of meaningful comparative statics theorems in economics, with special emphasis on extremum problems, qualitative analysis, and dynamic stability. Mathematical concepts necessary for access to the current literature will be developed.

### STATISTICS AND ECONOMETRICS 580

# Econometrics I (3) A

BARZEL, MILLER, SILBERBERG Study of empirical estimation techniques and related methodological problems.

## 581 Econometrics II (3) W

RAO

Advanced study of econometric methods and techniques. Prerequisites, 481, 482, and 580.

### **GENERAL**

600 Independent Study or Research (\*) AWŚp

## 700 Master's Thesis (\*) AWSp

800 Doctoral Dissertation (\*)

## ENGLISH

# **Courses for Undergraduates**

The lists of names under various literature courses indicate the kind of material covered, but are neither comprehensive nor exclusive of other significant figures.

## 104-105 Introductory English (5,5) AWSp, AWSp

Emphasis upon writing and analysis of reading selections. For Educational Opportunity Program students only.

## 111 Writing About Literature (5) AWSp

A course in interpretive and critical writing, based upon selected works in fiction, drama, and poetry. Prerequisite, qualifying score on the Washington Pre-College Test.

## 121, 122 Issues, Topics, and Modes (5.5)

AWSp, AWSp Α course in argumentative and persuasive writing, based upon reading drawn from a variety of sources-ancient and modern, informative and imaginative literature-arranged by themes of contemporary interest, to be announced in advance. Prerequisite, qualifying score on the Washington Pre-College Test.

# 171, 172 College Writing (3.3)

AWSp, AWSp A course devoted exclusively to the development of writing skills. Students will be encouraged to develop their own resources and to acquire new techniques for more meaningful and effective expression. Related readings in expository prose. Prerequisite, qualifying score on the Washington Pre-College Test for 171; 111, 121, 122, or 171 for 172.

### COURSES IN ENGLISH FOR FOREIGN STUDENTS

(These courses are administered by the Department of Linguistics.)

## 150 Intermediate Oral English for Foreign Students (5) AW

Concentration on pronunciation problems, basic grammatical patterns, and idioms from the point of view of oral practice and fluency.

### **Advanced Oral English for Foreign** 151

Students (5) AWSp An advanced version of English 150, as well as an introduction to basic writing.

#### 160 English for Foreign Students: Intensive (15) S

An intensive course specifically intended to prepare the foreign student for the coming academic year. Oral and written work. This course will satisfy the foreign student English requirement.

### 303 Advanced Written English for Foreign Students (3, max. 9) AWSp

Content varies each quarter: composition, humanities, and science readings.

### Introduction to Scientific and Technical **Communications for Foreign Students** (4) A

SELINKER, TRIMBLE Scientific and technical writing and reading for foreign students well grounded in oral English. Concentration on (1) application of rhetorical concepts most frequently used in scientific and technical writing, (2) gram-

matical analysis in areas traditionally difficult for foreign students, and (3) grammatical-rhetorical analysis of scientific and technical discourse. Offered jointly with the College of Engineering as Humanistic-Social Studies 304.

### 305 Scientific and Technical Report Writing for Foreign Students (4) W SELINKER, TRIMBLE

Application of the problem-solving approach to scientific and technical writing. Concentration on (1) undergraduate laboratory reports, (2) advanced grammatical analysis in areas traditionally difficult for foreign students, and (3) advanced grammatical-rhetorical analysis of scientific and technical discourse. Offered jointly with the College of Engineering as Humanistic-Social Studies 305. Prerequisite, 304 or Humanistic-Social Studies 304 or permission.

## LOWER-DIVISION COURSES FOR NONMAJORS

These courses may be elected by students majoring in English but may not be counted toward the major.

### 251 Introduction to World Literature (5) AWSp

Reading and critical discussion of great works in world literature.

257 Introduction to Poetry (5) AWSp Poetic techniques; readings from nineteenthand twentieth-century English and American poets.

258 Introduction to Fiction (5) AWSp Fictional techniques; analysis of short stories and novels.

Introduction to Modern Drama 259 (5) AWSp

Dramatic techniques; analysis of twentiethcentury plays.

### LOWER-DIVISION COURSES FOR MAJORS AND NONMAJORS SURVEY COURSES

264 English Masterpieces: Beginnings through Shakespeare (to 1600) (5) AWSp Readings in principal works and authors, with examples of romances, ballads, and drama.

265 English Masterpieces: Donne through Blake (1600-1800) (5) AWSp Includes Milton, Restoration plays, Pope, Swift, Fielding, Johnson, and others.

English Masterpieces: Wordsworth through Hardy (1800-1900) (5) AWSp 266

Includes Romantic and Victorian poets, novelists, and essayists.

American Masterpieces: Beginnings to 267

1900 (5) AWSp Includes Edwards, Franklin, Thoreau, Haw-thorne, Melville, Twain.

WRITING COURSES FOR MAJORS AND NONMAJORS

271, 272 Advanced Expository Writing (3,3) AWSp, AWSp

Practice in writing information and opinion papers to develop easy and effective expression. 272 is somewhat more advanced. Pre-requisites, sophomore standing for 271; 271 for 272.

274, 275, 276 Verse Writing (5,5,5) AWSp, AWSp, AWSp Prerequisite, sophomore standing.

### 277, 278 Beginning Short Story Writing (3,3) AWSp, AWSp

Prerequisites, sophomore standing for 277; 277 or permission for 278.

## **Upper-Division Courses**

To register in 300 and 400 courses in English and American Literature a student must have upper-division standing or the permission of the Chairman, Undergraduate Programs. (In general, permission will be granted only if the student has completed one lower-division course in literature.) All 300 and 400 courses are for majors and nonmajors unless otherwise specified.

## PERIOD COURSES

301 Topics in English Literature (5) Sp This course, for students in the Study Abroad program in London, seeks to relate selected major works of English literature to the landscape and activities of London and England. The specific focus will vary from year to year, depending on the choice of the instructor and on what is currently available in England, Possible topics: Shakespeare's theater and Elizabethan England; the London of Pope and Johnson; the poets of the Lake District; the literature and landscape of the nineteenth-century novel. The subject for each Spring Quarter will be announced before students must complete their registration.

### 321 The Renaissance (5) W

Wyatt and Surrey, Spenser, the Humanists, Elizabethan prose. Alternates with 335.

322 Medieval and Renaissance English Drama Exclusive of Shakespeare (5) Sp Marlowe, Greene, Webster, Jonson, and others. Alternates with 323.

323 English Drama: 1660-1800 (5) Sp Restoration and eighteenth-century English drama. Dryden, Etherege, Wycherley, Congreve, Goldsmith, Sheridan, and others. Alternates with 322.

324 Shakespeare (5) AWSp General survey. From five to seven or eight plays, including plays from the major periods and representing the major types.

325 Shakespeare (5) AWSp Types of plays, to 1603 (including Hamlet).

326 Shakespeare (5) WSp Types of plays, after 1603.

331 Literature: 1600-1660 (5) A Donne, Herbert, Marvell, Bacon, Browne, Burton.

332 Milton (5) AWSp

Major poems and selected prose.

Restoration Literature: 1660-1700 (5) W Dryden and other satirists and playwrights, diarists, and essayists. Alternates with 321.

336 Early Eighteenth-Century Literature (5) ÅWSp

Swift, Pope, Defoe, Addison, and Steele.

337 Later Eighteenth-Century Literature (5) WSp

Johnson, Boswell, dramatists, novelists, preromantic poets.

341 Romantic Poets (5) AWSp Blake, Wordsworth, Coleridge.

342 Romantic Poets (5) AWSp Keats, Shelley, Byron.

344 Victorian Poets (5) A

Tennyson, Browning, and others.

347 Nineteenth-Century Prose (5) W Lamb, Hazlitt, Carlyle, Mill, Ruskin, Morris, Newman, Huxley.

348 Modern British Poetry: A Survey (5) Sp Housman, Bridges, Yeats, Eliot, Auden, Thomas.

American Literature: Beginnings to 1800 361 (5) AWSp

Including Taylor, Edwards, Franklin.

362 American Literature: 1800-1865 (5) AWSD

Including Irving, Cooper, Poe, Hawthorne, Melville, Emerson, Thoreau.

American Literature: 1865-1914 363

(5) AWSp Including Twain, James, Howells, Henry Adams, Norris, Crane, Dreiser.

364 American Poetry: Beginnings to 1900 (5)

Poetry in Colonial America; romantic and later nineteenth-century poetry, including such figures as Bradstreet, Taylor, Freneau, Bryant, Poe, Whitman, Dickinson, Longfellow, and others.

### 365 American Poetry Since 1900 (5) Sp

Major twentieth-century American poets. Likely to be included are Robinson, Frost, Moore, Pound, Eliot, Crane, Cummings, Ransom, Stevens, Williams.

369. The Literature of Black America (5) W Selected works by Afro-American writers, with emphasis on twentieth-century literature.

### NONPERIOD COURSES FOR MAJORS AND NONMAJORS

374, 375 Beginning Playwriting (3,3) AWSp, AWSp

387 English Grammar (5) AWSp Word forms, structures, and usages in the present-day English sentence.

388 Current English Usage (3) Principles for deciding what constitutes good English in an individual's speech and writing.

390 The Bible as Literature (5) ASp For nonmajors; English majors may use as elective beyond the 50 specified credits.

LITERARY TYPES 410 **Types of Dramatic Literature:** Comedy (5) W

Analysis of dramatic structures.

411 Types of Dramatic Literature: Tragedy (5) Sp Analysis of dramatic structures.

413, 414, 415 Types of Contemporary Poetry (5,5,5) A,W,Sp

417 The English Novel (5) AWSp Eighteenth century: Swift, Defoe, Richardson, Fielding, Smollett, Sterne.

418 The English Novel (5) AWSp Early and middle nineteenth century: Scott, Austen, Brontes, Dickens, Thackeray.

419 The English Novel (5) AWSp Later nineteenth century: Trollope, Eliot, Meredith, Hardy, the Naturalists, Conrad.

423 Romances and Folk Literature (5) W

424 The Popular Ballad (5) W

Extensive reading of the English and Scottish

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popular ballads. Origins, transmission, themes, and music of the ballad form.

## PERIODS AND OTHER TOPICS

425 Chaucer (5) AWSp

Reading in the Canterbury Tales and other major works.

426 Utopias and Social Ideals (5)

More, Utopia; Bellamy, Looking Backward; Mill, On Liberty; Huxley, Brave New World, etc.

430 English Literature: 1900-1930 (5) ASp Content will vary. Likely to be included are Joyce, Lawrence, Forster, Woolf, Huxley, Shaw, O'Casey, selected poets.

431 English Literature: Since 1930 (5) W Content will vary. Likely to be included are Bowen, Orwell, Waugh, Cary, Greene, Powell, Green, Murdoch, Auden, Thomas.

### 434 American Literature: 1914-1945 (5) AWSp

Content will vary. Likely to be included are Anderson, Lewis, Cather, Robinson, O'Neill, Frost, Pound, Eliot, Cummings, Hemingway, Fitzgerald, Faulkner, Steinbeck, Hart Crane, Stevens.

### 435 American Literature: Since 1945 (5) AWSp

Content will vary. Likely to be included are Miller, Warren, Tennessee Williams, Bellow, Lowell.

437 Modern European Literature (5) AWSp Content will vary. Likely to be included are Mann, Proust, Kafka, Gide, Hesse, Rilke, Valery, Lagerqvist, Pirandello, Moravia, Sar-tre, Camus, Beckett, Robbe-Grillet.

### 438 Modern Jewish Literature in **Translation (5) Sp**

The various ways in which Jewish experience has impinged on individual writers. Authors likely to be included are Sholom Aleichem, Hayyim Bialik, I. L. Peretz, Franz Kafka, Isaac Bashevis Singer, S. Y. Agnon, Elie Wiesel.

## LANGUAGE AND WRITING

447 History of the English Language (5) ASp Growth and development of the English lan-guage from Anglo-Saxon times to the present. Open to sophomores.

449 English Prose Style (5)

Analysis of the traits of language that contribute to the effects of writings in prose.

451 Special Studies in Expository Writing (5) Sp

Work in nonfiction, including short biographies, historical narrative, opinion articles. Prerequisite, 271 or 272, or permission.

453, 454, 455 Advanced Verse Writing (5,5,5) AWSp, AWSp, AWSp Prerequisite, 274 or 275 or 276 or permission.

457, 458 Advanced Short Story Writing

(5,5) AWSp, AWSp Prerequisite, 277, 278, or permission.

461, 462, 463 Novel Writing (5,5,5) A,W,Sp

Prerequisite, permission.

471 Introduction to the Folktale Among Literate Peoples (3) A

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. Offered jointly with the College of Engineering as Humanistic-Social Studies 471. Prerequisite, upper-division standing.

472 Introduction to American Folklore (5)

Study of different kinds of folklore inherited from America's past and to be found in America today. The cultivation of an awareness of authentic folklore and of how to collect it. Offered jointly with the College of Engineering as Humanistic-Social Studies 472.

480, 481 Current Developments in English Studies (5,5)

Emphasis on composition, practical criticism, language study, and selected readings in literature. Open only to teachers and teaching cadets. Prerequisite, teaching experience.

- 482 **Current Develpments in English Studies:** Conference (3)
- 483 Special Topics in English for Teachers (1-3, max. 5)
- 490, 491 Major Conference

, (3,3) AWSp, AWSp Individual study by arrangement with instructor. For majors only.

492H Major Conference for Honors (5) ASp

Individual study (reading, papers) by arrange-ment with the instructor. Required of, and limited to, Honors seniors in English.

493, 494 Advanced Writing Conference

(3-5, 3-5) AWSp, AWSp Revision of manuscripts. Preliminary work on writing projects should be completed before entrance. Prerequisite, permission.

#### **Special Studies in Literature** 499

(5, max. 10) AWSp To be offered occasionally by visitors or res-ident faculty. To be utilized in honors program.

### **Courses for Graduates Only**

Graduate standing in English, or permission, is required for registration in courses num-bered above the 400 level.

- 505 Graduate English Studies (5) 506 Studies in Literary Genres
- (5, max. 15)

507, 508 Literary Criticism (5,5)

- 509 Methods of Contemporary Criticism (5)
- 510, 511, 512 The Renaissance and Spenser (5,5,5)
- 513 Shakespeare's Dramatic Contemporaries (5)
- 515, 516 Chaucer (5,5)
- 517, 518, 519 Shakespeare (5,5,5)
- 521, 522, 523 Seventeenth-Century Literature (5,5,5)

524, 525, 526 American Literature (5, max. 10 each)

- 527, 528 Studies in Medieval Literature (5,5)
- 530 The English Language (5)
- 531 Introductory Reading in Old English (5)
- Advanced Reading in Old English (5) 532
- 533 Foundations of American English (5)
- 534 American English Dialectology (5)

## 535 Comparative Grammars (5)

A study in detail of one or more systems of grammar besides traditional grammar. Prerequsite, teaching experience.

- 538, 539, 540 Early Nineteenth-Century Literature (5,5,5)
- 541, 542, 543 Victorian Literature (5, max. 10 each)
- 544. 545, 546 Eighteenth-Century Literature (5,5,5)
- 547 Rhetoric (5)
- 548 Twentieth-Century Literature (5)
- 553 Current Rhetorical Theory (5)
- Prerequisite, teaching experience.
- 561 English Literature, Beginnings to 1500 (5)
- Graduate survey for first-year graduate students.

562 English Literature, 1500-1660 (5) Graduate survey for first-year graduate students.

563 English Literature, 1660-1780 (5)

Graduate survey for first-year graduate students.

- 564 English Literature, 1780-1900 (5) Graduate survey for first-year graduate stu-
- dents. 565 American Literature, Beginnings to

1900 (5) Graduate survey for first-year graduate students.

566 Anglo-American Literature, Twentieth Century (5)

Graduate survey for first-year graduate stustudents.

580 Critical Approaches to Literary Texts (5) Prerequisite, teaching experience.

- 586 Graduate Writing Conference (5)
- Special Studies in Literature 599 (5, max. 15)
- 600 Independent Study or Research (\*)
- 700 Master's Thesis (\*)
- 800 **Doctoral Dissertation (\*)**

## **GENERAL AND**

**INTERDISCIPLINARY STUDIES** 

Course numbers under this heading are reserved by the Division of General and Interdisciplinary Studies for curriculum innovations. Descriptions of GIS course offerings are available during preregistration and in-person registration in the office of the Division of General and Interdisciplinary Studies, C18 Padelford Hall.

### **GENERAL STUDIES**

250 Project-Oriented Study

(1-5, max. 10) AWSpS For freshmen and sophomores only. Maxi-(General Studies 250 and 350) may be counted toward a degree in the College of Arts and Sciences.

### **300H Honors Colloquium (Humanities)** (2, max. 6) W

Discussion of selected topics in a variety of subject matter fields. Topics and reading material vary from year to year. Open to juniors and seniors in the College of Arts and Sciences Honors Program. Prerequisite, permission.

### 301H Honors Colloquium (Social Science) (2, max. 6)

Discussion of selected topics in a variety of subject matter fields. Topics and reading material vary from year to year. Open to juniors and seniors in the College of Arts and Sciences Honors Program. Prerequisite, permission.

### 302H Honors Colloquium (Science) (2, max. 6)

Discussion of selected topics in a variety of subject matter fields. Topics and reading material vary from year to year. Open to juniors and seniors in the College of Arts and Sciences Honors Program. Prerequisite, permission.

## 350 Project-Oriented Study (1-5, max. 15) AWSpS

For juniors and seniors. Maximum of 15 credits in project-oriented study (General Studies 250 and 350) may be counted toward a degree in the College of Arts and Sciences.

### 391 Supervised Study in Selected Fields' (\*, max. 15) AWSp

Special supervised study in a field represented in the College of Arts and Sciences. Prerequisites, permission of major department, supervisor of study, and General Studies Office.

### 455, 456 Critical Problems of Our Culture (3-5, 3-5) WSp

Two interdisciplinary courses for seniors, in which faculty from several departments discuss the critical problems of our culture as seen from their various specialties. Prerequisite, senior standing; juniors by permission.

### 492 Latin-American Studies Seminar (5)

A proseminar, primarily for Latin-American Studies majors, involving readings and research on a broad topic concerning Latin America. Prerequisite, senior in Latin-American Studies major or permission.

### 493 Senior Study (1-5) AWSp

For General Studies majors only. Prerequisites, permission of supervisor of study and General Studies Office.

## GENETICS

### **Courses for Undergraduates**

## 351 Human Genetics: The Individual and Society (3) W

GARTLER, STADLER

A discussion of the genetic factors pertinent to problems confronting the individual and society. The genetic consequences of population structure and of environmental contamination, and the genetic components of disease, intelligence, and behavior, are some of the topics to be discussed. This course is appropriate for nonscience majors and is not recommended as a substitute for Genetics 451 for majors in biological sciences. Open for credit to all upper-division students who have not taken 451 or the equivalent.

### 451 Genetics (4) AWSp

HARTWELL, ROMAN, SANDLER, STADLER A general course recommended for majors in the biological sciences and for those other students who are interested in the role of genetics in modern biology. Prerequisite, 10 credits in the biological or physical sciences or mathematics.

## 452 Advanced Genetics (3)

A discussion course designed to follow 451. For students with an interest in further examining selected topics in general genetics. Prerequisite, 451.

499 Undergraduate Research (\*) AWSpS Prerequisite, permission.

### **Courses for Graduates Only**

### 501 Introduction to Research Materials (3, max. 9) AWSp

The student is assigned to one of the several research areas of the Department, to work with a research group for a quarter at a time. Prerequisite, graduate standing in the Department of Genetics, or permission.

### 520 Seminar (1, max. 15) AWSpS Prerequisite, permission.

### 531 Problems in Human Genetics (2) W MOTULSKY

An advanced course in human genetics emphasizing modern aspects and research methods. Prerequisite, 451 or permission. (Offered alternate years; offered 1973-74.)

### 551 Mutation and Recombination (3) A

First course in a three-quarter sequence in molecular genetics. Contributions of research with micro-organisms to an understanding of the molecular basis of mutation and recombination: life cycles, mutation rate, mutagenesis, structure of DNA molecules, fine-structure genetics, enzymology and genetics of recombination, DNA transformation. Prerequisite, 451 or permission.

### 552 Information Transfer (3) W

Current understanding of the molecular mechanisms involved in the replication of genetic material and transfer of genetic information into RNA and protein molecules: enzymology and genetics of DNA replication by bacteria and viruses, organization and replication of DNA in chromosomes and cytoplasmic organelles of the cells of higher organisms, replication of RNA viruses, genetics and biochemistry of protein synthesis, the genetic code, messenger RNA transcription from DNA, enzymology of RNA synthesis. Prerequisite, 551 or permission.

### 553 Regulation of Gene Expression (3) Sp Current understanding of mechanisms of gene expression: physiology of messenger RNA synthesis and decay, control of translation, processing of proteins, genetics and biochemistry of regulation of bacterial operons and bacterial virus development, ribosome biogenesis, genesis of antibody diversity. Prerequisite, 552 or permission.

### 554 Topics in Genetics (2, max. 6) AWSp Current problems and research methods. Prerequisite, permission.

### 555 Bacteriophage Experiments (4) W DOERMANN

A sequence of laboratory experiments to familiarize students with current materials and methods of investigating genetic structure, replication, recombination, and mutation in virulent bacteriophages. Prerequisite, permission.

### 556 Bacteriophage Genetics (2) Sp DOERMANN

Inheritance mechanics of bacteriophages and structure and function of their apparatus will be discussed. Molecular models derived from genetic data will be emphasized. Prerequisite, permission.

### 560 Chromosomal Behavior (3) W SANDLER

Properties of meiotic chromosomes with special emphasis on recombination and segregation. Prerequisite, permission. (Offered alternate years; offered 1973-74.)

### 561 Cytogenetics (3) W

ROMAN

Discussion of cytological investigations of normal and aberrant chromosomal behavior, with particular reference to the structure of the chromosome and its response to mutagenic agents. Prerequisite, permission. (Offered alternate years; offered 1972-73.)

### 562 Population Genetics (3) Sp

FELSENSTEIN Mathematical and experimental approaches to the genetics of natural populations, especially as they relate to evolution. Prerequisite, permission.

### 583 Methodology in Biochemical Genetics (2) A

HALL

Experiments and discussion sections on modern research techniques used in biochemical genetics. Prerequisite, permission.

- 600 Independent Study or Research (\*) AWSpS
- 700 Master's Thesis (\*) AWSpS

800 Doctoral Dissertation (\*)

## GEOGRAPHY

## **Courses for Undergraduates**

Prerequisites: In addition to specified prerequisites for individual courses, students should also meet the general course level requirements as indicated by the numbers except where they may have special preparation or background in geography or in related fields.

### INTRODUCTION TO GEOGRAPHY

100 Introduction to Geography (5) AWSp Major concepts and methods in the field; analysis of selected problems and types of regions. Honors sections available for honors students by permission.

### 200 Introduction to Human Geography (5) W

VELIKONJA

Survey of noneconomic components of patterns and systems of human occupancy of the world. Emphasis on cultural processes, dynamic change, functional relations and networks. No prerequisite; Geography 100 recommended.

## INTRODUCTION TO FIELDS IN GEOGRAPHY

### 205 Man's Physical Environment (5) ASp ROMANOWSKI

Survey of character and location of different types of land forms, climates, soils, vegetation, minerals, and water resources; their significance to human occupance.

### 207 Economic Geography (5) AWSp

BEYERS, BOYCE, THOMAS

Introductory analysis of the spatial order and changing locational patterns of man and his economic activities. Emphasis placed on concepts and theories pertaining to primary, secondary, and tertiary production, to transportation, and to the geography of consumption. Special attention given to cities and the distribution of activities within cities.

## 227 Historical Geography of Black

America (3) A EICHENBAUM, MORRILL

Study of the historical processes of Afro-American migration and segregation in Afro-American settlement patterns in the United States; study of theories of the human use of space as related to Afro-American migration and settlement.

### 235 Geography of the Lesser-Developed World (5) Sp CHANG

Regional study of the underdeveloped world with special emphasis on the varying stages in, and major programs of, economic development in the well-populated areas of Asia, Africa, and Latin America and on the overriding problems confronting each.

### 258 Maps and Map Reading (2) AWSp HEATH, MUEHRCKE, SHERMAN

Categories of maps and aerial photographs and their special uses; map reading and interpretation.

### 277 Geography of Cities (5) Sp BOYCE

Survey of the spatial and functional orderliness of cities; their location, distribution, function, and spread. Particular emphasis on current urban problems—sprawl, city decline, and metropolitan transportation.

### 287 The Structure of Political Regions (5) A JACKSON

Spatial organization of political activity; a survey of contemporary political regions, both state and nonstate, with special emphasis on the political organization of the Puget Sound lowland.

### INTERMEDIATE AND ADVANCED COURSES

300 Advanced Regional Geography (5) Sp The region viewed as a major concept in geography. An intensive examination of major physical and biotic regions seen in the light of human occupance patterns. Prerequisite, 100 or upper-division standing. (Not offered 1971-73.)

### 303 Perspectives on Man and Nature (3) Sp JACKSON

Introduces the main theses of man's relationship to nature as expressed in Western and Asian geographic thought; emphasizing the sources of man-environmental dualism and dialectic leading to contemporary ecological discussion in geography. Will serve as an introduction to the history of geographic thought. Prerequisites, 100, 205 or permission.

### SYSTEMATIC FIELDS

207 or permission.

315 Agricultural Geography (5)

ROMANOWSKI Survey of the physical, social, and economic elements comprising agriculture and their variation in time and space. Prerequisite,

325 Historical Geography of America (3) A Exploration, migration routes, pioneer settlement, and the moving frontier in relation to geographical phenomena. Criteria for differential development of regional cultures. (Not offered 1971-73.)

### 342 Geography and Inequality in the United States (3) Sp MORRILL

The geography of social and economic in-

equality. Analysis of the 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 ghettoes, as well as religious and age discrimination.

### 350 Urban and Regional Analysis (3) A MORRILL

Spatial organization of the economy; methodology in the study of location of economic activities and their spatial interrelations; economic regionalization.

### 370 Conservation of Natural Resources (5) ASp

Principles and practices in effective utilization of resources; public policies relating to conservation.

### 375 Political Geography (5) A JACKSON, VELIKONJA

A study of the spatial variations and interrelationships of political activities and systems.

### 416 Urban Economics (5) Sp BISH

The 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. Offered jointly with the Department of Economics as Economics 416. Prerequisite, Economics 300 or 400, or equivalent.

### 440 Regional Analysis (3 or 5) BEYERS, KRUMME

Analysis of regional industrial structures and economic change. Application of shift and share, cohort, multiplier, input-output, location-interaction, and programming models to the analysis and the projection of urban and regional population patterns, and income distributions, interurban and interregional growth differentials, regional, and interregional linkages and flows, as well as urban and regional impacts of government expenditures. Lectures, 3 credits; independent study, 2 additional credits with permission of instructor. Prerequisite, 207 or permission.

## 441 Geography and Industrial Change (3 or 5) A

THOMAS

Analyses of changes in the spatial and structural components of industrial activity patterns. Attention also focused on understanding the nature and influences of dominant forces affecting industrial change. Examples drawn primarily from North America and Western Europe. Lectures, 3 credits; independent study, 2 additional credits with permission of instructor.

### 442 Social Geography (3 or 5) A MORRILL, VELIKONJA

Spatial patterns of population distribution and settlement; of migration and the spread of ideas; of social characteristics and social relations; social regions. Lectures, 3 credits; independent study, 2 additional credits with permission of instructor.

### 443 Location and Movement Models (3) Sp MORRILL

Application of models of optimum location and allocation; assignment, transportation, and spatial equilibrium; spatial interaction; geographic simulation; and spatial diffusion.

### 444 'Geography of Water Resources (3 or 5) W

MARTS

Analysis and appraisal of water resources in land and industrial development; problems and policies of river basin planning with emphasis on the Pacific Northwest. Lectures, 3 credits; independent study, 2 additional credits with permission of instructor.

### 448 Geography of Transportation (3) W ULLMAN

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. Lectures, 3 credits; independent study, 2 additional credits with permission of instructor.

### 449 Geography of Ocean Transportation (3 or 5) '

FLEMING

Geographic analysis of ocean trade routes, cargo and passenger flows, and port activities. Evaluation of the role of the transportation carrier in international trade. Lectures, 3 credits; independent study, 2 additional credits. Prerequisite, 207 or permission.

### 450 Theories of Location (3 or 5) W BEYERS, KRUMME, MORRILL

Classical and neoclassical theories of location of agricultural, residential, industrial, and recreational activities, spatial equilibrium comditions for individuals, organizatons, sets of activities, urban land use and settlement patterns, and associated networks focusing on the effect of transportation and transport costs. Course represents, in part, the history of thought in theoretical economic geography. Prerequisite, 207 or permission.

## 451 Regional Planning and Development (3 or 5) Sp

THOMAS

Emphasis placed primarily on the process of implementing regional development policies in economically advanced and lesser developed countries. Resultant changes which occur in the distribution and structure of economic activities and settlement patterns are also studied and evaluated. Lectures, 3 credits; independent study, 2 additional credits with permission of instructor. Offered jointly with the Department of Urban Planning as Urban Planning 451.

### 452 Location and Behavior (3 or 5) Sp KRUMME

Principles governing individual and organizational behavior in space. Emphasis is placed on the interdependence of economic and noneconomic goals, aspirations, and other stimuli and constraints as they affect economic location and interaction decisions in urban and industrial settings. Behavioral frameworks are investigated as to their explanatory power for the analysis of spatial decision-making processes. Prerequisite, 450 or permission.

### 475 Problems in Political Geography (5) W

JACKSON, VELIKONJA

Selected problems of spatial patterns and dynamic relationships. Geographical problems of regional, national, and international organization. Lectures, 3 credits; independent study, 2 additional credits. Prerequisite, 375 or permission.

### 477 Urban Location and Structure (3) A ULLMAN

Analysis of urban and other agglomerated settlements in terms of nature, economic base, site and situation, distribution, supporting areas, and new trends in metropolitan form and arrangements. Lectures, 3 credits; independent study, 2 additional credits with permission of instructor.

### 478 Urban Spatial Patterns (3) W BOYCE

Analysis of intra-urban land-use patterns and structure; particular attention to locational theories pertaining to population, land-use linkages, rents, gradients, and normative spatial relationships. Prerequisite, upper-division standing.

### **REGIONAL FIELDS**

301 Anglo-America (5)

Examination of the United States-Canada resource base and geographical implications of economic activities. Geographical aspects of contemporary problems and the future development of both countries. (Not offered 1972-74.)

### 302 The Pacific Northwest (3) AWSp BEYERS

Survey of the economy of the Pacific Northwest in the light of factors of location, resources, resource-oriented industries, and resource policies. An introduction to regional studies on a local scale.

### 304 Western Europe (5) A

FLEMING

An analysis of the physical and socio-economic characteristics of Western Europe. Contemporary political and economic integration trends are evaluated in their regional context.

### 305 Eastern Europe (5) W

VELIKONJA

An analysis of the physical, historical, and socio-economic characteristics of Eastern Europe.

## 306 Africa (5)

Historical and economic geography, emphasizing the role of natural resources in settlement and economic development; problems of colonization, the foundations of commercial agriculture, and trends in industrial development. (Not offered 1972-74.)

### 307 Australia and New Zealand (5)

Pastoral and agricultural development; industrial potential; urbanization; immigration and trade policies; external economic and political relations.

### 308 Latin America (5)

Present and future development and problems of Caribbean and South America in terms of their natural resources, economic activities, and ethnic and settlement patterns. (Not offered 1972-74.)

### 313 East Asia (5) W

KAKIUCHI

Nature and geographic setting of Far Eastern civilization with reference to origins, development, and present outlines of settlement; cultures, resource use, and economic structures in China, Japan, and Korea.

### 332 Islands of the Pacific (3)

Analysis of major islands and groups with respect to resources, settlement, population composition; role in modern transportation and communications; current political status. (Not offered 1972-74.)

### 333 Geographic Patterns of Soviet Development (5) A JACKSON

Patterns and trends in the development of the Soviet Union, with particular emphasis on Soviet objectives, regionalization, distribution of population, agriculture, and manufacturing.

### 336 Regional Geography of China (5) W CHANG

A study of the geographic foundations, the pattern of the cultural and economic developments, and the interrelationships among the major regions of China with special emphasis on the role of the key agricultural and manufacturing areas in the economic growth of the country. Prerequisite, 100 or permission.

## 402 United States (5) Sp

BOYCE, EICHENBAUM

The spatial pattern of economic and social life in America—how it evolved, the role of the environment and resources; problems of regional inequality in development.

### 404 Problems in the Geography of Western Europe (3 or 5) Sp FLEMING

Emphasis on problems stemming from contemporary political and socioeconomic changes under way in Europe. Topics include urbanization, regional development, economic integration and patterns of trade. Lectures, 3 credits; independent study, 2 additional credits; with permission of instructor.

### 405 Problems of Eastern Europe (5) A VEL!KONJA

Analysis of selected geographical aspects of Eastern Europe. Natural and human resource base, social and political organization. Their relationships and interdependence. Prerequisite, 305 or permission.

# 433 Spatial Perception and Organization in the USSR (5)

JACKSON, ROMANOWSKI '

Russian and Soviet views of the world, of man and society, and of the spatial structuring of the Soviet system. Prerequisite, 333 or permission.

### 434 Problems in the Geography of Southeast Asia (5)

Analysis of regional and political structures; resources, economic activities, and problems of development; overseas and internal relationships.

## 435 Problems in the Geography of China (5) A

CHANG

Origins and development of Chinese civilization in its geographic base and areal spread; political China and the Chinese sphere; physical base and resources; problems of agriculture, population, industrialization, urbanization, transportation, and contemporary development; communist China.

## 437 Problems in the Geography of Japan (3 or 5) Sp

KAKIUCHI

Regional structure of Japanese urban, industrial, and agricultural geography. Analysis of contemporary patterns considering cultural and physical factors and selected aspects of their historical development. Lectures, 3 credits; independent study, 2 additional credits, with permission of instructor.

### 438 Soviet Regions and Regionalization (3 or 5) Sp

JACKSON

An evaluation of prerevolutionary and Soviet efforts to determine a basis for subdividing Russia into regions, together with an analysis of contemporary Soviet regions and their economic development. Lectures, 3 credits; independent study, 2 additional credits, with permission of instructor. Prerequisite, 333 or permission.

### **CARTOGRAPHY**

### 360 Principles of Cartography (5) ASp HEATH, SHERMAN

Map scales, grid systems, symbolism, and map reproduction. Laboratory experience in application of these principles to map design and construction.

### 361 Experimental Cartography (5) A HEATH, SHERMAN

Application of and experimentation with cartographic techniques and materials. Problems of relief representation, mapping of quantitative data, and their relation to reproduction processes. Prerequisite, 360.

### 363 Aerial Photographs as Source Materials (3) A

HEATH

Training in the use of aerial photographs as source materials in map compilation and other geographic purposes. Prerequisite, 360.

### 365 Introduction to Computer Cartography (3 or 5) W MUEHRCKE

Introduction to the origins, development, and methods of automated cartography. Experiments with a user-oriented package of computer mapping programs capable of performing most thematic mapping operations. Requires normal use of the Computer Center with special emphasis on the CALCOMP plotter, line-printer, and cathode ray tube (CRT) display. Prerequisites, 360 and a computer programming course, or permission. Students who have taken General Engineering 115 or Engineering 141 can take 365 for 3 credits.

### 430 Map Projections (3) W VERESS

Classification of projections, theory of distortion. Projection from ellipsoid to sphere. Theory of conformal projections (Lambert, Mercator, Stereographic). Equal area projections. Polyconic and other projections. Offered jointly with the Department of Civil Engineering as Transportation, Construction, and Geotechnical Engineering CETC 430, Prerequisite, permission.

### 458 Map Intelligence (3) W SHERMAN

Analysis and appraisal of United States and foreign maps and atlases; mapping agencies, coverage, organization, and indexing; symbolism, scales, projections, and military grids; map library problems and operation.

# 462 Problems in Map Compilation and Design (5) Sp

HEATH, MUEHRCKE, SHERMAN Application and analysis of map intelligence procedures as related to map compilation. Measurement and experimental study of psycho-physiological factors in design of map elements. Prerequisite, 360.

### 464 Problems in Map Reproduction (3) W HEATH

Processes and photographic techniques applicable to cartographic and geographic presentations. Prerequisite, 360.

465 Research in Cartography (3) Sp MUEHRCKE

Detailed examination of research activity and trends. Graphic communication is emphasized. Materials are presented in a problemoriented fashion and specifically chosen to provide essential research topics and techniques for the student seriously contemplating a future in cartographic research. Prerequisites, 365 and 426, or permission.

### GEOGRAPHY AND EDUCATION 467 Geography in the Social Studies Curriculum (3) S

A discussion of the concepts and content of geography essential to effective social studies curricula. Offered jointly with the College of Education as Educational Curriculum and Instruction EDC&I 467. (Not offered 1972-73.)

## INTRODUCTORY RESEARCH TECHNIQUES

## 426 Statistical Measurement and Inference (5) A

MORRILL, MUEHRCKB

Identification of geographic problems and selection of data; tests of simple hypotheses; applications of uniequation, simultaneous equation, and variance models; evaluation of findings. Prerequisite, an introductory course in statistics or permission.

### 490 Field Research (6, max. 12)

Development and application of skills essential to geographic field investigations: (1) training in the use of field techniques and base materials; (2) evaluation of these in a variety of research situations; (3) analysis and interpretation of field data; and (4) presentation of results of field investigations.

499 Special Studies (\*, max. 15) AWSp Supervised reading programs, undergraduate and graduate library and field research; special projects for undergraduate honors students. Prerequisites, senior class, graduate standing, and permission.

### **Courses for Graduates Only**

- 500 Contemporary Geographic Thought (3, max. 6) AW
- 501 Geographic Analysis (3)
- 502 Professional Writing in Geography (\*, max. 6) Sp
- 503 Research Seminar: Eastern Europe (3, max. 6) Sp
- 504 Research Seminar: Western Europe (3, max. 6) Sp FLEMING, VELIKONJA
- 505 Research Seminar: China and Northeast Asia (3, max. 6) WSp CHANG
- 506 Research Seminar: Southeast Asia (3, max. 6) AW
- 507 Research Seminar: Soviet Union (3, max. 6) AW JACKSON
- 508 Research Seminar: Historical Geography of Anglo-America (3, max. 6)

- 509 Research Seminar: Japan (3, max. 6) W KAKIUCHI
- 510 Research Seminar: Settlement and Urban Geography (3, max. 9) W BOYCE, ULLMAN
- 520 Research Seminar: Cartography (3, max. 6) Sp
  - HEATH, MUEHRCKE, SHERMAN
- 526 Research Seminar: Quantitative Methods in Geography (3, max. 6) W MORRILL
- 527 Information Systems for Planning and Research (3) A HORWOOD

Computer programming technology and data systems design for large scale data inputs. Machine editing, data manipulation, and information retrieval. Laboratory problems adapted to specialized interests of students. No previous computer programming experience required. Offered jointly with the Department of Civil Engineering as Transportation, Construction and Geotechnical Engineering CETC 527 and with the Department of Urban Planning as Urban Planning 527.

### 528 Automated Mapping and Graphing (3) W

HORWOOD

Computer applications to statistical and areal analysis. Laboratory problems adapted to specialized interests of students. Offered jointly with the Department of Civil Engineering as Transportation, Construction, and Geotechnical Engineering CETC 528 and with the Department of Urban Planning as Urban Planning 528. Prerequisites, basic statistics and 527, or permission.

529 Computer Applications to Urban and Regional Analysis (3) Sp HORWOOD

Simulation models and automated systems for the study of land use and related economic and demographic data. Machine methods of planning analysis and feedback review. Laboratory projects. Offered jointly with the Department of Civil Engineering as Transportation, Construction, and Geotechnical Engineering CETC 529 and with the Department of Urban Planning as Urban Planning 529. Prerequisite, 528 or permission.

530 Research Seminar: Geography and Development (3, max. 6) A THOMAS

Offered jointly with the Department of Urban Planning as Urban Planning 530.

- 538 Research Seminar: Geography of Transportation (3, max. 6) ULLMAN
- 539 Research Seminar: Utilization of Water Resources (3, max. 6)
- 540 Research Seminar: Industrial Geography (3, max. 6) Sp THOMAS
- 542 Research Seminar: Social and Population Geography (3, max. 6) W MORRILL, VELIKONJA
- Prerequisite, graduate standing.
- 550 Research Seminar in Location Theory (3) W

BEYERS, KRUMME Discussion of selected research-oriented topics in classical, neoclassical, and behavioral location theory. Theoretical problems of locational analysis. Relationships between location theory and regional development and planning concepts. Location concepts for urban analysis. Prerequisite, permission.

### 551 Regional Planning Seminar (3) THOMAS

Regional planning and development theories and methodologies. Critical evaluation of regional planning in selected economically advanced and lesser-developed countries. Offered jointly with the Department of Urban Planning as Urban Planning 551. Prerequisites, 451 and graduate standing.

### 552 College Teaching of Geography (2, max. 6) AWSp

General instructional strategies, including expository and inquiry approaches, together with use of media. Explanation in geography and geographic theory and principles as the basis of instructional sequencing. Prerequisites, appointment as a teaching assistant in the Department of Geography and permission.

### 556 Seminar in Urban Economics (3) W BISH

The use of economic theory to explain landuse trends, transportation, housing and renewal, the ghetto, and the public economy in urban areas. Offered jointly with the Department of Economics as Economics 556. Prerequisites, Economics 300, 301, or equivalent.

- 570 Research Seminar: Natural Resources Analysis (3, max. 6) W
- Prerequisite, graduate standing.
- 575 Research Seminar: Political Geography (3, max. 6) VELIKONJA
- 577 Research Seminar: Internal Spatial Structure of Cities (3, max. 9) ASp BOYCE

Prerequisite, 478 or permission.

- 600 Independent Study or Research (\*) AWSp
- 700 Master's Thesis (\*) AWSp
- 800 Doctoral Dissertation (\*)

## **GEOLOGICAL SCIENCES**

## **Courses for Undergraduates**

101 Physical Geology (5) AWSpS BARKSDALE, HANSON, MC KEE, MISCH, WASHBURN, WHETTEN

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.

102 Geology and the Human Environment (5) ASp

COOMBS

Beginning course relating geology to an awareness and an understanding of contemporary problems. Topics will include a survey of geologic equilibria, geologic hazards, and earth resources and their relationship to man's activities and his environment. Specific environmental problems and possible approaches to solutions will be emphasized. Includes laboratory, discussion sections, and field trips.

## 103 Earth History (5) Sp

RENSBERGER, WHEELER Geology through time, including the elements

of stratigraphy and paleontology. With lab-oratory. Prerequisite, 101 or 205.

### 106 Geology in World Affairs (5) A BARKSDALE

Geological occurrence, world distribution, and production of coal, petroleum, and the important industrial materials. With laboratory. For nonscience majors. Prerequisite, 101.

### 205 Introduction to Geological Sciences (5) AW

### BOSTROM, CHENEY, COOMBS

Introduction to geology, with laboratory, for science majors, with emphasis on the physics, the chemistry, and the history of the earth. Prerequisite, a background in physics, chemistry, and mathematics is desirable. (Not open to students who have taken 101.)

### 301 Introduction to Field Geology (5) S

Introduction to methods of geologic field study. Taught from off-campus field camp during September. Registration will be Summer Quarter. Prerequisite, major in geological sciences or geological oceanography, or permission.

### 308 Geology of the Northwest (5) WSpS MC KEE, STAFF

The geologic history of Washington, Oregon, Idaho, and British Columbia. Emphasis to be on use of geologic principles in interpreting evidence found in landscape and rocks. Prerequisite, 101 or 205, or equivalent.

### Surface Processes and Environments 311 (4) A

PORTER

Dynamic role of physical geologic processes operating at the earth's surface in the development of surface features and environments. Climatic control of processes and the effect of climatic variations on landscape evolution; human effects and environmental management will be stressed.

## 320 Mineralogy (5) W

CHRISTENSEN An introduction to mineralogy, including elementary crystallography (lattice types, exter-nal morphology, stereographic projection), elementary crystal physics (relationship of physical properties, including tensor properties to crystal symmetry), and elementary crystal chemistry (structures, bonding, etc), especially of the silicates. Prerequisite, Chemistry 101 or 140.

### 321 Principles of Petrology (5) Sp EVANS

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.

### 340 Structural Geology (5) W MC KEE

Interpretation of rock structures and their genesis. Prerequisite, 321 or permission.

## 341 The Earth's Interior (3) W

BOSTROM, STUIVER Introduction to geophysics of solid earth, in-cluding thermal processes, seismology, and earth structure, the earth's gravity and magnetism, tectonics, geochronology, and the origin and chronologic development of the earth.

## 361 Surface Deposits and Fossils (5) Sp MALLORY, WHEELER

Basic concepts of stratigraphy and paleontol-

ogy and the interpretation of geologic history.

### 401-402 Field Course (8-7) Sp

Off-campus field work in general geology, emphasizing geologic mapping and report writing. Prerequisite, major in geological sciences with senior standing or permission.

## 405 Interpretation of Geophysical Data (5) Sp

### BOSTROM

Interpretation of geophysical data, including signal separation utilizing harmonic analysis and linear operators. Emphasis on specimen project (in alternate years, seismologic and potential field; 1973 seismologic project). Individual data may be used by arrangement with instructor. Prerequisites, 341 and calculus to level of partial differential equations. Course is complementary to Geological Sciences 450.

### 411 Fluvial Geomorphology (3) W STAFF

Hydraulic and dynamic characteristics of streams, morphology of drainage basins, landscape evolution by stream sculpture and deposition, and climatic implications of changes in stream regimen. Prerequisite, senior standing.

### 414 Photogeology (3) W PORTER

Geologic interpretations of aerial photograph, with emphasis on solving field problems. Prerequisites, 340, 461, or equivalent. (Of-fered odd-numbered years.)

### 415 Principles of Glaciology (4) A LA CHAPELLE, PORTER, RAYMOND,

STUIVER, UNTERSTEINER, WASHBURN Structure and properties of snow and ice: snow metamorphism, avalanches, heat and mass balance of valley glaciers, glacier structure and flow dynamics, continental ice sheets, sea, lake, and river ice, frozen ground, methods of paleoclimatology, and Ice Age theories. Offered jointly with the Geophysics Program as Geophysics 415. Prerequisites, upper-division standing and permission.

## 416 Glacial Geology (4) A

PORTER, WASHBURN Interpretation of glacial history through study of sediments and landforms, with emphasis on climatic implications, chronology, and correlation. Prerequisite, senior standing or permission.

### 417 **Quaternary Stratigraphy and Early** Man (5) Sp

KLEIN, PORTER

History of climatic changes during the Quaternary Period as revealed by physical and biological data. Global chronology and correlation of Quaternary sediments. Offered jointly with the Quaternary Research Center and the Department of Anthropology as Quaternary Studies 417 and Archaeology 417.

### 418 Periglacial Processes and Environments (4) A

WASHBURN

Introduction to environmental processes in glacier-free areas, with emphasis on frost action and its effects. (Offered odd-numbered vears.)

### 423 Optical Mineralogy (4) A VANCE

Petrographic microscope and recognition of common minerals in thin section. Prerequisite, 320.

### 424 Petrography and Petrology of Igneous Rocks (5) W VANCE

Systematic study of igneous rocks and their origin, using the petrographic microscope. Prerequisite, 423 or equivalent.

### 425 Petrography and Petrology of Metamorphic Rocks (5) Sp VANCE

Systematic study of metamorphic rocks and their origin, using the petrographic micro-scope. Prerequisite, 423 or equivalent.

### 426 Sedimentary Petrology and Petrography (5) A

STEWART, WHETTEN

Occurrence, characteristics, and origin of sedimentary rocks, with emphasis on chemical and physical processes of formation. Petrographic analyses in laboratory. Prerequisites, 320, 423, or equivalent.

#### 430 **General Paleontology (5)** A MALLORY

Systematic study of invertebrate fossils and the principles of paleontology. Prerequisite, 101 or 205, or equivalent.

### 436 Micropaleontology of Foraminiferida (5) Sp

MALLORY

Principles of paleontology as applied to micropaleontology; the systematic study of foraminifera. Prerequisites, 361, 430, or permission.

## 437 History and Classification of the Vertebrates (5) W

RENSBERGER

Classification, morphology, and geologic history of major vertebrate groups. Laboratories stress recognition of skeletal structures and adaptive meaning of modifications. Prerequisite, major with senior standing in geological sciences, zoology, or physical anthropology, or permission.

### 443 Advanced Structural Geology (5) A MISCH

Analysis in space and time; genetic interpretation; principles of geotectonics. Prerequisite, 340 or equivalent.

#### 450 Techniques in Geophysics (3) A

BOSTROM

Introduction to geophysics of the solid earth, outlining instruments, techniques, and interpretation. Prerequisite, senior standing in geology or permission.

### 461 Stratigraphy (5) A

WHEELER

Systematic study of spatial relations of surface-accumulated rocks and their space-time implications. Prerequisite, 321, 361, or equivalent.

### 462 Interpretation of Geologic History (5) W WHEELER

Regional and interregional integration of physical geology and biostratigraphy as basis for geologic history of North America. Prerequisites, 430 and 461, or equivalent.

### 471 Rock and Mineral Analysis (5) Sp GRESENS

Survey of analytical methods employed in geochemistry, emphasizing the theoretical basis for various techniques and their limitations. With laboratory. Prerequisites, 320, 321, Chemistry 160, or equivalent.

#### 472 Elements of Geochemistry (4) A

GRESENS

Introduction to the interpretation and under-

standing of geological processes from the chemical standpoint. Prerequisite, senior standing in geology or permission.

### 474 Introduction to Geological X-ray Methods (3) W GRESENS

Introduction to the routine analysis of geologic materials by the methods of X-ray diffraction and fluorescence spectroscopy, with laboratory. Prerequisite, senior standing or permission.

#### 480 History of Geology (3) Sp

BARKSDALE

A study of the contribution of individuals to the evolution of geological concepts. Prerequisites, senior standing in geology or permission.

## 486 Economic Geology of Sedimentary Rocks (5) A

CHENEY

Description and origin of fuels, water resources, and metallic and nonmetallic ore deposits indigenous to regoliths, sediments, and sedimentary rocks. Prerequisite, senior standing in geology or permission. (Offered even-numbered years.)

### Economic Geology of Igneous and 487 Metamorphic Rocks (5) W CHENEY

Description and origin of metallic and nonmetallic ore deposits formed in igneous and and metamorphic rocks or by igneous and metamorphic processes. The political and economic importance of ore deposits. Prerequisite, senior standing in geology or permission.

### 488 Economic Geology Field Trip (2) Sp CHENEY

Four-to-five-day trip to neighboring mining region for field inspection of ore deposits. Two weekend trips to map mineralized areas. Prerequisite, 487 or permission.

### 498 Undergraduate Thesis (5) AWSp

The thesis must be submitted at least one month before graduation. Prerequisites, senior standing and permission.

#### Undergraduate Research (\*, max. 5) 400

AWSp

Prerequisite, permission.

## **Courses for Graduates Only**

510 Advanced Studies in Geomorphology and Pleistocene Geology (\*, max. 10) AWSp

PORTER, WASHBURN

- 511 Seminar in Geomorphology (\*) AWSp PORTER, WASHBURN
- 512 Seminar in Pleistocene Research (2) AWSD PORTER, WASHBURN
- 516 **Advanced Problems in Glacial Geology** (3) Sp

PORTER

Field and/or laboratory investigations of selected glacial geologic problems, with emphasis on the Pacific Northwest.

### 518 **Advanced Problems in Periglacial** Processes (3) A WASHBURN

In-depth examination of various cold-climate geomorphic processes and their results, especially those related to frost action. Prerequisite, 418 or equivalent. (Offered even-numbered years.)

## 520 Advanced Studies in Mineralogy, Petrography, and Petrology (\*) AWSp

521 Metamorphic Minerals (5) W

MISCH

MISCH

Nature and paragenesis of metamorphic minerals; physical, chemical, and geological in-terpretation of paragenesis. Prerequisite, 425 or equivalent. (Offered odd-numbered years.)

#### Metamorphic Processes (5) W 522

Deformation and crystallization, migmatization, and mobilization. Prerequisite, 425 or equivalent. (Offered even-numbered years.)

### 523 Advanced Optical Mineralogy (4) A CHRISTENSEN

Universal Stage, petrofabrics, advanced optical theory, feldspar determination.

### Petrography and Petrogenesis of 524 Igneous Rocks (5) Sp MC CALLUM, VANCE

Classification and nomenclature of igneous rocks. Igneous rock associations, magma types, and petrographic provinces. Origin and differentiation of magmas. With laboratory. Prerequisite, 424 or equivalent.

525 Theoretical Metamorphic Petrology (4) A

### EVANS

Theoretical treatment of metamorphic mineral assemblages and metamorphic processes. Prerequisites, 425, Chemistry 456, or equivalent.

### 526 Theoretical Igneous Petrology (4) W MC CALLUM

Review of thermodynamics. Fundamentals of phase equilibria involving liquids, solids, and gases. Physical properties of silicate melts. Crystal growth and nucleation. Diffusion in melts. Experimental studies on synthetic and natural systems. Prerequisite, 424 or equivalent.

## 527 Rock-Forming Minerals (3) A

EVANS, MC CALLUM Structure, chemistry, physical properties, and determinative mineralogy of common rock-forming minerals. With laboratory. Coverage will vary from year to year. Prerequisites, 424, 425, 472.

### 530 **Advanced Studies in Paleontology** (\*, max. 9) AWSp MALLORY, RENSBERGER

### 531 Biostratigraphy (5) W

MALLORY Principles of stratigraphic paleontology and chronologic biostratigraphy. Prerequisites, 430, 461, or equivalent. (Offered even-numbered years.)

532 Studies in Paleoecology (5) Sp

MALLORY Properties of fossil populations and interpretation of habit and habitat in the geologic past. Prrequisites, 321, 430, or permission.

### Seminar in Vertebrate Paleontology 533 (3, max. 9) AWSp

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 physical anthropology.

Advanced Studies in Structural 540 Geology (\*) AWSp MC KEE, MISCH

### 545 Structure of Europe (5) Sp MISCH

Structural evolution and geotectonics of Europe. (Offered even-numbered years.)

546 Structure of Asia and West Pacific Rim (5) Sp

MISCH Structural evolution from Central Asia to West Pacific: geotectonic principles. (Offered odd-numbered years.)

### 547 Literature on Structural Geology (3 or 5) W

MISCH

Selected readings and seminars on Cordilleran structure.

#### 549 Structural Analysis of Tectonites (4) Sp BLACIC

Fundamentals of structural analysis of tectonites. Symmetry principles as applied to the study of petrofabrics. Determination of finite strain in deformed rocks. Experimental deformation of rocks, applications to dynamic analysis of tectonites. Prerequisite, 443 or permission.

### 550 Studies in Geophysics (\*, max. 9) AWSD

BOSTROM, CHRISTENSEN, CROSSON

553 Physical Properties of Earth Material (3) Sp

CHRISTENSEN, CROSSON

Composition of rocks; mechanical, thermal, magnetic, and electrical properties of rocks; tensor properties of crystals; measurement of rock properties at high pressures and temperatures. Offered joinitly with the Geophysics Program as Geophysics 553. Prerequisite, Aeronautics and Astronautics 567 or equivalent.

### 560 Advanced Studies in Stratigraphy (\*) AWSp

MALLORY, WHEELER

### 563 West Coast Cenozoic Stratigraphy (5) A MALLORY

Lithologic and faunal studies of the West Coast Cenozoic. (Offered odd-numbered vears.)

### 565 Paleozoic Stratigraphy (5) Sp WHEELER

North American Paleozoic stratigraphy as a basis for interpretation of regional and interregional geologic episodes. (Offered evennumbered years.)

#### 568 Mesozoic Stratigraphy (5) Sp WHEELER

North American Mesozoic stratigraphy as a basis for interpretation of regional and interregional geologic episodes. (Offered oddnumbered years.)

#### 570 Advanced Studies in Geochemistry (\*) AWSp

- EVANS, GRESENS, MC CALLUM
- 571 Engineering Geology (3) W

### COOMBS

Geologic principles as applied to large engineering projects. Emphasis is on the physical properties of rocks and their relation to contemplated engineering structures.

- 573 **Application of Microprobe Techniques** (4) W
  - EVANS

### 576 Geochronometry (4) A

STUIVER Principles, methods, and applications of dating rocks and organic materials.

Advanced Studies in Sedimentology (\*) 580 AWSp

STEWART, WHETTEN

581 Analysis of Sediments and Sedimentary Rocks (5) Sp

KELLEY, STEWART, WHETTEN

Methods of analysis of sediments and sedimentary rocks, and statistical evaluation, presentation, and interpretation of data. Offered jointly with the Department of Oceanography as Oceanography 581. Prerequisites, 423, Mathematics 281 or Quantitative Science 281, or equivalent.

582 Seminar in Sedimentology (2) W STEWART, WHETTEN

Lectures, discussions, and readings on selected problems of current interest.

Advanced Studies in Economic Geology 585 (\*) AWSp

CHENEY, COOMBS

Geochemistry of Ore Deposits (3) A 587 CHENEY

Origin of metallic ores with emphasis on geochemistry and isotopic geology; four- to fiveday field trip to mining region. Prerequisites, 472 or equivalent, and 486 or 487. (Offered odd-numbered years.)

590 Seminar (\*) AWSp

600 Independent Study or Research (\*) AWSp

700 Master's Thesis (\*) AWSp

800 Doctoral Dissertation (\*)

## GEOPHYSICS

400 Introduction to Geophysics I (5) A Review of potential theory and thermodynamics and their applications to geophysical problems. Prerequisites, Mathematics 438 and Physics 323, or permission.

401 Introduction to Geophysics II (5) W Introduction to continuum and fluid mechanics and their applications to geophysical problems. Geophysics 400 recommended.

402 Introduction to Geophysics III (5) Sp Introduction to turbulence, elastic waves, and magnetohydrodynamics, with special emphasis on geophysical applications. Prerequisites, 400 and 401, or permission.

### 415 Principles of Glaciology (4) A LACHAPPELLE, PORTER, RAYMOND,

STUIVER, UNTERSTEINER, WASHBURN Structure and properties of snow and ice: snow metamorphism, avalanches, heat and mass balance of valley glaciers, glacier structure and flow dynamics, continental ice sheets, sea, lake, and river ice, frozen ground, methods of paleoclimatology and ice age theories. Offered jointly with the Department of Geo-logical Sciences as Geological Sciences 415. Prerequisites, upper-division standing and permission.

501 Earth Potential Fields (3) A

BOOKER, LISTER Application of potential theory to the interpretations of magnetic and gravity anomalies. Heat flow and interpretations. Global tectonics. Prerequisite, 400.

## 502 Geophysics of Solids (3) W

BLACIC, MERRILL Introduction to the applications of solid-state physics to geophysics. The origin and the properties of remanent magnetization in rocks. Equations of state and the composition of the mantle. Defects in solids and their roles in tectonophysics. Prerequisite, permission.

503 Elements of Seismology (3) Sp CROSSON, S. SMITH

Propagation of elastic waves and techniques of determining the properties of the deep interior of the earth. The nature of earthquakes and their relation to geologic processes. Prerequisite, 401.

### 510 Physics of Ice and Snow (3) A

HOBBS 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. Offered jointly with the Department of Atmospheric Sciences as Atmospheric Sciences 510. Prerequisite, permission.

### **Glaciology I: Formation of Snow** 511 and Ice Masses (3) W HOBBS, UNTERSTEINER

Snow climatology. Transport of snow by wind. Transfer of radiative, sensible, and latent heat at the surface of snow and ice. Freezing of natural water bodies. Heat and mass budget of ice masses. Theories of ice ages. Offered jointly with the Department of Atmospheric Sciences as Atmospheric Sciences 511. Prerequisite, 510 or permission.

#### 512 Glaciology II: Dynamic Glaciology (3) Sp

**RAYMOND, UNTERSTEINER** 

Rheology of ice. Internal deformation and sliding of glaciers. Thermal regime of glaciers. Steady flow, dynamic response to changing climate, and surges. Deformation and drift of sea ice. Snow and avalanche dy-namics. Offered jointly with the Department of Atmospheric Sciences as Atmospheric Sciences 512. Prerequisites, 510, 511, or permission.

### **Glaciology III: Structural Glaciology** 513 (3) A

### RAYMOND, UNTERSTEINER

Snow metamorphism and primary layering. Dynamic metamorphism, flow structures, and relation to ice deformation. Structure of river, lake, and sea ice. The role and behavior of foreign matter. Physical processes of structural change and relationship between structures and bulk physical properties. Offered jointly with the Department of Atmospheric Sciences as Atmospheric Sciences 513. Pre-requisites, 510, 511, 512, or permission.

## 514 Field Glaciology (6) Sp

LACHAPPELLE, RAYMOND, UNTERSTEINER Structure and metamorphism of snow cover. Energy exchange at melting snow and ice surfaces. Deformation and flow of glaciers. Climatology and mass budgets. Glacier features. Emphasis on instrumentation, field techniques, and data analysis. Offered jointly with the Department of Atmospheric Sciences as Atmospheric Sciences 514. Prerequisite, 511 or 512 or permission.

### 520 Seminar (1-2) AWSp

Review of current literature in geophysics and graduate student research with faculty participation. Prerequisite, graduate standing.

### 535 Introduction to Plasmas in Geophysics (3)

LIEMOHN

Kinetic theory of ionized gases, phase space distribution, magnetohydrodynamics of con-

ducting fluids, transport processes, configuration-space instabilities in the magnetosphere, charged particle trajectories in nonuniform fields, geomagnetic trapping in radiation belts, electromagnetic and hydrodynamic waves in anisotropic media, velocity-space instabilities, propagation in the ionosphere and magnetosphere. Prerequisite, graduate standing or permission.

### 536 Geomagnetism (3) W

Description and theory of earth's permanent magnetic field. Secular variations. Solar and lunar magnetic variations. Atmospheric tides. Dynamo theory. Ionosphere. Solar-terrestrial relationships. Magnetic storms. Prerequisites, Physics 426 or Aeronautics and Astronautics 567, or permission.

### 537 Magnetosphere I (3) Sp

Formation by interaction of solar wind with geomagnetic field. Trapped particles. Electromagnetic waves in anisotropic plasma. Dynamic disturbances and plasma instabilities. Prerequisite, 535 or permission.

## 538 Magnetosphere II (3) A

Plasma waves. Propagation of very low frequency and hydromagnetic waves in the magnetosphere. Interactions between plasma waves and particles. Prerequisite, 537.

### 539 Structure and Dynamics of Upper Atmosphere (3) Sp

LEOVY

Properties of the ionosphere, electromagnetic wave propagation, the dynamics of the ionosphere. Offered jointly with Atmospheric Sciences as Atmospheric Sciences 539. Prerequisite, Atmospheric Sciences 542 or permission.

#### 551 Advanced Potential Theory and

Applications (3) A CROSSON

Fundamental existence theorems of potential theory, geopotential and the physical surfaces of the earth, special topics in physical geodesy: statistical methods, integral equation techniques, and celestial methods; implications with regard to the mass distribution in the earth. Prerequisites, 501, 502; Mathematics 569 or equivalent.

#### 552 Theoretical Seismology (3) W CROSSON

Wave motion in uniform and layered elastic solids, dispersion, surface waves, modal analysis; inhomogeneous and anisotropic media; effects of anelasticity, gravity, and curvature, eigenvibrations of the earth. Prerequisite, Aeronautics and Astronautics 546.

### 553 Physical Properties of Earth Material (3) Sp

### CHRISTENSEN, CROSSON

Composition of rocks; mechanical, thermal, magnetic, and electrical properties of rocks; tensor properties of crystals; measurement of rock properties at high pressures and temperatures. Offered jointly with the Department of Geological Sciences as Geological Sciences 553. Prerequisite, Aeronautics and Astronautics 567 or equivalent.

### 571 Gravity and Geomagnetic Interpretation (3) A

BENNETT, BURNS

Fundamental concepts; the earth's magnetic field; instrumentation and reduction of magnetic measurements, interpretation of magnetic data; gravity measurements, reduction of gravity observations; interpretation of gravity anomalies. Offered jointly with the Department of Oceanography as Oceanography 571. Prerequisites, Mathematics 324, Physics 323, or equivalents; permission.

### 572 Geodynamics (3) A LISTER

A qualitative discussion of the processes which cause crustal movement, viewed on a global scale, and the techniques used to investigate these processes. Prerequisite, permission.

### 573 Terrestrial Magnetism (3) Sp 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. Offered jointly with the Department of Oceanography as Oceanography 573.

### 574 Tectonophysics (3) A BLACIC

The physics of rock deformation, theory of brittle and ductile behavior, techniques of experimental rocks deformation at high temperature, and pressure with applications to flow processes in the mantle and crust. Prerequisite, permission.

## 580 Special Topics in Geophysics (2-6, max. 12) Sp

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 is expected to vary from year to year. Prerequisite, graduate standing or permission.

### 600 Independent Study or Research (\*) AWSp

700 Master's Thesis (\*) AWSp

800 Doctoral Dissertation (\*)

## GERMANIC LANGUAGES AND LITERATURE

## **Courses for Undergraduates**

101-102, 103 First-Year German (5-5,5) AWS, AWSp, AWSpS

The methods and objectives are primarily oral-aural.

## 111, 112, 113 First-Year German (5,5,5) AWS,AWSp,AWSpS

Primary emphasis is placed on an accelerated acquisition of the reading skill. A foundation for proficiency in writing, speaking, and listening is the secondary objective of the course. A structural and grammatical approach rather than an oral-aural approach is used.

### 121, 122 First-Year Reading German (5,5) AS,WS

A special beginning course devoted exclusively to the reading objective; 122 continuation of 121. For graduate students only.

### 123, 124, 125 German for the Elementary School (3,3,3) A,W,Sp

Training in basic German grammar, pronunciation, and intonation with practical techniques for using German in the elementary classroom; organization of study units, songs, dialogues, and dramatizations. Open to those with little or no background in German. 201 Basic Second-Year German (5) AWSpS Readings and oral practice in German, plus grammar review. Prerequisite, 103 or equivalent.

202 Intermediate Second-Year German (5) AWSpS

Continuation of 201. Prerequisite, 201 or equivalent.

203 Advanced Second-Year Reading (3)

AWSpS Introduction to literary analysis. Majors and minors take concurrently with 207. Prerequisite, 202 or equivalent.

207 Advanced Second-Year Conversation (2) AWSpS

Discussion of general topics to develop oral fluency. Prerequisite, 202 or equivalent.

211 Basic Second-Year Reading (5) AW Primary emphasis is placed on the reading skill. The active reproduction of German is de-emphasized. Prerequisite, 113 or equivalent.

### 212 Intermediate Second-Year Reading (5) WSp

Readings in German history and culture. Student may do supervised work in readings relating to his own discipline. Prerequisite, 211 or equivalent.

### 213 Advanced Second-Year Reading (3)

ASp Readings in contemporary German history and culture. Student may do readings relating to his own discipline. Prerequisite, 212 or equivalent.

### 230 Conversational German (5) S

Intensive. For participants in the Living-Language Group Program only. Prerequisite, 103 or equivalent.

**260** Lower-Division Scientific German (5) W Students in the sciences may substitute 260 for 212. Prerequisite, 211 or equivalent.

### 261 Advanced Scientific German (3) WSp

Concentration on the further development of a general science vocabulary. In addition, students read texts relating specifically to their own scientific disciplines. Prerequisite, 260 or equivalent.

### 290, 291, 292 Survey of German Tradition (3,3,3) A,W,Sp

The interrelations of political, social, and economic developments in literature and the arts, middle ages through the twentieth century. Course offered in English. For majors and minors only.

299 Directed Reading (1-5, max. 10) AWSpS This course is designed strictly for nonmajors who have demonstrated a level of proficiency equivalent to the completion of German 203, and who wish to go on with reading original texts in German literature and thought, and yet who do not wish to compete in a 300-or 400-level major course—or who do not wish to be restricted to the subject matter of these 300- and 400-level courses.

### 301, 302, 303 Grammar and Conversation (3,3,3) AW,WSp,SpS.

The materials used aim not merely at an increase in ability to speak, write, and understand German, but also at broadening the student's understanding of the culture of German-speaking countries. Primarily for majors and minors. Prerequisites, 15 credits in second-year German.

## 307 Third-Year Composition (5) S

Not open for credit to those who have had 301, 302, 303.

### 310 Introduction to Twentieth Century Literature (3) AS

Critical analysis, interpretation, and comparison of individual works by twentieth century writers. Short stories, poems, and one play by Kafka, Zweig, Walser, Borchert, Böll, Aichinger, Trakl, Rilke, Heym, Brecht, Frisch, and others. Prerequisite, 15 credits in second-year German.

### 311 Introduction to the German Novelle (3) WS

Critical analysis, interpretation, and comparison of four German Novellen by Kleist, Brentano, Storm, and Keller, and consideration of the theory and development of the German Novelle in the nineteenth century. Prerequisite, 15 credits in second-year German.

### 312 Introduction to Goethe (3) SpS

Critical analysis and interpretation of Goethe's Faust, Part I, with consideration of the literary and historical background of the work, and critical analysis and interpretation of selected poems by Goethe. Prerequisite, 15 credits in second-year German.

## 330 Conversational German (5) S

For participants in the Living-Language Group program only. Not open for credit to those who have had 301, 302, 303. Prerequisite, 207 or permission.

## 401, 402 Grammar and Composition (3,3) A,W

Primarily for majors and minors. Prerequisites, 301, 302, and 303.

### 403 Applied Linguistics (3) Sp

Linguistics in its ramifications and applications to teaching. Prerequisite, third-year German or permission.

### 404 History of the German Language (3) SpS ALLARD, BARRACK, VOYLES

From early Germanic to the present. Open to junior majors. (Offered Summer Quarter 1973.)

## 405 Linguistic Analysis of German (3) A,Sp

ALLARD, BARRACK, VOYLES Prerequisite, third-year German, or permission.

407 Advanced Composition (5, max. 10) S Not open for credit to those who have had 401, 402, 403.

### 410, 411, 412 Survey of Modern German Literature and Culture (3,3,3) A,W,Sp D. BEHLER, HERTLING, MC LEAN

410: German Romanticism: Literature from 1800 to 1830 with aesthetic and historical consideration of works by Novalis, Brentano, Eichendorff, Heine, Kleist, Büchner, E.T.A. Hoffmann, Grillparzer, and others. 411: Nineteenth Century Realism: Literature from 1830 to 1890, with aesthetic and historical consideration of works by Keller, Hebbel, Meyer, Stifter, Fontane, and others. 412: The Twentieth Century: Literature from 1890 to 1945, with aesthetic and historical consideration of works by Hauptmann, Kaiser, Brecht, Kafka, Mann, Rilke, Trakl, Stadler, Stramm, van Hoddis, and others. Prerequisite, for either 410, 411, or 412, 15 credits in thirdyear German or permission.

### 413, 414, 415 Survey of Older German Literature and Culture (3,3,3) Sp,W,A ALLARD, HERTLING, HRUBY

413: Medieval Literature: German literature from 750 to 1400, with aesthetic and historical consideration of works from the Carolingian and Cluniac Periods, the Court Epic, the Heroic Epic, the Spielmannsepik, the Minnesang, the poetry of the epigones who followed the Age of High Chivalry, the German Mystics, and the Ackermann aus Böhmen. 414: Literature of the Sixteenth, Seventeenth, and Early Eighteenth Centuries: Aesthetic and historical consideration of works by Erasmus, Luther, Hans Sachs, the Historia von Dr. Faustus, Baroque poetry, and the literature of the early Enlightenment. 415: Literature of the Eighteenth Century: Aesthetic and historical consideration of works by Lessing, Schiller, and Goethe, with attention to the historical background and development of German Classicism. Prerequisite, for either 413, 414, or 415, 15 credits in thirdyear German or permission.

### 430 Advanced Conversational German (5, max. 10) S

For participants in the Living-Language Group program only. Not open for credit to those who have had 401, 402, 403. Prerequisite, 330 or permission.

### 473 Pedagogical Training of Teaching Assistants (3) A

**490** Contemporary German Literature (3) A Interpretation of selected works by contemporary German authors. A senior colloquium for majors. Prerequisite, permission.

### 491 Introduction to Literary Analysis (3) W MC LEAN

An introduction to various methods of interpretation and to their practical application. For senior majors. Prerequisite, permission.

## 492 History of Germanic Philology (3) Sp

An introduction to the works of outstanding scholars in the field of Germanics. For senior majors. Prerequisite, permission.

### 495 Proseminar in German Literature (3, max. 15) AWSpS

Special topics, the subject matter and depth of which are not included in other literature courses in the program, and which are to be arranged through cooperative consultation between students and faculty. Prerequisite, 15 credits in third-year German or permission.

497 Studies in German Literature (1-5, max. 15) AWSpS

## 498 Studies in the German Language (1-5, max. 15) AWSpS

### **COURSES IN ENGLISH**

340 Friedrich Nietzsche and His Impact on German Literature (3) A D. BEHLER

Concerned with the analysis of Friedrich Nietzsche's chief works and the discussion of his position within modern German literature and thought.

### 341 Kafka in English (3) W SOUTH

Intensive study of the short stories and novels of Franz Kafka in English translation; emphasis on philosophical relevance and aesthetic significance.

### 342 Thomas Mann in English (3) Sp REY

Intensive study of some of Thomas Mann's theoretical writings, short stories, and novels, interpreted within the wider context of German literature and philosophy at the turn of the century.

# 343 The Theme of the Death of God in German Thought and Literature (3) W

Course devoted to the discussion of the great controversies about the traditional concept of God, pantheism, atheism, and nihilism, which mark German thought and literature since the late eighteenth century and throughout the nineteenth century.

# 344 Hermann Hesse and the Crisis of Human Individuality (3) A

Course designed to offer an in-depth study of the major novels of Hermann Hesse. Hesse's works will be discussed within the framework of the European intellectual tradition and with regard to their present popularity in the United States. The crisis of human individuality in a technological world will be the major philosophical focus of the course.

### 345 Bertolt Brecht in Translation (3) A MC LEAN

Brecht's life and work, particularly his plays and writings on theater, also 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.

### 346 The Contemporary Novel in German (3) W

Selections from the modern German novel representative of the concern with the human condition, of social criticism, and of experimentation with new forms of prose writing.

### 347 German Mysticism (3) Sp ALLARD

Historical survey of the quest for the mystical in German literature and philosophy from the Middle Ages to the twentieth century.

## 360 The Image of Woman in German Literature (3) W

D. BEHLER

The image of woman as a reflection of the prevailing social attitudes on various periods of German literature.

370 Man's Quest for Meaning: Germany's Intellectual Contribution Today (3) Sp E. BEHLER

Search for meaningful existence in contemporary thought. The main goal is to present this aspect of modern life to a broader community of students and to discuss with them problems that constitute a challenge to an understanding of ourselves.

### **Courses for Graduates Only**

- 500 Methods and Ideologies of German Literary Criticism (3) W
- 501 Bibliography (3) A
- 502 History of German Criticism (3) W E. BEHLER
- 503 Modern Poetry (3) A REY
- 506 German Syntax and Semantics (3) SpS ALLARD, VOYLES
- Advanced structural analysis of German

grammar, with special emphasis on the application of descriptive techniques. (Offered Summer Quarter 1972.)

### 510, 511, 512 German Civilization (3,3,3) AS,WS,SpS

Aesthetic and historical presentation of modern German civilization with due emphasis on its cultural, political, and social aspects. Prerequisite, permission. (Offered in consecutive Summer Quarters; 510 was given in Summer 1971.)

### 513 Germany 1918-1968, A Study in German Fiction and Thought (3) AS ALLARD

German intellectual life from 1918 to 1968. A study in German fiction and thought in relation to the cultural, political, and social aspects of the period. (Offered Summer Quarter 1974.)

- 515 Romanticism (3) Sp D. BEHLER
- 516 Nineteenth-Century Drama (3) A
- 517 Nineteenth-Century Prose (3) W HERTLING
- 518 Twentieth-Century Literature (3) Sp REY

520 Contemporary German Literature (3) Sp Prerequisite, graduate standing.

- 521 Seminar in the Literature of the Reformation and Renaissance (3) Sp HRUBY.
- 522 Seminar in Baroque (3) Sp
- 524 Seminar in Eighteenth-Century Literature (3) A
- 525 Seminar in Romanticism (3) Sp E. BEHLER
- 526 Seminar in Nineteenth-Century Drama (3) Sp
- 527 Seminar in Nineteenth-Century Prose (3) A HERTLING
- 528 Seminar in Twentieth-Century Literature (3) A
- 531 Lessing (3) A · SOUTH
- 534 Goethe 'I (3) A AMMERLAHN
- 535 Goethe II (3) W AMMERLAHN
- 538 Schiller (3) W SOUTH
- 540 Development of German Poetry from the Late Nineteenth Century to the Present (3) A MC LEAN

The development of German poetry from Rilke, Hofmannsthal, and George through Trakl, Benn, the Expressionists and the Dadists, Brecht, and Enzenberger, to such contemporaries as Eich, Heißenbüttel, the concrete poets, Celan, and Bachmann. Prerequisite, graduate standing.

### 541 Twentieth-Century German Drama (3) W

Selection from modern German drama representative of the concern with the human condition, of social criticism, and of experimentation with the new dramatic forms. Prerequisite, permission.

### 542 Storm and Stress and Classicism: Revolution and Resignation (3) W AMMERLAHN

An analysis of the important theoretical and creative writings of the Storm and Stress period culminating in German Classicism, tracing this development in the context of the cultural and historical setting, and showing the significance for the future course of German history and civilization.

### 543 Social Criticism in Twentieth-Century German Prose (3) Sp

Studies of selected modern German novels and short novels by representative authors, dealing with the social and political problems of Germany. Prerequisite, permission.

544 Seminar in Goethe (3) W

550 Gothic (3) A VOYLES

- 552 Old High German (3) W
- 555 Old Saxon (3) A
- 556 Middle High German (3) A HRUBY
- 557 Middle High German Literature I (3) W HRUBY
- 558 Middle High German Literature II (3) Sp HRUBY
- 560 Modern Dialects (3) W BARRACK
- 564 Early Middle High German Literature (3) A HRURY

A comprehensive presentation of early Middle High German literature in the original.

565 Seminar in Courtly Epic (3) W

Aspects and methods of literary analysis pertaining to the study of medieval courtly epics.

 566 Late Middle High German Narrative
(3) Sp HRUBY

Study of the evolution of the late Middle High German novelistic narrative.

567 Late 'Minnesang' (3) A HRUBY

A comprehensive study of the various developments of Middle High German lyric poetry from 1215 to the fifteenth century (Walther von der Vogelweide to Oswald von Wolkenstein).

568 Seminar in Heroic Epic (3) W HRUBY

Literary and historic problems of the German heroic epic, with special emphasis on the Nibelungenlied and the Dietrichsepik.

569 Didactic and Religious Medieval Literature (3) Sp

A comprehensive study of Middle High German religious and didactic poetry from the twelfth to the fifteenth century.

## 570 Nietzsche (3) A

E, BEHLER

Intensive study of the main works of Friedrich Nietzsche in the original. Emphasis on philosophical relevance and aesthetic significance. Prerequisite, graduate standing.

## 572 Seminar in Heine (3) W

Comprehensive study of the literary importance and the philosophical, political, and social thought of Heinrich Heine, with emphasis on his prose works. Prerequisite, graduate standing or special permission.

### 573 Philosophy in German Literature (3) Sp E. BEHLER

Seminar will be devoted to the great figures of German philosophical thought and their interrelationship with German literature. Special goal is to provide future teachers of German literature with the philosophical background of their field. Prerequisite, graduate standing.

574 Introduction to Methods of Teaching German (3) AS

RABURA

Developments in the methods of teaching German, curriculum and programs on the elementary and secondary level; qualifications of a foreign language teacher are discussed.

575 Teaching Advanced German Language and Literature on Secondary Level (3) SpS

SOUTH

Teaching of German language and literature on the advanced level in secondary schools. Coordinated six-year program and the preparation for advanced college work. (Offered Summer Quarter, 1972.)

### 576 Modern Methods and Materials in Teaching German (3) WS RABURA

The audio-lingual method and its application; planning, organization, and use of a foreign language laboratory; tests and measurements; evaluation of teaching materials. (Offered Summer Quarter 1973.)

### 577 Principles of Second-Language Learning (3) W

Examination of the roles of aptitude, attitude, and motivation as factors affecting secondlanguage learning in general, and German specifically. Recent developments, e.g., individualized instruction, will be examined and demonstrated. Prerequisites, Foreign Language Teaching Methods course and graduate standing.

580, 581, 582 Seminar in the Modern Period of German Literature (1-5, 1-5, 1-5) A,W,Sp

Prerequisite, permission.

- 590 German Mysticism of the Late Middle Ages (1-5) A E. BEHLER
- 591 German Idealism and Its Relationship to Literature (1-5) W E. BEHLER
- 592 German Existentialism and Its Relationship to Literature (1-5) Sp E. BEHLER
- 595, 596, 597 Seminar in Germanic Philology (1-5, 1-5, 1-5) A,W,Sp
- 600 Independent Study or Research (\*) AWSpS
- 700 Master's Thesis (\*) AWSpS
- 800 Doctoral Dissertation (\*)

## HISTORY

Specific areas in History are designated by area letters. These letters must precede course numbers on the student's Official Program. Designation letters and their definitions are:

### HST—History (General)

HSTAA-History of the Americas

HSTAM—Ancient and Medieval History (including Byzantine)

HSTAS—History of Asia

HSTEU-Modern European History

## **Course for Undergraduates**

Social Science 150 Afro-American History (5) ASp

An examination of the Negro and his role in history, both in Africa and the Americas.

## **GENERAL HISTORY**

# **Courses for Undergraduates**

HST

## 111 The Ancient World (5) A

FERRILL, C. THOMAS A history of the origins of Western civilization to the fall of Rome.

HST

# 112 The Medieval World (5) AW

BACHARACH, MOSHER A survey of the political, economic, social, and intellectual history of the Middle Ages. (Not open to students who have taken HST 301.)

### HST

## 113 The Modern World (5) Sp

BRIDGMAN, PINKNEY

A survey of the political, economic, social, and intellectual history of Modern Europe. (Not open to students who have taken HST 302 or 303.)

HST

### 215 The History of the Atomic Bomb (3) HANKINS

History of the atomic bomb from the beginning of nuclear physics to the security hearing of J. Robert Oppenheimer. The course will include a study of the scientific achievements that made the bomb possible, the organization of a community of scientists in the United States, the history of the Manhattan Project, the decision to deploy the bomb, the moral misgivings of the scientists involved, and the problem of espionage and security, ending with the security hearing of Oppenheimer. In addition to readings in the voluminous literature on the subject, the course will include documentary films and discussions with faculty members who were actively engaged in the research of the Manhattan Project.

### HST

### 261 Survey of the Muslim Near East (5) BACHARACH

Survey of the history of the Near East (the Arab countries, Turkey, Iran, and Afghanistan) from the emergence of Islam in A.D. 622 to the present. The various aspects of history (culture, economics, politics, etc.) will be discussed.

### HST

## 299H Honors Colloquium (3-5) Sp

Introduction to historical method. Through the use of well-known tales, the student will examine historical evidence and study the difference between mythology and legend and the nature of history.

## HST

## 301 Early Modern European History: 1450-1648 (5) A

BRIDGMAN, EMERSON, GRIFFITHS, LEVY Political, social, economic, and cultural history from the Late Renaissance to the Peace of Westphalia.

## HST

302 Modern European History: 1648-1815 (5) W

BRIDGMAN, EMERSON, HANKINS,

LYTLE, SUGAR Political, social, economic, and cultural history from the Peace of Westphalia to the fall of Napoleon.

## HST

303 Contemporary European History Since 1815 (5) Sp BRIDGMAN, EMERSON, FARRAR,

PINKNEY, SUGAR

Political, social, economic, and cultural history from the fall of Napoleon to the present.

### HST

### 311 Science in Civilization: Antiquity to 1600 (5) A HANKINS

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.

## HST

## 312 Science in Civilization: Science in Modern Society (5) W

HANKINS

The 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.

### HST

### 345 War and Society: An Interdisciplinary Study (5) A

L. FARRAR

Interdisciplinary study of war and society, viewing the problem from six different. perspectives: historical, social and natural scientific, humanistic, personal experience, and policy option.

### HST

### 361 Slavery in History: A Comparative Study (5) Sp

BACHARACH

Slavery as a universal historical phenomenon lending itself to a comparative analysis will be studied in terms of its philosophical justifications, economic importance, and local practices. The following historical periods will be surveyed: the ancient Near East, Greece, Rome, Islam, Africa, Latin America, and North America.

## HST

### 362 The Ending of Slavery in History: A Comparative Study (5)

Slavery has existed in many, perhaps most, societies in all chronological eras and geographical areas of which we have knowledge. It still exists in some societies as of the 1970's; in other societies, the institution of slavery appeared as one stage of development and then was gradually transformed into some other institution, such as feudalism; in yet other societies, slavery has been abolished at a specific time by action of the society. The societies that will be considered in this course (some in more detail than others) are: Ancient Greece and Rome; medieval Europe; the Islamic societies of the Mideast; African tribes.

### HST 391H-392H Colloquium in the History of

Ideas (5-5) W,Sp Discussion of selected topics in the history of

# ideas; writing of an interpretive essay.

## HST

### 411 Origins of Modern Science: The Physical Sciences (5) HANKINS

The history of the physical sciences seen through an intensive study of key periods in their development. Emphasis will be placed upon the nature of scientific revolutions and the role of individual scientists. Prerequisite, one introductory course in a physical science.

## HST

412 Science and the Enlightenment (5) A 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.

### HST

421 Africa South of the Sahara (5) Sp Political and cultural evolution of the peoples inhabiting these lands.

### HST

422 South Africa (3) Sp

South Africa in the nineteenth and twentieth centuries: social, political, and economic developments; nationalism and race relations; South Africa in crisis.

### HST

# 423 History of Australia and New Zealand (5) W

The techniques of overseas colonization of the nineteenth century and development of egalitarian democratic communities in the late nineteenth and twentieth centuries.

## HST

### 425 History of the British Empire and Commonwealth Since 1783 (5) Sp BELL

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.

### HST

### 441 Diplomacy of Early Modern Europe (5) W FARRAR

Relations between European states during the period of French predominance, 1648-1870.

### HST

442 Diplomacy of Modern Europe (5) Sp FARRAR

Relations between European states during the period of German predominance, 1870-1945.

## HST

443 Japanese-American Relations (5) Sp BUTOW

The confrontation between Japan and the United States from Perry to MacArthur with emphasis on the period from 1905 to 1945. Prerequisite, permission.

### HST

### 461 History of the Near East: 622-1300 (5) A

BACHARACH

The Arab countries from the emergence of Islam.

### HST

462 History of the Near East: 1300-1789 (5) W

### BACHARACH

The Arab countries to the accession of Sultan Selim III.

## HST

### 463 History of the Near East Since 1789 (5) Sp BACHARACH

The Arab countries from the westernizing reform movements to the present.

### HST

465 Numismatics Seminar (3) BACHARACH

An introduction to the use of numismatic evidence for political, economic, and cultural history. Prerequisite, permission of instructor.

### HST

### 469 Introduction to Modern Jewish History (5)

Selective problems in modern Jewish history, 1789-1948.

### HST

### 481 Economic History of Europe (5) W MORRIS, R. THOMAS

The origins of the modern European economy; an historical analysis of economic change and growth from medieval times that stresses the preconditions and consequences of industrialization. Offered jointly with the Department of Economics as Economics 460. Economics 200, 201 recommended.

### HST

### 491H-492H Historical Method (5-5) A,W The purposes, materials, and techniques of historical scholarship. Theory, practice, and criticism.

### HST

### 495 The Teaching of Black, Chicano, and Indian History in the High School and the College (3) S

Exploration of the challenge, the principles, the present opportunities, and the unresolved issues involved in the introduction of Black, Chicano, and Indian history into current high school and college curricula. Designed for present and future teaching of American history.

### HST

## 498 Senior Seminar (3-5, max. 15)

Each seminar will examine a different subject or problem. A list of the seminars and their instructors is available in the Department of History office. Students must have the permission of the instructor of the seminar in which they plan to enroll.

### HST

499 Undergraduate Research (1-5, max. 15) AWSp

## Courses for Graduates Only

### HST

511 History of Science (3-6) HANKINS

### HST

512-513-514 Seminar in the History of Science (3-6)-(3-6)-(3-6) A,W,Sp HANKINS

### HST

524 British Empire History (3-6) BELL

### HST

## 540-541 Diplomacy of World War I (3-6)-(3-6)

L. FARRAR

Seminar. European diplomacy from the July crisis, 1914, to the armistice, 1918. The relations among the European states will be interpreted broadly to include domestic problems as well as military and diplomatic decisions.

### HST

### 542 European Diplomatic History, 1870-1945 (3-6) L. FARRAR

### HST

### 543 War and Diplomacy: The Totalitarian Challenge, 1931-1945 (3-6) A BUTOW

Field course in diplomacy of World War II, with emphasis on the confrontation between the United States and the Axis powers. Prerequisite, permission.

### HST

### 544-545 Seminar in War and Diplomacy: The Totalitarian Challenge, 1931-1945 (3-6)-(3-6) W,Sp BUTOW

The diplomacy of the Second World War with emphasis on the confrontation between the United States and the Axis powers. Prerequisite, permission.

### HST

### 561 Islamic History (3-6) BACHARACH

Field course. Introduction to advanced study in the major periods and problems of Islam. Bibliographical guidance is stressed.

### HST

### 562 Ottoman History (3-6) SUGAR

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 will be made to teach some use of Ottoman materials. A minor problem will be investigated in detail by every student. Prerequisite, knowledge of at least one major language besides English. French, German, Russian, or other.

### HST

### 563 Modern Near East (3-6) BACHARACH

A field course introducing the student to the major periods and problems of Near Eastern history, 1798 to the present. Prerequisite, permission of instructor.

### HST

### 571 History in the College (0) WSp

Optional noncredit course for prospective college and university history instructors, preparing them for their duties. Prerequisite, M.A. in history.

### HST

591 Historiography: Ancient and Medieval European (3) A

### HST

592 Historiography: Early Modern European (3) W

## HST

593 Historiography: Early Modern European and American (3) Sp

### HST

594-595 Seminar in Philosophy of History (3-6)-(3-6) A,W

### .

### HST 598 Methods of Historical Research (5) BESTOR

Practical instruction in the scholarly techniques employed in historical research. A professional level of competence will be inculcated through written exercises involving the actual searching out of historical sources, the critical evaluation of documents, the utilization of historical evidence in writing papers and theses, and the proper forms of documentation. Field trips to various archival establishments will supplement the lectures and written exercises.

## HST

600 Independent Study or Research (\*) AWSpS

HST

700 Master's Thesis (\*) AWSpS

## HST

800 Doctoral Dissertation (\*)

### HISTORY OF THE AMERICAS

### **Courses for Undergraduates**

### HSTAA

201 Survey of the History of the United States (5) AWSp

Supplies the knowledge of American history which any intelligent and educated American citizen should have. The objective is to make the student aware of his heritage of the past and more intelligently conscious of the present.

## HSTAA

301 Foundations of American Civilization (5) A

SCHOLZ

The founding of Anglo-Saxon society in the Western Hemisphere, with attention to the earliest colonial establishments, the growth of a new culture, independence, and the organization of the American Union.

### HSTAA

311 American Civilization: The First Century of Independence (5) W

BESTOR, PEASE, PRESSLY, SAUM Establishment of the constitutional system;

development; internal conflicts, the Civil War, and Reconstruction.

### HSTAA

### 331 Modern American Civilization from 1877 (5) Sp

BURKE, PEASE, PRESSLY

The emergence of modern America, after the Civil War; interrelationships of economic, social, political, and intellectual developments.

## HSTAA

351 American Constitutional History to 1800 (3)

BESTOR

English constitutionalism and its meaning for the colonies; the American Revolution; constitution making in the states; the Articles of Confederation and the Constitution of 1787; inauguration of the new government and adoption of the Bill of Rights.

## HSTAA

352 American Constitutional History: Nineteenth Century (3) BESTOR

Fundamental decisions of the Supreme Court

under Marshall and Taney; democracy, sectionalism, and slavery; the Civil War and Reconstruction; the Supreme Court and economic concentration.

### HSTAA

## 353 American Constitutional History: Twentieth Century (3)

BESTOR

The Constitution and social legislation from the Progressive Era to the great Depression; the New Deal and its challenge to the Supreme Court; the shift of focus from economic issues to civil rights in recent constitutional interpretation.

### HSTAA

### 381 Latin America: The Early Colonial Period (5) A

ALDEN, SOLBERG

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) W ALDEN, SOLBERG

Imperial reforms, the struggle for independence; the founding of new nations.

### HSTAA

### 383 Modern Latin America (5) SOLBERG

Analysis of economic problems, political and social changes, and intellectual trends in major Latin American republics since the late nineteenth century.

### HSTAA

# 401 American Revolution and Confederation (5) W

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

# 402 The Colonial Mind (5) Sp

SCHOLZ

An examination of the main currents of the colonial American mind, with special reference to Puritanism, the formation of a colonial mentality, and the relationship between colonial thought and institutions.

### HSTAA

## 405-406 History of American Character and Values (5-5)

SCHOLZ

A course designed to explore the origins and nature of American character and values, past and present, with special emphasis upon American Protestantism and the role of religion in American life. Prerequisite, permission of instructor.

### HSTAA

411 The United States During the Era of Civil War and Reconstruction (5) Sp PRESSLY

Conflicting interests, ideologies, and ways of life in the United States from the 1840's to the 1870's.

## HSTAA

## 412 The Westward Movement (5) W

CARSTENSEN, SAUM Territorial and economic expansion of the

United States from the Revolution to World War I; conditions affecting settlement and development of the West; political and social institutions; interregional relationships.

## HSTAA

### 425 American Urban History (3) HOLL

Study of the urbanization of American life and culture from the age of Jackson to the present. This course will examine the ambivalence of American intellectuals toward the city; the tension between city and country life; industrialization, immigration and bossism in urban America; education, morality, and urban identity; formation of urban slums and the response of urban reformers; and the emergence of the metropolis. Open primarily to juniors and seniors.

## HSTAA

### The History of American Penology 429 and Criminology (3) HOLL

Studies in the social and intellectual history of American penology and criminology, including a study of Beccaria, Howard, Toc-queville, Brockway, Osborne, the Pennsylvania and Auburn penal systems, the rise of the reformatories, the emergence of the New Penology in the Progressive Era, and the professionalization of penology and criminology in modern times. Open to juniors and seniors.

### HSTAA

# 431 American Politics and Society Since 1920 (5)

BURKE, PEASE

Political, social, economic, and intellectual developments in the United States from 1920 to the present. Not open to students who have taken HSTAA 450.

### HSTAA

432 History of Washington and the Pacific Northwest (5) AWSp

CARSTENSEN, SAUM

Exploration and settlement; economic development; growth of government and social institutions; statehood.

## HSTAA

443 Black Americans, 1877-1933: From **Reconstruction to the New Deal (5)** 

A study of Black Americans from Reconstruction to the New Deal with special emphasis upon their institutional and social life, and the impact of society upon their development.

### HSTAA

#### 444 Black Americans Since 1933: From the New Deal to the Present (5)

A study of Black Americans from the New Deal to the present, with special emphasis upon their institutional and social life, and the impact of society upon their development.

### HSTAA

### 451 Constitutionalism in America: Seventeenth and Eighteenth Centuries (5) A

BESTOR

Studies of the English constitutional heritage and of the making of the American Constitution and Bill of Rights. Students will attend the lectures in HSTAA 351 and also will work with the primary historical documents in preparing papers for presentation to a discussion section, meeting for two additional hours each week. Prerequisite, 10 credits in American history. Credit cannot be received for both HSTAA 351 and 451.

### HSTAA

### **Constitutionalism in America:** 452 Nineteenth Century (5) W BESTOR

Study of constitutional issues in the United States from the establishment of the government under the new Constitution of 1787 until the end of the nineteenth century: basic decisions of Marshall and Taney, the slavery crisis, Reconstruction, and the constitutional enshrinement of laissez-faire. Students will attend the lectures in HSTAA 352 and also will work with the primary historical documents in preparing papers for presentation to a discussion section, meeting for two additional hours each week. Prerequisite, 10 credits in American history. Credit cannot be received for both HSTAA 352 and 452.

### HSTAA

### 453 Constitutionalism in America: **Twentieth Century (5) Sp** BESTOR

Study of constitutional issues in the United States since the beginning of the twentieth century: the Progressive Era; the New Deal; desegregation, civil rights, apportionment, separation of church and state, and other contemporary constitutional issues. Students will attend the lectures in HSTAA 353 and will prepare papers based on primary historical documents for presentation to a discussion section, meeting for two additional hours each week. Prerequisite, 10 credits in American history. Credit cannot be received for both HSTAA 353 and 453.

### HSTAA

### 454 The Intellectual History of the United States (5) A SAUM

Lectures and discussions devoted to the development of the American mind, from historical beginnings to the present.

### HSTAA

### 455 History of American Liberalism Since 1789 (5) BURKE, PRESSLY

Comparative study of aims and accomplishments of four major reform movements in the United States: Jeffersonian democracy, Jacksonian democracy, Progressivism, the New Deal.

### HSTAA

### 458 History of American Education to 1865 (3) BURGESS

Development of American education in cultural context: colonial period, influence of enlightenment, and common school movement. Offered jointly with the College of Education as Educational Policy Studies **EDEPS 494.** 

### HSTAA

History of American Education Since 459 1865 (3) BURGESS

Development of American education in cultural context: progressive education, recent criticism, continuing issues and trends. Off-ered jointly with the College of Education as Educational Policies Studies EDEPS 495.

## HSTAA

### 461 Diplomatic History of the United States: 1776-1877 (5) A FOWLER

Foreign policy of the United States government. Emphases upon wars, territorial expansion, and the peculiarities of the American position in world politics.

### HSTAA

### 462 Diplomatic History of the United States: 1877-1953 (5) A FOWLER

Foreign policy of the United States government, from the emergence of the United States as a great power through the presidency of Harry S. Truman.

### HSTAA

## 475 History of Canada (5) A

The struggle for unity and nationhood as determined by geographical conditions, by religious antagonism, by the impact of modern com-mercial and industrial society upon an old-world culture, and by pulls toward Europe and the United States the United States.

## HSTAA

### 481 The History of Mexico: 1517 to the Present (5) W

ALDEN, SOLBERG

Political, social, and economic history of Mexico from its discovery by the Spanish to the present.

### HSTAA

### 482 The History of Brazil: Colonial Period to the Present (5) Sp ALDEN

Colonial foundations; the first and second empires; the old and new republics; current problems; prospects for the future.

## HSTAA

### The River Plate Republics and Chile: 483 Colonial Period to the Present (5) SOLBERG

The course will analyze political history, economic development, social change, and intellectual trends in Argentina, Uruguay, Paraguay, and Chile; it will also consider the relations of these countries with the United States and Europe, and with each other.

# **Courses for Graduates Only**

### HSTAA

501 American History: Early (3-6) W SCHOLZ

### HSTAA

503-504 Seminar in American History: Early (3-6)-(3-6) W,Sp SCHOLZ

### HSTAA

511 American History: Civil War (3-6) W PRESSLY

### HSTAA

512 American History: Western (3-6) A CARSTENSEN, SAUM

### HSTAA

513-514-515 Seminar in American History; Western (3-6)-(3-6)-(3-6) A,W,Sp CARSTENSEN, SAUM

## HSTAA

American History: Nineteenth 516 Century (3-6) SAUM

### HSTAA

517-518 Seminar in American History: Nineteenth Century (3-6)-(3-6) BESTOR, SAUM

## HSTAA

521-522 American History: Writings and Interpretations (4-6)-(4-6) FOWLER, PRESSLY

## HSTAA

531 American History: Twentieth Century (3-6) AW BURKE, PEASE

## HSTAA

532-533-534 Seminar in American History: Recent Period (3-6)-(3-6)-(3-6) A,W,Sp BURKE, PEASE

## 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.

### HSTAA

561 History of American Foreign Policy (3-6) A FOWLER

562-563 Seminar in American Diplomatic History (3-6)-(3-6) W,Sp FOWLER

### HSTAA

581 Latin American History: Colonial Period (3-6) W AT DEN

### HSTAA

582 Latin American History: National Period (3-6) Sp ALDEN, SOLBERG

### **HSTAA**

583-584-585 Seminar in Latin American History (3-6)-(3-6)-(3-6) ALDEN

Problems of historical research in the history of Latin America from colonial beginnings to the present.

### HSTAA

586-587 Seminar in Comparative Colonial History (3-6)-(3-6) ALDEN

HSTAA 599 American History: New Findings and New Approaches (4-6) S

## ANCIENT AND MEDIEVAL HISTORY (INCLUDING BYZANTINE)

## **Courses for Undergraduates**

### HSTAM

### 201, 202 Ancient History (5,5) WSp FERRILL, THOMAS

Political, social, economic, and cultural development of the ancient Near East, Greece, and Rome; the elements of ancient civilization that contributed vitally to medieval and modern civilization.

### HSTAM

331 Early Middle Ages (5)

KAMINSKY, MOSHER

The dark ages, feudalism, emergence of the medieval order of civilization, and the development of Romanesque culture.

### HSTAM

## 332 Central Middle Ages (5)

KAMINSKY, MOSHER 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)

## KAMINSKY

The 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

334 Medieval Culture (5)

## KAMINSKY

Selective study in literature, art, music, philosophy, and religion of Europe during the Middle Ages.

### HSTAM

401 Early Greece (3) A

FERRILL, THOMAS A study of the political, institutional, and

cultural history of early Greece, with emphasis on the origins of Greek civilization.

### HSTAM

402 Greece in the Age of Pericles (3) Sp EDMONSON, THOMAS

A study of the political, institutional, and cultural history of classical Greece, with special emphasis on the legacy of Greece to Western civilization.

### HSTAM

403 Alexander the Great and the Hellenistic Age (3) Sp

EDMONSON, THOMAS

Political, social, economic, and cultural history of the Greco-Oriental world from Alexander to the Roman conquest, with special emphasis on the change from city-state to world-state and the fusion of Greek and Oriental cultures.

### HSTAM

411 The Early Roman Republic (3) A 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) Sp FERRILL

Political, social, and cultural history with special emphasis on the period of Cicero and Caesar.

### HSTAM

413 The Early Roman Empire (3) FERRILL

Political, social, economic, and cultural history with emphasis on the Julio-Claudians.

## HSTAM

414 The Late Roman Empire (3)

FERRILL Political, social, economic, and cultural history with emphasis on the decline of ancient

civilization.

### HSTAM

421 The Byzantine Empire (5) BOBA, KATZ

Political, institutional, and cultural history of the Eastern Roman Empire from the fourth to the fifteenth centuries, with emphasis on its relations with the Latin West and the Slavic and Moslem areas.

### HSTAM

426 Origins of the East-European States (5) BOBA

Analysis of social, cultural, and political development among the Slavs and other peoples of Eastern Europe leading to the emergence of national states of the Middle Ages. Prerequisites, General History HST 111 and 112 or 113, or permission.

### HSTAM

### 431 Topics in Medieval History, 500-1000 (5)

BOBA, MOSHER

A 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**

432 Topics in Medieval History, 1000-1250 (5)

BOBA, KAMINSKY, MOSHER

A study in depth of one or more topics in the history of Europe during the High Middle Ages. Prerequisite, a course in medieval history.

### HSTAM

433 Topics in Medieval History, 1250-1500 (5)

### KAMINSKY

A study in depth of one or more topics in the history of Europe during the Later Middle Ages. Prerequisite, a course in medieval history.

### HSTAM

441 Church and State in the Middle Ages (5) W

BOBA, KAMINSKY

Changing theories and realities of relationship between religious and secular elements of medieval civilization.

### HSTAM

### 442 Central Europe in the Middle Ages (5) Sp

BOBA, KAMINSKY

Origins and medieval history of Germany, Austria, Bohemia, and Poland, considered as a region within the sphere of Western European civilization.

### HSTAM

HSTAM

HSTAM

HSTAM

stitution.

451 Medieval Italy (5)

GRIFFITHS

GRIFFITHS

### MOSHER

Italy, from the barbarian invasions to the Renaissance, considered in the framework of European and Mediterranean cultures.

452 The Early Renaissance (1300-1450) (3)

The growth of a Humanist culture in the

Italian city-state in contrast with the Gothic

453 The High Renaissance (1450-1560) (3)

Climax of the Humanist tradition and the

Problems in the history of the Athenian Con-

53

values of the waning Middle Ages.

expansion of European culture.

501 Greek History (3-6)

EDMONSON, THOMAS

**Courses for Graduates Only** 

### HSTAM

511 Roman History (3-6) W 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.

### HSTAM

### 521 Byzantine History (3-6) BOBA, KATZ

### HSTAM

530 Early Middle Ages (3-6) W BOBA

Field course. Survey of early European history through the times of tribal migrations and invasions from Asia. Problems and methods of research. Prerequisite, permission.

### HSTAM

531 Medieval European History (3-6) KAMINSKY, MOSHER

### HSTAM

532, 533, 534 Medieval European Seminar (3-6, 3-6, 3-6) A,W,Sp

KAMINSKY, MOSHER

Prerequisites, a reading knowledge of French or German and Latin.

## HISTORY OF ASIA

## **Courses for Undergraduates**

### HSTAS

201 Ancient Indian Civilization (5) A CONLON

An introductory course dealing with the religions, literature, philosophy, politics, arts, and history of India from earliest times to the Muslim invasion.

### HSTAS

### 202 Modern Indian Civilization (5) W CONLON

An introductory course dealing with 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 East Asian Civilization (5) A DULL, PALAIS, PYLE

Intensive survey of the origins and development of Chinese civilization and its adoption, in Japan and Korea, to the tenth century.

### HSTAS

### 212 History of East Asian Civilization (5) W DULL, PALAIS, PYLE

Intensive survey of historical developments in China, Japan, and Korea from the tenth to the nineteenth centuries. Topics include the origin and dvelopment of feudalism in Japan, the transition to a bureaucratic Confucian state in Korea, and the rise of Neo-Confucianism and autocracy in China. Prerequisite, 211 or permission of the instructor.

### HSTAS

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### 213 History of East Asian Civilization (5) Sp DULL, PALAIS, PYLE

Intensive survey of historical developments in modern Japan, China, and Korea. Special attention is given to the impact of Western civilization and to the contrasting dynamics of modernization in these countries. Prerequisite, 212 or permission of the instructor.

### HSTAS

301 Problems of Modern India (5) CONLON

An analysis of the problems in the fields of social life, international and domestic politics, education, economics, and other areas that confront India today and which may determine her future.

### HSTAS

## 401 History of India: Earliest Times to A.D. 647 (5) W

CONLON

India in ancient times; emphasis on forms of political organizations and economic life, social organizations, and cultural developments. Prerequisite, 201 or permission.

### HSTAS

402 History of India: A.D. 647 to A.D. 1525 (5)

CONLON Medieval India; emphasis on forms of political organizations and economic life, social organizations, and cultural developments.

### HSTAS

403 History of India: A.D. 1525 to the Present (5) Sp CONLON

Modern India; emphasis on forms of political organizations and economic life, social organizations, and cultural developments. Prerequisite, 202 or permission.

### HSTAS

# 405 Maharashtra in Indian History (5)

Regional approach to medieval and modern Indian history through examination of the history of Maharashtra in Western India. The rise of the Marathas; British rule; political and economic modernization; religious and social life; problems of contemporary society. Prerequisite, 403 or permission.

### HSTAS

421 History of Early Japan (5) A

Political, social, economic, and cultural development of Japan to the beginning of the Tokugawa period (17th century).

### HSTAS

# 422 History of Tokugawa Japan (5) W

Feudal development prior to 1600; establishment of the Tokugawan political structure, and the social, economic, and cultural history of the period from 1600 to 1868.

### HSTAS

423 History of Modern Japan (5) Sp 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

### 451 Chinese History: Earliest Times to 221 B.C. (5) A

DULL

Pre-Imperial China.

## HSTAS

### 452 Chinese History: 221 B.C. to A.D. 906 (5) W DULL

Development of the imperial Chinese state.

## HSTAS

453 Chinese History: A.D. 906 to A.D. 1840 (5) Sp

DULL The Wu, Tai, Sung, Yuan, Ming and early Ch'ing periods.

### HSTAS

454 History of Modern China (5) Sp China from approximately 1800 to the present, with major emphasis on political and intellectual history since 1895. The focus is on the processes of modernization and revolution, and on the relationship between them.

### HSTAS

469, 470 History of Korea (5,5) PALAIS

A survey of Korean history from earliest times to the modern period. Prerequisite, permission.

### HSTAS

### 476 Western Influences in Russian and Chinese Intellectual History (4) TREADGOLD

Comparative analysis of stages of Western impact on Russian (1462-1917) and Chinese (1582-1949) thought previous to the proclamation of Marxism-Leninism as the official ideology.

# **Courses for Graduates Only**

### HSTAS

### 501 Indian History (3-6) CONLON

Prerequisite, permission.

### HSTAS

521 Modern Japanese History (3-6) A

Field course. Prerequisites, History of Asia HSTAS 422, 423, or permission.

### HSTAS

522 Japan as a World Power, 1895-1945 (3-6) Sp

BUTOW

Field course. Prerequisite, permission of instructor.

### HSTAS

523, 524 Seminar in Modern Japanese History (3-6), (3-6) W,Sp

PVLR

Prerequisite, permission.

### HSTAS

525 Japan in the Twentieth Century (3-6) BECKMANN

Problems in the political, economic, and social history of Japan, 1890-1952.

### HSTAS

HSTAS

# 526 Seminar on the Modernization of Japan (5) A

548-549 Seminar in Chinese History:

Sung to Modern (3-6)-(3-6)

reading knowledge of Chinese.

PYLE, HELLMAN

Historical and theoretical approach to social, political, economic, and psychological problems of modernization in Japan. Offered jointly with the Department of Political Science as Political Science 504. Prerequisite, permission.

Professional writing seminar in Chinese his-

tory from Sung to modern times. Prerequisite.

### HSTAS

### 551 Field Course in Chinese History: Pre-Sung Period (3-6) Sp DULL

To introduce students to 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)-(3-6)-(3-6) DULL

Prerequisite, reading knowledge of Chinese.

### HSTAS

555 Chinese History: Modern Period (3-6) W Designed to introduce students to Western language materials dealing with the history of modern China. In addition to giving students bibliographical guidance to help them prepare for field examinations, the course seeks to familiarize students with the major issues being dealt with in current scholarship on modern China.

### HSTAS

## 556-557-558 Seminar in Chinese History:

Modern Period (3-6)-(3-6)-(3-6) A,W,Sp Research seminar in modern Chinese history. Prerequisite, reading knowledge of Chinese.

### HSTAS

### 564 Field Course in Chinese History: Sung to Modern (3-6) MOTE

To introduce students to Western language materials on Chinese history from the Sung dynasty to the modern period in order to give them bibliographical and other assistance in preparing for examinations in this field of history.

## HSTAS

### 566 Research Seminar: Modern Korea (3-6) PALAIS

Advanced instruction in problems and methods of research in Korean history. No foreign language required. Prerequisite, permission.

### HSTAS

### 570 Modern Korean History (3-6) PALAIS

Field course. Prerequisite, HSTAS 470 or permission.

# HSTAS

571-572-573 Seminar in Korean History (3-6)-(3-6)-(3-6) Selected topics in Korean history and histori-

ography.

### MODERN EUROPEAN HISTORY

# **Courses for Undergraduates**

## HSTEU

### 271-272, 273 English Political and Social History (5-5,5) A,W,Sp COSTIGAN

England from the earliest times to the present, stressing the origins of American institutions and social patterns.

### HSTEU

### 371 Intellectual History of Modern England (3) Sp LEVY

This course will relate the changes in political theory, philosophy, science, and literature to the historical events of the period 1500 to the present.

### HSTEU

### 380 History of Scandinavia to 1814 (3) W HILDEMAN, HOLKERS

survey of Scandinavian history from the Viking period to 1814 with primary emphasis on the development of Denmark, Finland, Iceland, Norway, and Sweden and the role of the Scandinavians in world history. Offered jointly with the Department of Scandinavian Languages and Literature as Scandinavian 380.

### HSTEU

### 381 History of Scandinavia Since 1814 (3) Sp HILDEMAN, HOLKERS

A survey of Scandinavian history from 1814 to the present with major emphasis on the political, social, cultural, and economic development of the Scandinavian countries. Offered jointly with the Department of Scandinavian Languages and Literature as Scandinavian 381.

### HSTEU

### 401 The Reformation (3) W GRIFFITHS

The origins of the disunity of Europe in the crisis of sixteenth century with special emphasis upon the relations between religion and politics.

### HSTEU

402 The Wars of Religion (3) Sp

GRIFFITHS

The effects of theology on the politics of the sixteenth century, with special emphasis on the changes in political thought occasioned by the Reformation crisis.

### HSTEU

405 European Intellectual History:

Eighteenth Century (5) A KILCUP

the history of modern Europe.

The development of the social sciences, moral theory, political theory, and religious thought in eighteenth-century Europe. Rationalism, empiricism, utilitarianism, and the sources of idealism. Prerequisite, at least one course in

### **HSTEU**

### 406 European Intellectual History: Nineteenth Century (5) W

KILCUP

Selected topics in intellectual history up to 1860. The philosophical consequences of the French Revolution, the development of idealism, conservatism, romanticism, and early so-cialist theory. Positivism, the problems of historicism, new forms of Christian apolo-getics, utilitarianism in decline, liberalism as philosophy, the early Marx. Prerequisite, at least one course in the history of modern Europe.

### HSTELL

### **European Intellectual History:** 407 **Twentieth Century (5) Sp**

KILCUP Selected topics in the intellectual history of the late nineteenth and early twentieth cen-The aftermath of Darwinism, the turies. problems of methodology in modern social science, historicism and moral relativism, irrationalism in philosophy and social theory, revisionism in secular and orthodox religions. Prerequisite, at least one course in modern European history.

### HSTEU

- 411 Europe: 1814-1870 (5) A
  - BRIDGMAN, EMERSON, FARRAR, LYTLE, PINKNEY, SUGAR

The 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) Sp

BRIDGMAN, EMERSON, FARRAR, SUGAR The impact of population increase and technological change on European society; stresses and strains in European life and outlook.

### HSTEU

## 413 Europe: 1914-1945 (5) Sp

BRIDGMAN, EMERSON, FARRAR The politics and society of Europe in the age

of the concentration camp.

### HSTEU

414 Europe Since 1945 (5) Sp

FARRAR, ULLMAN

Political, economic, and military developments in Europe under the impact of the cold war.

### HSTEU

421 France, 1429-1789 (5) A

LYTLE, PINKNEY

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) W
  - LYTLE, PINKNEY

The 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 1815 (5) Sp

LYTLE, PINKNEY

Political, economic, and social history since the Congress of Vienna. Special emphasis will be laid upon the continuity of the revolutionary tradition.

### HSTEU

## 430 Germany 1000-1648 (5)

BRIDGMAN A survey of the society, economy, and political problems of Central Europe from the late Middle Ages to the Treaty of Westphalia.

### HSTEU

### 431 Germany: 1648-1914 (5) W BRIDGMAN, EMERSON

A survey of the society, economy, and political problems of Central Europe from the Thirty Years' War to the First World War, with particular emphasis on the nineteenth century.

### HSTELL

## 432 Germany: 1914-1945 (5)

BRIDGMAN, EMERSON, FARBAR Politics and society from the collapse of the Bismarckian empire to the collapse of Hitler's empire.

### HSTELL

## 435 World War I (5)

BRIDGMAN A study of political, institutional, cultural, and military history of World War I, with special emphasis on the impact of the war on European society.

## HSTEU

### 438 Modern Russian Intellectual History (5) ELLISON, TREADGOLD

Development of Russian social and political thought and philosophy from the seventeenth century to the Revolution of 1917.

### HSTEU

## 442 History of Russian Culture to 1800 (5) W

TREADGOLD

The development of religion, political ideas, philosophical and literary theories, art, architecture, drama, and music from Kievan times to the end of the eighteenth century. Prerequisites, HSTEU 441 or HST 111 and 112, or permission. (Offered alternate years; offered 1971-72.)

### HSTEU

### 443 Kievan and Muscovite Russia: 850-1700 (5) A

Development of Russia from earliest times to the reign of Peter the Great. Prerequisites, HST 111 and 112, or permission.

### HSTEU

444 Imperial Russia: 1700-1900 (5) W TREADGOLD

Development of Russia from Peter the Great to Nicholas II. Prerequisites, HSTEU 444 or HST 111 and 112, or permission.

## HSTEU

445 Twentieth-Century Russia (5) Sp ELLISON, TREADGOLD

Russia and the USSR from Nicholas II to the present. Prerequisites, HSTEU 444 or HST 111, 112, and 113, or permission.

### HSTEU

**446 Russian Historiography (5) Sp** Prerequisites, HST 111 and 112 or HSTEU 441 or 442, or permission.

### HSTEU

447 Russian and East European Bibliography (5) W

BOBA

Analysis of bibliographical problems in the social sciences and the humanities. For seniors and graduate students. Prerequisite, one East European language or German.

### HSTEU

451- Eastern Europe: 1772-1918 (5-) A SUGAR

Poland, Czechoslovakia, Hungary, Rumania, Yugoslavia, Bulgaria, and Albania, from the first partition of Poland to the end of World War I.

### HSTEU

### -452 Eastern Europe Since 1918 (-5) W SUGAR

Poland, Czechoslovakia, Hungary, Rumania, Yugoslavia, Bulgaria, and Albania, from the end of World War I to the present.

### HSTEU

56

### 453 History of the Balkans, 1400-Present (5) SUGAR

Course will deal with the centuries of Ottoman rule in the Balkans that completely transformed the political, social, economic, and cultural life and institutions of this region, producing a brand new basis for the re-emergence of independent states in the nineteenth and twentieth centuries. The course also will discuss the history of these new states, placing emphasis on their reintegration into Europe and the manifestations of Western trends (industrialization, liberalism, fascism, communism, etc.) in this region.

### HSTEU

461 Formation of the Spanish Nation (5) A ULLMAN

A study of the major political, economic, and cultural events leading to the creation of the Spanish nation under Ferdinand and Isabel. HSTEU

### 462 Spain in the Modern World (5) W ULLMAN

A study of the political, economic, and cultural attempts of Spain to adjust to capitalism, liberalism, and secularism.

### HSTEU

463 Portugal in the Age of Exploration (5) ALDEN

The pivotal role of Portugal in the expansion of Europe from the eleventh to the seven-teenth centuries.

### HSTEU

471 England in the Sixteenth Century (5) A

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.

### HSTEU 472 Engla

472 England in the Seventeenth Century (5) W

# LEVY

Political, administrative, and social history from the accession of James I to the Glorious Revolution.

### HSTEU

473 England in the Eighteenth Century (5) Sp

A study of political, social, economic, and cultural developments. Parliamentary government; rise of the British Empire; aristocratic culture.

### HSTEU

474 England in the Nineteenth Century (5) W

BELL 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) Sp

BELL, COSTIGAN

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)

COSTIGAN

Growth of Irish national feeling in the nineteenth century through the Home Rule and Sinn Fein movements; establishment of the Irish Free State and the Republic of Eire; background of the Irish literary renaissance; establishment of Northern Ireland.

## **Courses for Graduates Only**

### HSTEU

501 Renaissance and Reformation (3-6) A GRIFFITHS

### HSTEU

502-503-504 Seminar in the Renaissance and Reformation (3-6)-(3-6)-(3-6) A,W,Sp GRIFFITHS

### HSTEU

### 511 Graduate Field Course in European History, 1789-1945 (3-6) Sp FARRAR

Course introduces the graduate student to the general problems and major works of European history, 1789-1945. It concentrates particularly on such movements as socialism, imperialism, nationalism, liberalism, totalitarianism, romanticism, materialism, etc., that characterizes this era in European history.

### HSTEU

### 515 Modern European Intellectual History (3-6) A

KILCUP

Readings and discussions on selected problems in eighteenth- and nineteenth-century intellectual history. Prerequisites, reading knowledge of French and permission.

### HSTEU

### 516-517 Seminar: European Intellectual History (3-6)-(3-6) A,W KILCUP

Seminar on modern European intellectual history, chiefly in the eighteenth century. Prerequisites, permission and a reading knowledge of French, Italian, or German.

### HSTEU

521 Modern European History: France (3-6) Sp

LYTLE, PINKNEY

## HSTEU

522-523-524 Seminar in French History (3-6)-(3-6)-(3-6) A,W,Sp LYTLE, PINKNEY

### HSTEU

531 Modern European History: Germany (3-6) W BRIDGMAN, EMERSON

### HSTEU

532-533-534 Seminar in Modern European History: Germany (3-6)-(3-6)-(3-6) A,W,Sp

BRIDGMAN, EMERSON

### HSTELL

541 Medieval Russian History (3-6) Sp Prerequisites, HSTEU 441, 442, or permission; Russian or French, and German.

### HSTEU

542-543 Seminar in Medieval Russian History (3-6)-(3-6) A,W BOBA

Prerequisite, reading knowledge of Russian.

### HSTEU

544 Modern Russian History (3-6) A ELLISON, TREADGOLD

### HSTEU

545-546-547 Seminar in Modern Russian History (3-6)-(3-6)-(3-6) A,W,Sp

ELLISON, TREADGOLD Seminar in modern Russian history. Prerequisite, reading knowledge of Russian.

A study of the East-Central European region:

Poland, Czechoslovakia, Hungary, Rumania, and the Balkan countries, from their rebirth to World War II. Prerequisite, reading knowl-

edge of German, French, Russian, or one

### HSTEU

551 History of Eastern Europe:

1772-1939 (5) SUGAR

East European language.

### HSTEU

552 History of Eastern Europe: 1939 to the Present (5) SUGAR

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) A,W,Sp

SUGAR

Study and research involving special methods dealing with the histories of the East European countries in the modern period.

## HSTEU

## 562 Early Spanish History (3-6)

ULLMAN Problems in the history of Spain, antiquity through the Middle Ages,

### HSTEU

## 563 Modern Spanish History (3-6)

ULLMAN Problems in the history of Spain, 1500 to the present.

### HSTEU

571 English History: Tudor and Stuart (3-6) LEVY

### HSTEU

572 English History (3-6) A BELL, COSTIGAN

### HSTEU

573-574 Seminar in Modern English History (3-6)-(3-6) BELL, COSTIGAN

### HSTEU

### 575-576 Seminar in Tudor-Stuart History (3-6)-(3-6)

LEVY

Seminar in the history of England under the Tudors and the Stuarts. Prerequisite, HSTEU 571 or permission.

### HSTEU

### 583 Research in the U.S.S.R. (3-6) S A course especially designed to assist graduate students who expect to do historical research in the Soviet Union, providing both disciplinary training and an introduction to the special problems of field research in Soviet archives

and libraries. Prerequisite, graduate standing;

# HOME ECONOMICS

knowledge of Russian desirable.

### **Courses for Undergraduates**

## 110 Food and Nutrition (5)

Meal management and food preparation with emphasis on nutritive and economic values. For nonmajors. Not open to students who have had 300.

### 125 Textiles (3) AWSp

KING

Relationship of raw materials, construction, and finish to quality and cost; identification of fibers, yarns, and fabrics; microscopic and chemical tests; economic development of textile industry.

## 134 Clothing (5) AWSp

MURDOCH, SHIGAYA Sociological, psychological, economic, and aesthetic aspects of clothing selection. Custom techniques in construction of cotton and linen garments. Students having had 231 will receive only 3 credits.

### 148 The Home, Its Equipment, and Management (3) AWSp WILSON

Management of resources to achieve family goals. Principles of management, kitchen and laundry planning, work simplification, wiring, and selection and care of household equipment.

# 225 Textile Analysis (2) AWSp

Emphasis on physical characteristics and properties of textile fibers; relationships to performance, selection, and care; use of test equipment and evaluation of data with reference to consumer use. Prerequisite, 125, which may be taken concurrently.

## 231 Clothing Selection (2)

Sociological, psychological, economic, and aesthetic aspects of clothing for the individual. Not open to students who have had 134.

### 234 Costume Design (5) AWSp

SHIGAYA, SMITH

Principles of flat pattern technique applied to design and construction of wool garments. Prerequisites, 125, 134, and Art 109 or 129, or equivalent.

### 240 Home Furnishing (3)

SCHROEDER

A study of the house and its furnishings for present-day living. Not open to freshmen or to students who have taken 347.

### 300 Nutrition (2) WSp

Importance of food to the maintenance of health; nutritive values and human needs; ways of meeting requirements at different cost levels. For upper-division nonmajors. Not open to students who have had 110.

### 307 Nutrition (5) AW

Chemistry of digestion and metabolism. Food values; human requirements and ways of meeting them at different cost levels. Qualified transfer students receive 3 credits. Prerequisites, general and organic chemistry and human physiology.

### 314 Foods I (5) AWSp

MARTINSEN The composition, structure, and interactions of the constituents of foods, with emphasis on the principles underlying the preparation of foods of standard quality. Prerequisite, organic chemistry.

### 316 Demonstration Techniques (3) AWSp MARTINSEN

Principles and techniques of food and equipment demonstrations; food photography; recipe development. Prerequisite, 314 or permission.

## 317 Foods II (3) AWSp

MARTINSEN ' A study of new food products, food additives, and convenience food items. Some time will be spent on origins of food patterns of various cultures, food buymanship, and characteristics of certain wines and spirits. Prerequisite, 314.

### 319 Nutrition and Nursing (4) A

MONSEN, WORTHINGTON Basic principles of nutrition and their relationship to the nursing profession. Chemistry and metabolism of the nutrients essential for the maintenance of health; 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. Prerequisites, Conjoint 316, 317-318, and organic chemistry.

### 320 Nutrition and Dental Health (4) WSp MONSEN, WORTHINGTON

Chemistry and metabolism of essential nutrients and their relationship to dental health; effects of age on nutritional needs; nutritional values of foods; influence of the environment on nutrition; dietary counseling of dental patients. Prerequisites, Conjoint 316, 317-318, and organic chemistry, or permission.

### 321 Applied Design (2)

Functional and decorative phases in the development of needlework and their application to contemporary design and textile art. Illustrated by a unique collection of historic lace. Prerequisites, 134 and Art 109 or 129 or equivalent, or permission.

### 322 Applied Design (2)

History of European national costume and embroidery as source material for modern design. Illustrated by rich collection of authentic folk costumes. Prerequisites, 134 and Art 109 or 129 or equivalent, or permission.

### 329 Weaving: Basic Structural Design (3) BROCKWAY, WILSON

Weaving as an art form; fundamentals of loom design and operation; experimental problems in basic fabric structure. Prerequisites, permission and junior standing.

### 334 Costume Design (3) AWSp KATZ

Designing as interpreted by techniques of draping, appropriate for silk and synthetic fabrics. Study of economic factors involved in clothing production at various price levels. Prerequisite, 234.

### 338 Analysis of Procedures in Clothing (3) AWSp

KATZ

Emphasis is on developing quick, professional, and innovative skills iin handling new materials and fabrics. As prospective teachers of clothing, students gain experience appropriate to current socioeconomic environmental factors and to differing age groups. Prerequisite, 134.

### 347 Home Furnishing (5) AWSp SCHROEDER

Analysis of problems with relation to today's family living. Selection and arrangement of furnishings based on good design and appropriateness. Field trips and individual laboratory problems. Not open to students who have taken 240. Prerequisites, 125 and Art 109 or 129, and upper-division standing.

### 348 Home-Management House (3) AWSp WILSON

Home-Management House Laboratory. Application of principles of time, energy, and money management to group living. Advance reservation required. Prerequisites, 148, 307, 314, 347, 354, senior standing, and permission.

# 350 Managing Family Finances (3)

Use of financial resources to further family goals. Changes in income and in prices of consumer goods in relationship to family budgeting. Consumer credit, savings, insurance, social security, investments, taxes, trusts, and wills.

### 354 Family Economics and Finances (5) AWSp HALL

Economic and social conditions affecting the consumer. Use of financial resources to further family goals. Family budgeting, credit, eavings, insurance, social security, investments, taxes, trusts, and wills. Not open to those who have had 350. Prerequisites, Economics 200 and junior standing.

### 356 Family Relationships (3) AWSp STONE

Principles underlying good family relationships; wholesome adjustment of the home to a changing society. Prerequisite, upper-division standing.

### 372 Institution Food Preparation (5) WSp

Laboratory and institution practice in largequantity food preparation and cost control. Prerequisite, 314 or permission.

### 380 Field Work in Apparel Manufacturing (2, max. 6) AWSp SMITH

Open only to apparel manufacturing majors. A program of part-time employment planned in advance with the instructor to provide onthe-job training correlated with periodic reports and evaluation of experience. Prerequisites, senior standing and permission.

### 405 Laboratory Methods of Analysis (5) W MARTINSEN, MONSEN

Objective and subjective methods appropriate in the evaluation of foods. Laboratory analyses basic to the study of animal and human nutrition. Prerequisite, inorganic and organic chemistry.

### 406 Recent Developments in Nutrition (3) AWSpS

MONSEN

Review of nutrition in the light of recent developments; interpretation of current research; special needs of various age groups.

### 407 Advanced Nutrition (3) W MONSEN

Recent research on vitamins, minerals, amino acids, lipids, and their interrelationships. Methods of utilizing knowledge in public health work, teaching, and research. Prerequisites, 307 and organic chemistry, or permission.

## 408 Diet Therapy (3) Sp

MONSEN

Nutrition as a curative and preventive factor in disease. Journal readings. Prerequisite, 407.

### 409 Food and People (3) A FEENEY

Economic, cultural, and social determinants or food patterns. Problems of population and food supply. Meaning of food to different peoples. An ecological approach to malnutrition as a major world problem. Programs of national and international scope designed to combat malnutrition. Prerequisites, 307 or 15 credits of social science and upper-division standing.

# 415 Experimental Foods (3) W

Illustrating scientific principles by subjective and objective testing of foods. Individual research problems. Prerequisite, 314 or permission.

### 425 Advanced Textiles (3) W BROCKWAY

Textile testing in research and in measuring fabric performance; textile legislation, standards, and methods of quality control; economic factors in world production and distribution of raw materials. Prerequisites, 125, 225, organic chemistry, and Economics 200 or equivalent.

## 429 Advanced Weaving (3) A

BROCKWAY Experimental problems, creative techniques, in designing decorative textiles; cloth analysis and design; library investigations of historic and contemporary contributions to textile arts. Prerequisite, 329 or equivalent.

### 432 History of Costume and Textiles (4) W SMITH, YERINA

Fabrics and costumes of ancient civilizations and medieval European countries with consideration of their respective cultural origins. Prerequisites, General History HST 111 and 112, or equivalent, junior standing in Home Economics or permission.

### 433 History of Costume and Textiles (4) Sp SMITH, YERINA

Continuation of 432 from the Renaissance to the present time. Prerequisite, 432.

### 434 Costume Design (3) Sp

SHIGAYA

Principles of tailoring. Analysis of methods and comparative costs of custom made and ready-to-wear garments. Appreciation of fine quality in clothing; discrimination in selection. Prerequisites, 338 or 334, and permission.

# 435 Advanced Costume Design (5) A

Application of the principles of flat pattern designing to problems in custom and mass production. Prerequisites, 334, 434, and ART 369, which may be taken concurrently.

### 437 Socio-Psychological Aspects of Clothing (3) Sp

YERINA

Clothing as a reflection of culture and societal value concepts. Emphasis on theory, motivation, behavioral patterns. Prerequisites, 432, 433, or equivalent from other disciplines; 10 credits from sociology or anthropology or psychology, including Psychology 345.

### 439 History of Textile Design (3) A YERINA

Chronological development of design in western textiles. Includes study of motifs, production techniques and materials, and sociocultural influences on development and changes in design. Prerequisites, 125, Art History ART H 201, 202, 203, or permission.

### 447 Advanced Home Furnishing (3) Sp SCHROEDER

Individual projects in specific fields of furnishings. Evaluation of standards in professionally constructed furniture and furnishings. Laboratory problems. Prerequisites, 240 and permission, or 347, and upper-division standing.

# 454 Advanced Family Economics and Finances (3) W

Family adjustment to differing social and economic conditions. Legislation affecting consumers. Prerequisites, 354, or equivalent, and Economics 200.

# 456 Advanced Family Relationships (3)

AWSp STONE

Advanced study in interpersonal relationships in the family; growth and development during various phases of the family life cycle. Synthesis and evaluation of knowledge and concepts from the behavioral sciences concerned with family relationships. Prerequisites, 356 or teaching experience and upper-division standing.

# 457 Child Nutrition and Care (3) WSp JOHNSON

Physical, mental, and emotional health of children. Experience with parents and children in nutrition clinic under supervision of a pediatrician. Prerequisite 300 or 307, or permission.

### 462 Improvement of Teaching: Home Economics (3, max. 6) AS GRANBERG

Identification of goals, concepts, and generalizations in home economics units at the secondary level with emphasis on teaching techniques, evaluation, and use of resources. Offered jointly with the College of Education as Educational Curriculum and Instruction EDC&I 427. Prerequisite, teaching experience in home economics or permission.

### 472 Institution Food Purchasing (3) W

Market organization, buying procedures, payment and credit; food selection and care; inspection of merchandise. Prerequisites, 314 and 372.

## 473 Institution Management (5) Sp

Organization and administration in food service institutions. A study of types of institutions, work planning, personnel direction, quality and cost controls, sanitation, budget analysis, professional ethics, executive qualifications. Prerequisite, 372.

### 475 Institution Equipment (3) A

Equipment requirements and flow of work in institutions. Institution kitchens and serving units; equipment selection, operation, and care; repair and depreciation records. Prerequisite, 372.

480 Special Problems in Family Economics (\*. No more than 10 credits in the 480 series may be applied toward any one degree.) AWSp

Individual study and research in family economics. Prerequisite, permission.

### 481 Special Problems in Institution

Administration

(\*. No more than 10 credits in the 480 series may be applied toward any one degree.) AWSp

Individual study and research in institution administration. Prerequisite, permission.

## 482 Special Problems in Home Economics Education

(\*. No more than 10 credits in the 480 series may be applied toward any one degree.) AWSp

Individual study and research in home economics education. Prerequisite, permission. 483 Special Problems in Family Relationships

(\*. No more than 10 credits in the 480 series may be applied toward any one degree.) AWSp

Individual study and research in family relationships. Prerequisite, permission.

**Special Problems in Costume Design** (\*. No more than 10 credits in the 480 series may be applied toward any one degree.) AWSp

Individual study and research in costume design. Prerequisite, permission.

- 485 Special Problems in Textiles
- (\*. No more than 10 credits in the 480 series may be applied toward any one degree.) AWSp

Individual study and research in textiles. Prerequisite, permission.

486 **Special Problems in Foods** (\*. No more than 10 credits in the 480 series may be applied toward any one degree.) AWSp

Individual study and research in foods. Prerequisite, permission.

Special Problems in Home Furnishing 487 (\*. No more than 10 credits in the 480 series may be applied toward any one degree.) AWSp

Individual study and research in home furnishing. Prerequisite, permission.

**Special Problems in Home Management** (\*. No more than 10 credits in the 480 series may be applied toward any one degree.) AWSy

Individual study and research in home management. Prerequisite, permission.

489 **Special Problems in Nutrition** (\*. No more than 10 credits in the 480 series may be applied toward any one degree.) AWSp

Individual study and research in nutrition. Prerequisite, permission.

#### Workshop in Home Economics 494 Education (21/2) S

Current problems in Home Economics Education. Prerequisites, Educational Curriculum and Instruction EDC&I 327 and Educational EDUC 375, or equivalent.

### 496H Senior Honors Thesis

(2 or 3, min. 6 and max. 6) AWSp For undergraduate home economics honors students only. Requires 6 credits taken over a minimum of two quarters.

## **Courses for Graduates Only**

507 Seminar in Nutrition (1-3, max. 9) Sp MONSEN

Library research and seminar on selected topics in recent developments in the field of nutrition. Prerequisite, 407 or equivalent.

### 509 Evaluation of Nutritional Status (2) W FEENEY

Dietary, clinical, and biochemical aspects as an integral part of evaluating nutritional status. Critical examination of major nutritional status surveys. Experimental design. Dietary methodology. Prerequisites, 407, 408, Bio-chemistry 405, or equivalent.

### 510 Community Nutrition (3) Sp

FEENEY Survey of major nutritional problems facing American communities, with special emphasis on the problems of pregnancy and childhood. Practical approaches to nutrition education and the dynamics of changing food habits. Program planning and exposure to available resources for interdisciplinary services. Current programs in the United States and other countries. Prerequisites, 457 or equivalent, 509, or permission.

511 Field Work in Public Health Nutrition (2-12, max. 12) AWSp

Observation and participation in community agency nutrition programs. Prerequisite, permission.

### 515 Seminar in Foods (1-3, max. 9) W MONSEN

Library research and seminar on selected topics in recent developments in food chemistry, selection, processing, and preparation. Pre-requisite, 314 or equivalent, or permission.

### 525 Seminar in Textiles (3) Sp

BROCKWAY

Readings and discussion of factors affecting economic utilization and technical develop-ment of textile products. Trends in current research and methods of investigation. For graduate students in textiles and clothing. Prerequisites, 125, 225, 425, or equivalent.

### 537 Seminar: Clothing (3) W YERINA

Selected readings and discussion of research and trends in production and marketing of apparel, and in esthetic and behavioral aspects of clothing usage. Prerequisites, graduate standing; approved undergraduate preparation in textiles, clothing, and art, or allied disciplines.

### 554 Social and Economic Problems of the Consumer (3-5) Sp HALL

Selected topics in the family economics field. Prerequisites, 454 or equivalent, and permission.

### 556 Seminar in Family Relationships (3) ASp

STONE

Seminar on recent developments in the field of family relationships, with emphasis on current research methods and findings. Prerequi-sites, 456 or equivalent, and permission.

562 Home Economics Education (\*) W Study of achievements, trends, functions, methods, and teaching materials.

# 576, 577, 578 Supervised Field Work (4,4,4) AWSpS, AWSpS, AWSpS WENBERG

Three quarters of practice and organized classwork for graduates in institution management and dietetics. An administrative dietetics internship approved by the American Dietetic Association.

### 600 Independent Study or Research (\*) AWSp

700 Master's Thesis (\*) AWSp

## HUMANITIES

103 The Arts of Africa, the Caribbean, and Black America (5)

Creative achievements by the Blacks of Africa, the Caribbean, and America in visual arts, music, dance, literature, and theatre. Guest lecturers and performing artists.

## **INSTITUTE FOR COMPARATIVE** AND FOREIGN AREA STUDIES

### (Formerly the Far Eastern and Russian Institute)

Institute courses, listed by area and discipline, are designated by prefixes appropriate for the areas. Courses formerly designated "FAR E" and jointly listed with a discipline department are identified solely by the departmental prefix designation. Courses formerly designated "FAR E" but not jointly listed are designated as follows:

**EASIA**—East Asia

IASIA—Inner Asia REEU—Russia and East Europe SASIA—South Asia

Where quarter, course description, and instructor are omitted, refer to the appropriate academic department elsewhere in this Catalog.

## East Asia

GENERAL

**COURSES FOR UNDERGRADUATES** EASIA

210 The Far East in the Modern World (5) AWSp

DULL, HELLMANN, PALAIS, TAYLOR, TOWNSEND

Social, economic, and political problems of China, Japan, Korea, and Southeast Asia. Includes development of Russia as an Asiatic power, as well as the role of Western powers in the Far East. (Formerly FAR E 210.)

### EASIA

499 Undergraduate Research (3-5, max. 15) AWSp

ART H

301 Survey of Asian Art (5)

ART H

401 Oriental Ceramic Art (2)

ART H

417 Buddhist Painting of China and Japan (3)

ART H

418 Buddhist Sculpture of China and Japan (3)

ART H

- 419 Chinese and Japanese Architecture (3) C LIT
- 302 World Classics of the Orient (5)

DRAMA

- 477, 478, 479 History of Far Eastern Theatre and Drama (3,3,3)
- DRAMA

Special Studies of the Theatre Arts of 495 Asia (3, max. 9)

GEOG

313 East Asia (5)

HSTAS

211, 212, 213 History of East Asian Civilization (5,5,5)

MUSAP

159 Private Instruction: Non-Western Instruments (2-3, max. 9)

MUSIC

316, 317, 318 Music Cultures of the World (5,5,5)

**POL S** 

429 International Relations in the Far East (5)

POL S

432 American Foreign Policy in the Far East (5)

# COURSES FOR GRADUATES ONLY

EASIA

500 Research Seminar in Asian Arts (3-5, max. 15) Sp MC KINNON, ROGERS

Interdisciplinary inquiry into history, aesthetics, and forms of Asian arts. Prerequisite, permission.

EASIA

600 Independent Study or Research (\*) AWSp EASIA

700 Master's Thesis (\*) AWSp

### CHINA

COURSES FOR UNDERGRADUATES EASIA

240 Chinese Civilization (5) Sp

China's material civilization—including fine arts, literature, religion, and thought—in relation to general development of Chinese society. (Formerly FAR E 240.)

### EASIA

443 Chinese Social Institutions (5) W General survey of traditional institutions and their changes in modern times. (Formerly FAR E 443.)

### EASIA

455 Undergraduate Colloquium on China (5) Sp

TOWNSEND Interdisciplinary study of China, with emphasis on the modern period. Prerequisite, permis-

sis on the modern period. Prerequisite, perm sion. (Formerly FAR E 455.) EASIA

**462** Studies in Buddhism (5) W The growth of Buddhism in China. (Formerly FAR E 462.)

ANTH

- 403 Traditional Chinese Society (5)
- ART H 411 Early Chinese Painting: T'ang to Yüan (3)
- ART H
- 412 Later Chinese Painting: Yüan Through Ch'ing (3)

CHIN

- 352 Classical Chinese Literature in English (5)
- CHIN
- 362 Modern Chinese Literature in English (5)
- CHIN

407 Chinese Reference Works and Bibliography (3) (Formerly FAR E 409.)

CHIN

473 Conventions in Chinese Poetry (5)

C LIT 410 Literary Motifs (3-5, max. 10) ECON 493 Economy of Modern China (5) GEOG 336 Regional Geography of China (5) GEOG 435 Problems in the Geography of China (5) HSTAS 451 Chinese History: Earliest Times to 221 B.C. (5) HSTAS 452 Chinese History: 221 B.C. to A.D. 906 (5) HSTAS 453 Chinese History: A.D. 906 to A.D. 1840 (5) HSTAS 454 History of Modern China (5) HSTAS Western Influences in Russian and 476 **Chinese Intellectual History (4)** MUSIC 497 Music of China (3) PHIL 415 Chinese Philosophy (5) PHIL 416 Neo-Confucianism (5) POL S 414 Chinese Political Thought (5) POL S 442 Government and Politics of China (5) COURSES FOR GRADUATES ONLY EASIA 521-522 Seminar: Introduction to the **Interdisciplinary Study of China** (5-5) A.W TOWNSEND

(Formerly FAR E 521-522.)

EASIA 530 Seminar on China (3, max. 6) Sp

Problems of Chinese history. Prerequisite, permission. (Formerly FAR E 530.)

## EASIA

 599 Colloquium on Chinese History Research (5, max. 15) AWSp BRIM, CHANG, CHEUNG, DULL, MAH, SHIH, TAYLOR
Research seminar dealing with various aspects of Chinese society, modern and contemporary.
Prerequisite, permission. (Formerly FAR E 599.)

ART H

511 Seminar in Chinese Art (3, max. 9) GEOG

505 Research Seminar: China and Northeast Asia (3, max. 6)

HSTAS

548-549 Seminar in Chinese History: Sung to Modern (3-6)-(3-6)

HSTAS

551 Field Course in Chinese History, Pre-Sung Period (3-6) HSTAS

552-553-554 Seminar in Chinese History, Pre-Sung Period (3-6)-(3-6)-(3-6)

HSTAS

555 Chinese History: Modern Period (3-6)

HSTAS

- 556-557-558 Seminar in Chinese History: Modern Period (3-6)-(3-6)-(3-6)
- HSTAS
  - 564 Field Course in Chinese History, Sung to Modern (3-6)
- LAW
- 592 Chinese Law and Social Change (4) POL S
- 532 The Chinese Political System (3)

POL S

 533 Seminar on Contemporary Chinese Politics (3)
(5) W

JAPAN COURSES FOR UNDERGRADUATES

EASIA 451 Undergraduate Colloquium on Japan (5) W BECKMANN

(Formerly FAR E 451.)

EASIA

463 Studies in Buddhism (5) W The history of Japanese Buddhism after its transmission from China. Prerequisite, permission. (Formerly FAR E 463.)

- ART H
- 415 Early Japanese Painting: Twelfth to Sixteenth Centuries (3)

ART H

416 Later Japanese Painting: Sixteenth to Nineteenth Centuries (3)

C LIT

- 257 Literature and Film (3-5, max. 10)
- GEOG
- 437 Problems in the Geography of Japan (3 or 5)
- HSTAS

421 History of Early Japan (5)

- HSTAS
- 422 History of Tokugawa Japan (5)

HSTAS

423 History of Modern Japan (5)

HST

443 Japanese-American Relations (5)

# JAPAN

421 Japanese Literary Tradition in English (5)

JAPAN

- 422 Tokugawa Literary Tradition in English (5)
- JAPAN
- 423 Modern Japanese Literature in English (5)
- JAPAN
  - 441 Studies in Japanese Poetry in English (5)
- JAPAN

### JAPAN

443 Studies in Japanese Drama in English (5)

MUSIC

494 Music of Japan (3)

MUSIC

495 Music of Japan (3)

### POL S

435 Japanese Government and Politics (5)

## COURSES FOR GRADUATES ONLY

EASIA 555<sup>1</sup> Introduction to Modern Japanese Studies (5) Sp BECKMANN

Interdisciplinary study of Japan, with emphasis on the modern period. (Formerly FAR E 555.)

### EASIA

559 Interdisciplinary Seminar on Japan (5) W

BECKMANN

Research seminar, with emphasis on Japan's modern development and contemporary problems. (Formerly FAR E 559.)

## ART H

515 Seminar in Japanese Art (3, max. 9) GEOG

509 Research Seminar: Japan (3, max. 6)

## HSTAS

521 Modern Japanese History (3-6)

HSTAS

522 Japan as a World Power, 1895-1945 (3-6)

### HSTAS

523, 524 Seminar on Modern Japanese History (3-6), (3-6)

## HSTAS

525 Japan in the Twentieth Century (3-6)

526 Seminar on the Modernization of Japan (5)

(Offered jointly with the Department of Political Science as POL S 504.)

### HST

War and Diplomacy: The Totalitarian 543 Challenge, 1931-1945 (3-6)

### HST

544-545 Seminar on War and Diplomacy: · The Totalitarian Challenge, 1931-1945 (3-6)-(3-6)

### LAW

595 Introduction to Japanese Law (3)

POL S 504 Seminar on the Modernization of Japan

(5) (Offered jointly with the Department of History as HSTAS 526.)

### POL S

545 Seminar on Japanese Government and Diplomacy (3, max. 6)

### KOREA

## COURSES FOR UNDERGRADUATES

HSTAS 469, 470 History of Korea (5,5)

KOR

320 Korean Literature in English (5)

MUSIC 426 Music of Korea (3)

COURSES FOR GRADUATES ONLY

HSTAS 566 Research Seminar on Modern Korea

(3-6)

HSTAS 570 Modern Korean History (3-6)

HSTAS 571-572-573 Seminar in Korean History (3-6)-(3-6)-(3-6)

### **Russia and East Europe**

### GENERAL

COURSES FOR UNDERGRADUATES REEU

220 Introduction to Russian and East **European Studies (5) A** BOBA

Geographic setting, ethnic composition, religions, cultural pattern, economic problems, social and political institutions of Eastern Europe in the past and the present. (Formerly FAR E 220.)

### REEU

401, 402 Marxism-Leninism in Modern Intellectual History (5,5) A,W LEGTERS

Teachings of Marx and Engels in the 401: nineteenth century. Analysis of Marxism as a doctrine. 402: Marxism-Leninism in the twentieth century. References to Lenin and Stalin. Prerequisites, modern European, German, or Russian history or political thought, or permission. (Formerly FAR E 401, 402.)

### REEU

403 Marxism in Modern Intellectual History (5) Sp

LEGTERS

Deals with developments in Marxist thought since 1917, with emphasis on neo-Marxist theory in Europe. Prerequisite, permission. (Formerly FAR E 403.)

### REEU

417, 418, 419 Communist States of North-Central Europe (5,5,5) A,W,Sp LEGTERS

Contemporary history (since 1945) of the countries of North-Central Europe: Poland, Czechoslovakia, and East Germany. Emphasizes comparative developments in Russian countries in relation to the whole of the Soviet orbit. Prerequisite, East European history or politics, or permission. (Formerly FAR E 417, 418, 419.)

### REEU

Undergraduate Research (3-5, max. 15) 499 AWSp

For Russia and East Europe majors. Prerequisite, permission.

### HSTEU

447 Russian and East European **Bibliography (5)** 

## COURSES FOR GRADUATES ONLY REEU

508 Seminar: Problems in the Study of Marxism (3-5) W LEGTERS

Investigation of the deeper and more complex historical and philosophical problems encountered in understanding Marxist thought

of the nineteenth and twentieth centuries. Prerequisites, 401, 402, 403, or equivalent in other departments.

ARTS AND SCIENCES

### REEU

600 Independent Study or Research (\*) AWSD

### REEU

700 Master's Thesis (\*) AWSp

### RUSSIA

### COURSES FOR UNDERGRADUATES REEU

243 Russian Civilization (5) AWSp ELLISON, SWAYZE

Russia's material civilization, including fine arts, literature, religion, and history; political, social, and legal institutions; and thought, in relation to the general development of Russian society. (Formerly FAR E 243.)

### REEU

### 324 Survey of Soviet Society (5) A SWAYZE

Survey of the political, economic, and social institutions, and the literature and fine arts of the Soviet Union. (Formerly FAR E 324.)

### REEU

457 Undergraduate Colloquium on Russia (5) Sp

Interdisciplinary study of Russia, with emphasis through the historical period. Required of all undergraduate Russia area studies majors. Prerequisite, permission. (Formerly FAR E 457.)

### REEU

### 496H The Thought and Arts of Russia (5) W SWAYZE

Honors program seminar. Prerequisite, permission of Honors Program Adviser. (Formerly FAR E 496H.)

### ECON

495 The Economy of the Soviet Union (5)

### GEOG

333 **Geographic Patterns of Soviet Development (5)** 

GEOG

433 **Spatial Perception and Organization in** the USSR (5)

438 Modern Russian Intellectual History (5)

442 History of Russian Culture to 1800 (5)

443 Kievan and Muscovite Russia, 850-1700

444 Imperial Russia, 1700-1900 (5)

445 Twentieth-Century Russia (5)

446 Russian Historiography (5)

320 Russian Literature in English (5)

Literature in English (5)

Early Twentieth-Century Russian

61

438 Soviet Regions and Regionalization

### GEOG

HSTEU

HSTELI

HSTEU

HSTEU

HSTEU

HSTEU

RUSS

RUSS

420

(5)

(3 or 5)

RUSS

**Contemporary Russian Literature in** 421 English (5)

RUSS

422 Russian Plays in English (5)

- RUSS 426, 427, 428 The Russian Novel in English
- (5,5,5) POL S
- 420 Foreign Relations of the Soviet Union (5)

POL S

441 Political Institutions of the Soviet Union (5)

# COURSES FOR GRADUATES ONLY

- REEU
- 510 Seminar in Soviet Literary Politics (5) Sp SWAYZE

Examination of literary policies of the Soviet regime and their impact on Soviet belleslettres. Prerequisites, Modern European History HSTEU 445 or Political Science 441, Russian 421, or permission. Reading knowledge of Russian desirable.

### C LIT

580 Literary Relations (3-5, max. 15) ECON

595 Soviet Economics (3)

### GEOG

- 507 Research Seminar: Soviet Union (3, max. 6)
- HSTEU
- 541 Medieval Russian History (3-6)
- HSTEU 542-543 Seminar in Medieval Russian
- History (3-6)-(3-6)

HSTEU 544 Modern Russian History (3-6)

## HSTEU

545-546-547 Seminar in Modern Russian History (3-6)-(3-6)-(3-6)

HSTEU

- 583 Research in the USSR (3-6)
- POL S
- 520 Seminar on the Foreign Policy of the Soviet Union (3)

### POL S

541 The Soviet Political System (4)

POL S

546 Seminar in Problems of Soviet Politics (3)

### EAST EUROPE

## **COURSES FOR UNDERGRADUATES**

REEU

406, 407, 408 Revolutionary Movements in Eastern Europe (3,3,3) A,W,Sp LEGTERS

Historical analysis of the ideological and social character of revolutionary movements, chiefly nationalist and communist, in Eastern Europe from 1848 to World War II. (For-merly FAR E 406, 407, 408.)

## REEL

62

458 Undergraduate Colloquium on East Europe (5) Sp

ROBA, SUGAR

Interdisciplinary study of East Europe with

emphasis on the historical period. Prerequisite, permission. (Formerly FAR E 458.)

GEOG 305 Eastern Europe (5)

GEOG 405 Problems of Eastern Europe (5)

- HSTAM 426 Origins of the East-European States (5)
- **HSTEU**
- 451- Eastern Europe, 1772-1918 (5)

HSTEU -452 Eastern Europe Since 1918 (5)

HSTEU 453 History of the Balkans, 1400-Present (5)

CZECH 320 Czech Literature in English (5)

POLSH 320 Polish Literature in English (5)

- SER C 320 Serbo-Croatian Literature in English (5)
- MUSIC 318 Music Cultures of the World (5)

POL S

347 Governments of Eastern Europe (3)

COURSES FOR GRADUATES ONLY GEOG (

503 Research Seminar: Eastern Europe (3, max. 6)

HSTAM 530 Early Middle Ages (3-6)

HSTEU 551 History of Eastern Europe, 1772-1939 (5)

HSTEU

- 552 History of Eastern Europe, 1939 to Present (5)
- HSTEU 553-554-555 Seminar on Modern East European History (3-6)-(3-6)-(3-6)

## South Asia

COURSES FOR UNDERGRADUATES SASIA

291 Hinduism (3) Sp

GEROW, POTTER Variety and interrelatedness of contemporary Hindu religious phenomena; ritual behavior and practice, sects, ethics of action, and meditation; metaphysical presuppositions, cultural applications in art, music, and literature.

SASIA

461 Studies in Buddhism (5) A The principal religious and philosophical ideas of pre-Buddhist India, as well as fundamental Hinayana and Mahayana ideas. (Formerly FAR E 461.)

SASIA

**472** Introduction to Buddhism (3) Sp Basic doctrines: I. The Conditioned World; II. Its Origins; III. The Unconditioned World; IV. The Path Which Leads From One World to the Other and the Persons Who Use It. Prerequisite, permission. (Formerly FAR E 472.)

### SASIA

473 Readings in the Prainaparamita Literature in English (5, max. 10) Sp Study of texts in the following sequence: The Heart of Sutra, The Diamond Sutra, selected passages from The Large Sutra on Perfect Wisdom. Prerequisite, permission. (Formerly FAR E 473.)

SASIA

### 498 Undergraduate Colloquium on South Asia (5) Sp GEROW

Emphasized will be topics involving the interrelationship of the various social science disciplines in the study of South Asian history and culture. Prerequisite, permission. (For-merly FAR E 498.)

SASIA

499 Undergraduate Research (3-5, max. 15) AWSp

- ANTH
- 316 South Asia (3)

ANTH

412 South Asian Social Structure (5)

ART H

421 Art of India (3)

ECON

465 Economic History of South Asia (5) HSTAS

201 Ancient Indian Civilization (5) HSTAS

202 Modern Indian Civilization (5)

HSTAS

301 Problems of Modern India (5)

- HSTAS
- 401 History of India: Earliest Times to A.D. 647 (5)
- HSTAS

402 History of India: A.D. 647 to A.D. 1525 (5)

- HSTAS
- 403 History of India: A.D. 1525 to the Present (5)

405 Maharashtra in Indian History (5)

404, 405, 406 Indic and Indo-European

320 Classical Indic Literature in English (5)

321 Modern Indic Literature in English (3)

286 Introduction to India's Philosophies (3)

413 Studies in Indian Philosophy (3, max. 9)

434 International Relations in South Asia (5)

440 Government and Politics of South Asia

HSTAS

LING

INDIC

INDIC

MUSIC

PHIL

PHIL

PHIL

POL S

POL S

(5)

(3.3.3)

428 Music of India (3)

412 Indian Philosophy (3)

## COURSES FOR GRADUATES ONLY SASIA

### 501 Seminar on Buddhist Terminology (5, max. 15)

The meaning of Buddhist technical terms will be determined chiefly from authoritative commentaries. (Formerly FAR E 501.)

### ANTH

517 Seminar on South Asia (3)

## ART H

521 Seminar in Indian Art (3, max. 9)

## HSTAS

501 Indian History (3-6)

### PHIL.

586 Seminar on Indian Philosophy (3, max. 12)

## POL S

540 Seminar on Modern Indian Politics (3)

## Southeast Asia

COURSES FOR UNDERGRADUATES ANTH

317 Southeast Asia (3)

ANTH

404 Mainland Southeast Asian Societies (5)

## ANTH

Comparative Social Anthropology 405 of Malay Peoples (4)

GEOG

Problems in the Geography of 434 Southeast Asia (5)

### LING

Introduction to Southeast Asian 478 Linguistics (3)

### POL S

343 Government and Politics of Southeast Asia (5)

## POL S

433 International Relations in Southeast Asia (5)

### COURSES FOR GRADUATES ONLY

### ANTH

- 516 Seminar on Southeast Asia (3, max. 9)
- GEOG **Research Seminar: Southeast Asia** 506 (3, max. 6)

## LING

578 Seminar in Southeast Asian Linguistics (3, max. 9)

### POL S

531 Problems of Southeast Asian Politics (3)

## **Inner Asia**

### **COURSES FOR UNDERGRADUATES** TASTA

430 Survey of Mongol Culture (3) A Nomadic culture and tribal organization in ancient times; present state and cultural life of Mongolia. (Formerly FAR E 430.)

### IASIA

### 431 Tibetan History (3) W WYLIE

Survey of the history of Tibet from earliest times to the present, with emphasis on the status and relations of Tibet in Asian affairs and on the evolution of the political institu-

tions of a "lama-ruler" state. (Formerly FAR E 431.)

### IASIA

450 Survey of Turkic Culture of Central Asia (3) A

CIRTAUTAS

Nomadic culture of the Turks of Central Asia, their history, social organization, present state, and cultural life under Soviet Russia's or China's dominance. Prerequisites, EASIA 210, Anthropology 202, or permission. (Formerly FAR E 450.)

## IASIA

## 464 Tibetan Buddhism (3) A

WYLIE Survey of the development of Buddhist philosophy and its amalgamation with the teaching of Bon, the pre-Buddhist shamanism in Tibet, The resulting doctrines and phenomenology of Tibetan Buddhism are examined in depth. (Formerly FAR E 464.)

### IASIA

499 Undergraduate Research (3-5, max. 15) AWSD

For Institute majors. Prerequisite, permission. MONG

320 Mongolian Literature in English (5)

## TKIC

320 Eastern Turkic Literature in English (3)

COURSES FOR GRADUATES ONLY

- IASIA
- 598 Inner Asia Research Colloquium (5, max. 15)

CIRTAUTAS, WYLIE

Research seminar whose geographical focus is the area comprising Tibet, Mongolia, and Turkestan. Prerequisite, permission. (Formerly FAR E 598.)

### LING

579 Comparative Altaic Linguistics (3)

## LINGUISTICS

For courses in English for foreign students, see English 150, 151, 160, 303, 304, 305, and Speech 111.

101-102-103 Introduction to Language (5-5-5) A,W,Sp

introduction to the nature of language; Аn patterns of language change; the relevance of the study of language to the study of mental processes.

### 200 Introduction to Linguistics (5) AWSpS An introduction to the scientific study of language; language and writing; phonological and grammatical analysis; language change; related disciplines.

201 Language and Human Behavior (5) Sp. The course will cover the elements of the biological basis of human language, the differences between animal and human communication, and the function of language in society. Prerequisite, 20.

### Survey of Linguistic Method and 400 Theory (3) AWSpS

The background and scope of modern linguistics; languages of the world; language analysis; relation to other disciplines. (Not open to students who have had Linguistics 200.)

404, 405, 406 Indic and Indo-European (3,3,3) A,W,Sp

Reading of simple Sanskrit texts with emphasis on structure of Sanskrit and its comparison with other Indo-European languages. Introduction to principles of comparative linguistics.

### 441 Linguistics and Poetic Language (3)

Relationship between linguistic structures, lin-guistic universals, and the poetic uses of language; linguistic description in the analysis of literature. Prerequisite, 400 or permission.

## 443 Philosophy and Linguistics (3) A

A study of some of the connections between recent linguistics and philosophy, primarily philosophical problems that arise in the attempt to understand current linguistic theories and the implications of linguistics for philosophy. Offered jointly with the Depart-ment of Philosophy as Philosophy 443. Prerequisite, permission.

### 445 Teaching English as a Foreign Language (3) A

Linguistic analysis as a basis for the teaching of English as a foreign language; language as rule-governed behavior. Prerequisite, 400.

### 447 Language Development (3) W

The study of first-language acquisition and use by children. Emphasis will be placed on theoretical issues and research techniques. Offered jointly with the Department of Psychology as Psychology 457. Prerequisite, senior or graduate major standing.

## 451, 452, 453 Phonology (3,3,3) A,W,Sp

Detailed study of speech sounds, mechanisms of their production, and structuring of sounds in languages; practical experience with a wide variety of languages; field techniques. Offered jointly with the Department of Anthropology as Anthropology 451, 452, 453. Prerequisite, 200 or 400, which may be taken concurrently, or permission.

### 454 Methods in Comparative Linguistics (3) W

Method and theory of comparative linguistics in relation to anthropological research. Offered jointly with the Department of Anthropology as Anthropology 454. Prerequisite, 400 or nermission.

### 455 Areal Linguistics (3, max. 6) ASp

Linguistic analyses of the languages of a selected area. Offered jointly with the Department of Anthropology as Anthropology 455.

### 461, 462, 463 Syntax (3,3,3) W,Sp,A

Study of the structuring of meaningful elements in language; generative views of grammar. Offered jointly with the Department of Anthropology as Anthropology 461, 462, 463. Prerequisite, 200 or 400, which may be taken concurrently, or permission.

### 464 Phonetic Transcription (21/2) S

Practice in the transcription and analysis of phonological data from non-Indo-European languages. Offered Summer Quarter only. Prerequisite, permission.

### 465 Problem Solving in Phonology (5) S

Training in practical solutions to phonological problems from a variety of languages. Prerequisite, permission.

466 Problem Solving in Grammar (5) S Training in practical solutions to grammatical problems from a variety of languages. Prerequisite, permission.

467 Grammatical Exercises (21/2) S

Practice in eliciting, recording, and analyzing grammatical data of a non-Indo-European language. Offered Summer Quarter only. Prerequisite, 466, which may be taken concurrently.

### 471 Survey of Linguistic Theories (5) S

472 Linguistic Techniques (5) S

### 473 Informant Techniques (5) S

Guided practice in analyzing the phonology and grammar of a non-Indo-European lan-guage. Prerequisites, 471 and 472, which may be taken concurrently.

### 478 Introduction to Southeast Asian Linguistics (3) A COOKE

Survey of language families of Southeast Asia. Typology and relationships. Research needs and problems. Prerequisites, 452, 462.

### 499 Undergraduate Research (1-5) AWSp

### **Courses for Graduates Only**

500 Proseminar (3) A

Introduction to bibliography and research in linguistics.

501, 502, 503 Linguistic Analysis Laboratory (3,3,3) A,W,Šp

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, 463, or permission.

### 504 Indo-European Comparative Phonology (2) A

Sound systems of the principal families of Indo-European and the relation of these to a hypothetical parent tongue. Prerequisite, 406 or permission. (Offered alternate years; offered 1972-73.)

# 505, 506 Indo-European Comparative Grammar (2,2) W,Sp

Systematic treatment, with extensive surveys of individual language groups. Prerequisite, 504.

# 514, 515, 516 Seminar in Comparative

Linguistics (2,2,2) A,W,Sp Advanced problems emphasizing work with languages having few or no written records. Prerequisite, 406 or permission.

# 519 Mathematical Models of Grammar (3)

A 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. (Offered alternate years; offered 1973-74.)

### 524 Seminar in Descriptive Linguistics (2, max. 6)

Individual and joint research on selected topics in descriptive linguistics. Topics to change each quarter. Typical topics are semantics, generative grammar, phonological theories. Prerequisites, 453, 463.

530 Dialectology (3) Sp The principles of dialect deviation as related to linguistic structure and usage. Prerequisite, 452 or permission.

### 550, 551, 552 Advanced Phonology (3,3,3) A,W,Sp

Problems in phonological theory, generative

phonology, phonological change. History of phonological analysis. Prerequisites, 451, 452, 453

### 553 Analysis of Linguistic Structures (3, max. 6) AW

Offered jointly with the Department of An-thropology as Anthropology 553. Prerequisite, permission.

### 561, 562, 563 Advanced Syntax (3,3,3) A,W,Sp

An intensive investigation of the historical background of, and recent developments in, transformational syntax. Prerequisites, 461, 462, 463.

565 Contrastive Linguistics (3) Sp 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.

### 578 Seminar in Southeast Asian Linguistics (3, max. 9) A COOKE

Advanced consideration of specialized problems in Southeast Asian linguistics. Reports on individual research. (Offered alternate years; offered 1973-74.)

579 Comparative Altaic Linguistics (3) W Comparative phonology and morphology of Mongol and Turkic and other related languages. Offered jointly with the Department of Asian Languages and Literature as Mongolian 579. Prerequisite, permission.

### 580 Problems in Linguistics (3, max. 12) AWSp

For advanced students of linguistics, dealing with significant movements, techniques, skills, and theories in the field. Prerequisite, permission.

### 599 Linguistics Colloquium (1, max. 6) AWSp

Biweekly seminar attended by faculty and graduate students to discuss research in progress and topics of general interest. Attendance is required for a minimum of three quarters during the student's residence. Prerequisite, permission.

### 600 Independent Study or Research (\*) AWSpS

### 700 Master's Thesis (\*) AWSpS

800 · Doctoral Dissertation (\*)

### MATHEMATICS

### **Courses for Undergraduates**

### MATHEMATICS

100, 102 Algebra (5,5) AW, WSp Similar to the first three terms of high school algebra. Assumes no previous experience in algebra. (Not open to regularly admissible students who have completed two years of college-preparatory mathematics with C or better grades.)

### 101 Intermediate Algebra (0) AWSp

Similar to third term of high school algebra. Available only through the Division of Continuing Studies upon payment of a separate fee. Prerequisite, one year of high school algebra.

### 104 Plane Trigonometry (0) AWSp

Trigonometric functions, identities, equations, inverse functions, graphs, logarithms, and solution of triangles. Beginning Autumn Quarter 1972, 104 offered for no credit and available only through the Division of Continuing Studies upon payment of a separate fee. Prerequisites, 101 or equivalent and one year of plane geometry.

### 105 Elementary Functions (5) AWSp

Elementary functions with emphasis on the general nature of function, polynomial and rational functions, exponential and logarithmic functions and trigonometric functions. Prerequisites, one and one-half years of high school algebra and qualifying test, or 101.

### 106 Introduction to Finite Mathematics (3) AWSp

Brief introduction to logic, set theory, probability, and elements of matrix algebra. In-tended primarily for students in the biological and social sciences and in business administration. Credit may not apply toward a major in mathematics. Prerequisite, one and one-half years of high school algebra, or equivalent.

### 114 Elementary Computer Programming (2) AWSD

Programming and coding of problems for automatic digital computers. Flow charts, loops, subroutines. Codes written will be executed by machine. Prerequisite, 101 or equivalent; 105 or equivalent recommended.

## 124, 125, 126 Calculus with Analytic

Geometry (5, 5, 5) AWSp, AWSp, AWSp Plane analytic geometry, differentiation of algebraic and transcendental functions, definite and indefinite integrals, technique of integration, vectors, vector-valued functions, infinite series. Applications, No more than 5 credits from among 124, 134H, and 157 may be counted toward any degree. Prerequisites, 105 or qualifying test, and 104 or equivalent for 124; 124 or 134H for 125; 125 or 135H for 126.

# 134H, 135H, 136H Calculus with Analytic

Geometry (5, 5, 5) A,W,Sp Honors sections of 124, 125, 126. No more than 5 credits from among 124, 134H, and 157 may be counted toward any degree. Prerequisites, four years of high school mathematics and permission.

### 157 Elements of Calculus (4) AWSp

Elementary treatment of the differential and integral calculus of simple functions. Intended for students who wish only a brief course in calculus. No more than 5 credits from among 124, 134H, and 157 may be counted toward any degree. Prerequisite, 105 or qualifying test.

# 170, 171 Theory of Arithmetic (3,3) AWSpS,SpS

Numerals and systems of numeration; concept of a set; relations and their properties; systematic development of the integers, rational numbers; real numbers and their properties. Prerequisites, one year of high school algebra, one year of geometry and either Mathematics 101 or Philosophy 120 or equivalent for 170; 170 for 171. Ordinarily, credit may not apply toward a major in mathematics. Elementary Education majors are required to take 170.

### 205 Elementary Linear Algebra (3) AWSp Systems of equations, vector spaces, matrices, linear transformations, characteristic vectors.

Prerequisite, 124 or 157. Not recommended for mathematics majors, and not open for credit to students who have had 302.

## 224 Intermediate Analysis (3) AWSp

Rigorous treatment of the foundations of single-variable calculus. Limits, continuity, the completeness property of the real numbers and some of its consequences, theorems on differentiation and Riemann integration, infinite series. Prerequisite, 126 or 136H.

### 234H, 235H, 236H Advanced Calculus (3,3,3) A,W,Sp

Honors courses covering the material of 238, 324, 325, 326, and selected other topics. Prerequisites, 136H or permission for 234H; 234H for 235H; 235H for 236H.

### 238 Elements of Differential Equations (3) AWSp

Elementary methods of solution of first-order equations, linear equations of second and higher order, power series solutions. Prerequisite, 126 or 136H.

301 Elementary Number Theory (3) AWSp A brief introduction to some of the fundamental ideas of elementary number theory. Prerequisite, 126 or 136H.

### 302, 303 Linear Algebra (4,3) AWSp, AWSp

Vector spaces; linear transformations; systems of linear equations; equivalence and similarity of matrices quadratic forms. Prerequisites, 126 or 136H for 302; 302 for 303.

### 305 Introduction to Mathematical Logic (3) WSp

Formal principles of inference and definition. Propositional inference and inference involving quantifiers. Applications to elementary mathematical theories and to the axiomatic method are stressed. Prerequisites, 126, or 105 and Philosophy 120.

## 324, 325, 326 Advanced Calculus I, II, III (3,3,3) AW, WSp, Sp

Functions of several variables, partial derivatives, the gradient, extremal problems, multiple integrals, transformations and mappings, implicit function theorem, line and surface integrals, vector analysis, differentual forms, theorems of Green, Gaass, and Stokes, uniform convergence. Deals with n dimensions throughout. Prerequisites, 224 and either 302 or 205 for 324, 303 recommended; 324 for 325; 325 for 326.

### 327 Advanced Calculus (3) AWSp

Functions of several variables, partial derivatives, the gradient, extremal problems, line integrals, double integrals, Green's theorem. Prerequisite, 126 or 136H. Not recommended for mathematics majors, and not open for credit to students who have had 324.

## 328 Advanced Calculus (3) AWSp

Implicit function theorem, Lagrange multipliers, surfaces and surface integrals, vector analysis in three dimensions, theorems of Gauss and Stokes. Prerequisite, 327 or 324. Not recommended for mathematics majors, and not open to students who have had 325.

### 374 Principles of Digital Computers and Coding (3) AWSp

High-speed digital computation, number systems, machine components, programming, operation. Prerequisites, 114 and 125 or 134H.

## 400 Elementary Set Theory (3) Sp

Basic axioms of set theory, algebra of sets, Peano axioms, axiom of choice and Zorn's Lemma, transfinite recursion, cardinal numbers and arithmetic. Prerequisite, 236H or 325, or permission.

### 402, 403, 404 Introduction to Modern Algebra (3,3,3) A,W,Sp

Algebraic systems; elementary theory of groups, rings, and fields; polynomials; topics in linear algebra; reductions of forms. Prerequisites, 236H or 302 for 402; 402 for 403; 403 for 404.

405 Introduction to Metamathematics (3) Sp Formal systems; propositional calculus and predicate calculus of first order. The concepts of consistency, completeness, and decidability are introduced and applied to these systems. Prerequisite, 305 or permission.

### 407, 408 Mathematical Optimization Theory I, II (3,3) WSp, Sp

The theory of linear programs and its applications: Systems of linear inequalities, duality, the simplex algorithm, matrix games. Nonlinear programs and Lagrange multipliers. Assignment problems and various combinatorial extremum problems involving directed graphs. Prerequisites, 302 for 407; 407 for 408.

### 411, 412 Introduction to Modern Algebra for Teachers (3,3) A,W

Development of the number systems of elementary algebra; groups, rings, integral domains and fields; polynomials. Restricted to teaching majors, and not open for credit to students who have taken 402, 403. Prerequisites, 205 or 302 for 411; 411 for 412.

### 420 History of Mathematics (3) Sp

A survey of the development of mathematics from its earliest beginnings through the first half of the twentieth century. Prerequisites, 224, and 403 or 412.

### 424, 425, 426 Fundamental Concepts of Analysis (3,3,3) A,W,Sp

Sets, real numbers, topology of metric spaces, normed linear spaces, multivariate calculus from an advanced viewpoint. Prerequisites, 325 or 326 or 236H, and 303 or permission for 424; 424 for 425; 425 for 426.

### 427 Topics in Applied Analysis (3) AW

Some elementary functions of a complex variable, Cauchy integral formula and applications, Taylor and Laurent series, conformal mapping. Prerequisite, 234H or 324 or 327.

## 428, 429 Topics in Applied Analysis (3,3) WSp, Sp

Orthogonal functions and boundary value problems, calculus of variations. Prerequisites, 234H or 324 or 327, and 238.

### 438 Principles of Differential Equations (3) AWSp

Linear systems, existence of solutions, solution by series, special functions. Prerequisite, 236H or 224; 238 and 302 recommended.

### 441, 442, 443 Advanced Geometry (3,3,3) A,W,Sp

Selected topics from among: projective geometry, differential geometry, advanced analytic geometry, algebraic geometry, algebraic topology, and the geometry of convex bodies. Prerequisites, 324 or 327, and 302 or permission, for 441; 441 for 442; 442 for 443. 444, 445 Foundations of Geometry (3,3) A,W Axiomatic treatment of the foundations of Euclidean geometry. Introduction to non-Euclidean geometry. Designed for teaching majors. Prerequisites, 126 or 136H for 444; 444 for 445.

### 464 Numerical Analysis I (3) A

Basic principles of numerical analysis, classical interpolation and approximation formulas, finite differences and difference equations. Prerequisites, 238, 324 or 327, 374.

## 465 Numerical Analysis II (3) W

Numerical methods in algebra. Systems of linear equations, matrix inversion, successive approximations, iterative and relaxation methods. Prerequisites, 303 and 464.

### 466 Numerical Analysis III (3) Sp

Numerical differentiation and integration. Solution of differential equations and systems of such equations. Prerequisite, 465.

### 496H Honors Seminar (\*, max. 9) AWSp

Problem seminar for senior honors students and first-year graduate students. Prerequisite, permission.

### 497 Special Topics in Mathematics for Teachers (2-5, max, 15)

Algebra and geometry for junior high school teachers of mathematics. Offered jointly with the College of Education as Educational Curriculum and Instruction EDC&I 478.

### 498 Special Topics in Mathematics (2-5, max. 15) AWSp

Reading and lecture course intended for special needs of advanced students. Offered when demand is sufficient. Prerequisite, permission of the instructor.

### PROBABILITY AND STATISTICS

281 Elements of Statistical Method (5) AWSp

Elementary concepts of probability. Binomial and normal distributions. Basic concepts of testing hypotheses and estimation. Application to binomial and normal distribution. Chisquare tests. Linear regression theory. For nonmajors only. No more than 6 credits from among 281, 391, 392, Quantitative Science 281, and Psychology 302 may be counted toward any mathematics degree. Prerequisite, 105.

### 391 Elementary Probability (3) AWSp

Sample space, random variables, laws of probability. Combinational probabilities. Distributions: binomial, normal; expectation, variance. No more than 6 credits from among 281, 391, 392, Quantitative Science 281, and Psychology 302 may be counted toward any mathematics degree. Not intended for nonteaching majors in mathematics or the physical sciences or those desiring more than one quarter of probability. Not open for credit to students who have taken 394. Prerequisite, 126 or 136H.

### 392 Elements of Statistics (3) AWSp

Basic concepts of testing hypotheses and of estimation (interval and point). Binomial, normal tests, and estimates. No more than 6 credits from among 281, 391, 392, Quantitative Science 281, and Psychology 302 may be counted toward any mathematics degree. Not intended for nonteaching majors in mathematics or the physical sciences. Prerequisite, 391.

### 394 Probability (3) AW

Sample spaces; basic axioms of probability; combinatorial probability; conditional probability and independence; binomial, Poisson and normal distributions. Prerequisite, 224 or 136H.

## 395 Probability (3) WSp

Random variables; expectation and variance; laws of large numbers; normal approximation and other limit theorems; multidimensional distributions and transformations. Prerequisite, 394.

### 396 Probability (3) Sp

Characteristic functions and generating functions; recurrent events and renewal theory; random walk. Prerequisite, 395.

482, 483 Statistical Inference (3,3) A,W

Introduction to sampling and general theory of statistical inference; general theory of estimation and hypothesis testing; multivariate theory and correlation. Prerequisites, 395 for 482; 482 and 303 for 483.

## 484 Distribution-Free Inference (3) Sp

Distribution-free methods in estimation and testing; Chi-square theory. Prerequisite, 483.

### 485 Analysis of Variance (3) Sp

General linear hypothesis-tests and estimates. Distribution theory of tests. Tests of all contrasts. Fixed, mixed, and random models. Prerequisite, 483.

### 491, 492 Introduction to Stochastic Processes (3,3) A,W

Random walks, Markov chains, branching processes, Poisson process, point processes, birth and death processes, queuing theory, stationary processes. Prerequisites, 396 for 491; 491 for 492.

### **Courses for Graduates Only**

## MATHEMATICS

### 501, 502, 503 Mathematical Logic (3,3,3) A,W,Sp

Theory of formal systems. Formal development of number theory. Completeness and incompleteness, decidability, and undecidability. The theorems of Gödel, Henkin, Church, Rosser, and Tarski. Selected topics from axiomatic set theory, recursive function theory, theory of models, or advanced theory of formal systems. Prerequisites, 405 or equivalent for 501; 501 for 502; 502 for 503.

### 504, 505, 506 Modern Algebra (3,3,3) A,W,Sp

Theory of groups, rings, integral domains, and fields; polynomials; vector spaces, Galois Theory, and theory of ideals. Prerequisite, 404 or equivalent for 504; 504 for 505; 505 for 506.

### 507, 508 Foundations of Mathematics (3,3) S,S

Fundamental concepts and methods of mathematics; the axiomatic method; the logical foundations of mathematics. Prerequisite, 507 for 508.

510 Seminar in Algebra (\*, max. 5) AWSp Prerequisite, permission.

### 511, 512, 513 Special Topics in Algebra (2-3, max. 9; 2-3, max. 9; 2-3, max. 9) A, W, Sp

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.

### 524, 525, 526 Real Variable (3,3,3) A,W,Sp

Metric spaces; general measures and integration; differentiation of set functions; real valued functions on the line; Banach spaces. Prerequisites, 426 or equivalent for 524; 524 for 525; 525 for 526.

### 527 Elements of Real Variables for Scientists (3) A

Compactness theorems, Lebesgue integration and limit theorems, Fubini theorem,  $L_p$  spaces,  $L_2$  Fourier transform theory. Prerequisites, 427, 428, 429, or permission.

**528, 529 Hilbert Space Operators (3,3) W,Sp** Spectral theorem for bounded Hermitian operators, statement for unbounded operators, application to ordinary and partial differential operators with Fourier transforms, construction of Green functions, contour integral representation. Prerequisites, 527 for 528; 528 for 529.

530 Seminar in Analysis (\*, max. 5) AWSp Prerequisite, permission.

### 531, 532, 533 Special Topics in Analysis (2-3, max. 9; 2-3, max. 9; 2-3, max. 9) A, W, Sp

In recent years the following subjects have been covered: Functional Analysis, Abstract Harmonic Analysis, Linear Operations in Hilbert Space, Group Representations, Fourier Series and Integrals, Topological Lineal Spaces, Potential Theory, and Numerical Analysis.

### 534, 535, 536 Complex Variable (3,3,3) AW,WSp,Sp

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.

537 Applications of Operator Theory (3) A Schrodinger equations; eigenvalue distributions; perturbation theory; special functions. Prerequisite, 529.

### 538, 539 Nonlinear Ordinary Differential Equations (3, 3) W, Sp

Phase plane; analysis of critical points (nodes, saddle points, foci); theory of oscillations, limit cycles, Poincaré-Bendixon theory; topological methods, fixed-point theorems. Prerequisites, 324 (or 236H) and 438 for 538; 538 for 539. (Offered alternately with 578, 579; offered 1973-74.)

## 541, 542, 543 Special Topics in Applied

Mathematics (3, max. 9; 3, max 9; 3, max. 9) A,W,Sp

Such topics as mathematical quantum theory, fluid mechanics, optimization and operations research, and control theory will be covered.

## 544, 545, 546 Differential Geometry (3,3,3) A,W,Sp

544: Differential analysis in  $\mathbb{R}^n$ , inverse function theorem, vector fields, Stokes's theorem, existence theorems concerning differential equations. Perequisite, graduate standing or permission. 545, 546: Differentiable manifolds, differential forms, differential geometry in the large. Prerequisites, 544 for 545; 545 for 546.

## 547, 548, 549 Functional Analysis (3,3,3) A,W,Sp

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 will be assumed.

550 Seminar in Geometry (\*, max. 5) AWSp Prerequisite, permission.

### 551, 552, 553 Special Topics in Geometry (2-3, max. 9; 2-3, max. 9; 2-3, max. 9) A,W,Sp

In recent years the following subjects have been covered: Riemannian Geometry, Differentiable Manifolds, Complex Manifolds, Geometry of Convex Bodies.

### 557, 558, 559 Special Topics in Numerical Analysis (3, max. 9; 3, max. 9; 3, max. 9) A,W,Sp

Such topics as linear systems, approximation theory, or the numerical solution of differential

# equations will be covered. 561, 562, 563 General Topology (3,3,3)

A,W,Sp Theory of sets; metric spaces; topological spaces; compactness and other covering properties; function spaces; polyhedra; dimension theory. Prerequisites, 400, which may be taken concurrently, and 426 for 561; 561 for 562; 562 for 563.

### 564, 565, 566 Algebraic Topology (3,3,3) A,W,Sp

A, vr, sp 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.

## 569 Partial Differential Equations (3) Sp

Properties of diffusion, wave, and La Placetype equations. Initial and boundary value problems. Series expansions, Transform methods. Singularities, Green's functions. Classification of second order equations; theory and applications of method of characteristics. Numerical techniques. Offered jointly with the Department of Aeronautics and Astronautics as Aeronautics and Astronautics 569. Prerequisite, 428 or Aeronautics and Astronautics 568.

# 570 Seminar in Topology (\*, max. 5) AWSp Prerequisite, permission.

### 571, 572, 573 Special Topics in Topology (2-3, max. 9; 2-3, max. 9; 2-3, max. 9) A,W,Sp

Special topics from general and algebraic topology.

### 574, 575, 576 Advanced Partial Differential Equations (3,3,3) A,W,Sp

Classification, existence, uniqueness, and boundary value problems for partial differential equations. Green's function and associated integral equations. Prerequisite, 426 or 527.

## 578, 579 Special Functions (3,3) W,Sp

Special functions arising from eigenvalue problems, asymptotic developments by contour
integration, analytic continuation, complex variable aspects of Fourier integrals. Prerequisite, 427. (Offered alternately with 538, 539; offered 1972-73.)

585 Numerical Mathematics (3)

Numerical solution of linear algebraic systems, algebraic eigenvalue problems, ordinary and partial differential equations. Offered joinitly with the Computer Science Group as Computer Science 585. Prerequisites, Mathematics 303, 438, and programming with a procedure-oriented language.

## 586 Numerical Mathematics (3)

Continuation of Mathematics 585. Selected topics in numerical mathematics. Offered jointly with the Computer Science Group as Computer Science 586. Prerequisite, 585 or permission.

- 600 Independent Study or Research (\*) AWSpS
- 700 Master's Thesis (\*) AWSpS

800 Doctoral Dissertation (\*)

## PROBABILITY AND STATISTICS

521, 522,523 Probability (3,3,3) A,W,Sp 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.

## 581, 582, 583 Advanced Theory of Statistical Inference (3,3,3) A,W,Sp

Elements of decision theory; Neyman-Pearson theory; randomized tests; maximum likelihood statistics; confidence regions; distribution-free statistics; linear hypotheses; analysis of variance; block design. Prerequisites, 482 and 483 or permission for 581; 581 for 582; 582 for 583.

## 590 Seminar in Probability and Statistics (\*, max. 5) AWSp

Prerequisite, permission.

## 591, 592, 593 Special Topics in Statistics (3, max. 9; 3, max. 9; 3, max. 9) A,W,Sp

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).

## MUSIC

## MUSIC

## **Courses for Undergraduates**

Courses Primarily for Nonmajors (See also ENSEMBLES.)

- 100 University Singers (1, max. 12) AWSp EICHENBERGER
- 116, 117, 118 Elementary Music Theory

(2,2,2) AW, WSp, Sp Prerequisites, 116 for 117; 117 for 118.

### 120 Survey of Music (5) ASp CLARKE

Illustrated lectures with supplementary readings to provide the general student with understanding of common forms, idioms, and styles.

## 121 The Orchestra (2) AWSp

HOKANSON, MC INNES, SOKOL Development of the orchestra and its literature.

- 122 Orchestral Music: Seventeenth and Eighteenth Century (2) A
- 123 Symphonic Music: Nineteenth Century
   (2) WSp
   HOKANSON, O'DOAN, SOKOL
- 124 Symphonic Music: Contemporary (2) Sp HOKANSON, SOKOL
- 128 The Concerto (2) A O'DOAN, SOKOL
  - 185 The Concert Season (4) W BERGSMA

Sampling of different musical events on campus, which may include orchestra, chamber music, opera, non-Western music, mixed média, other. Analysis of selected works; when possible, preview with performers. Attendance required at one evening concert weekly.

316, 317, 318 Music Cultures of the World (5,5,5) A,W,Sp GARFIAS

316: music of India, Southeast Asia, Indonesia. 317: Africa, Western Europe, North and South America. 318: Eastern Europe, Middle East, Central Asia, Far East.

319 Afro-American Music (5)

GARFIAS

A survey course centering on Black music in the United States, but also clarifying the relationship of this music to the musics of other Afro-American cultures as well as to their African roots. (Formerly 129.)

329 Chamber Music (2) W

MC INNES Survey of literature for ensembles.

330 Music in the United States (2) W CLARKE

Contribution of music to the development of American culture.

## 331 History of Jazz (3) AWSp

GARFIAS, SMITH

The development of jazz in the United States, from its beginnings to its present trends.

## 339 Opera (5) W

TROY Contributions of music, text, and staging; study of representative works concentrating on problems of combining these elements into a composite work of art.

## 385 Music in Theatre (3)

BERGSMA

Survey of the interaction between musical form and function in relation to various kinds of theatre, from liturgical drama to film and multimedia. (Formerly 485.)

## 386 Multi-Media Music (3) A

DEMPSTER Survey tracing the development of multimedia musics since 1950 (experimental combinations of music with other art forms in unfamiliar circumstances.)

## COURSES PRIMARILY FOR MUSIC MAJORS

Permission of undergraduate adviser required for all courses except Music 100.

- 100 University Singers (1, max. 12) AWSp EICHENBERGER
- 101 University Symphony Orchestra (1, max. 15) AWSp KRACHMALNICK
- 102 University Band (1, max. 12) WSp BISSELL
- 103 Chamber Music (1, max. 12) AWSp HEINITZ, MC INNES
  - 104 Piano Ensemble (1, max. 12) AWSp GEISSMAR
  - 105 Brass Ensemble (1, max. 12) WSp BISSELL
  - 106 Woodwind Ensemble (1, max. 12) AWSp GROSSMAN, LEUBA, MC COLL, SKOWRONEK, STORCH, WELKE
  - 107 Opera Workshop (1, max. 12) AWSp ROSINBUM
  - 110, 111, 112 First-Year Theory (3,3,3) A,W,Sp

A study of basic musical concepts and terminology through a program of listening, analysis, and keyboard practice. To be taken concurrently with 113, 114, 115. Prerequisite, permission.

113, 114, 115 Ear Training (1,1,1) A,W,Sp To be taken concurrently with 110, 111, 112. Prerequisite, permission.

119 Music Fundamentals (2) AWSp For majors in elementary education.

136 Basic Keyboard (1, max. 6) AWSp For music majors only.

137, 138, 139 Class Instruction: Voice (1,1,1) A.W.Sp

- For music majors only.
- 191 Composition (2, max. 6) AWSp BEALE, BENSHOOF, BERGSMA, KECHLEY, SMITH, SUDERBURG, TUFTS, VERTALL

One half-hour private lesson and a one-hour laboratory session each week. Intended to develop skill in creative musical expression. Prerequisite, permission.

- 201 Wind Sinfonietta (1, max. 12) AWSp WELKE
- 203 Marching Band (1, max. 5) A BISSELL
- 204 Percussion Ensemble (1, max. 12) AWSp SHRADER
- 205 Non-Western Ensemble (1, max. 12) AWSp GARFIAS
- 206 Jazz Ensemble (1, max. 12) AWSp BRAZIL
- 207 University Oratorio Chorus (1, max. 12) AWSp

EICHENBERGER A choral ensemble that performs major works with orchestra. Prerequisite, permission of in-

structor.

208 University Laboratory Band (1, max. 12) AWSp

Large ensemble performance practices in the jazz idiom. Prerequisite, permission.

210, 211, 212 Second-Year Theory (3,3,3) A,W,Sp

BABB, BEALE, KECHLEY, TUFTS Practical writing and analytic experience in diatonic and chromatic harmony as it was used during the eighteenth and nineteenth centuries. To be taken concurrently with 213, 214, 215. Prerequisites, 112 and 115.

213, 214, 215 Music After 1750 (3,3,3) A,W,Sp TROY

To be taken concurrently with 210, 211, 212.

216, 217, 218 Introductory Composition (2,2,2) A,W,Sp BENSHOOF

For students not majoring in composition. Prerequisite, 112.

220, 221, 222 String Techniques I (1,1,1) A,W,Sp JUSSILA

Violin, viola, cello, stringbass.

- 223, 224, 225 String Techniques II (1,1,1) A,W,Sp JUSSILA
- 226, 227, 228 Woodwind Techniques (1,1,1) A,W,Sp WELKE
- 226: clarinet; 227: flute; 228: double reeds.
- 229, 230, 231 Brass Techniques (1,1,1) A,W,Sp BISSELL
- 229: trumpet; 230, 231: lower brass.
- 232 Percussion Technique (1) A SHRADER
- 233 Music Theatre Technique (1) A ROSINBUM

Stage deportment and dramatic movement for singers.

236 Secondary Piano (2, max. 6) AWSp

For music majors only.

237 Class Instruction: Voice (2, max. 6) AWSp

For music majors only.

240 Guitar Techniques (1) AWSp

241 Recorder Techniques (1) W

280 Basic Principles of Conducting (1) Sp KRACHMALNICK

Prerequisite, 212, which may be taken concurrently.

291 Composition (2, max. 6) AWSp BEALE, BENSHOOF, BERGSMA, KECHLEY, SMITH, SUDERBERG, TUFTS, VERRALL

One half-hour private lesson and a one-hour laboratory session per week. Prerequisite, 191 or permission.

**308 Electronic Music Laboratory (2)** To develop proficiency in the use of tape recorders for original recordings, for dubbing, and for mixing, and to provide experience in the setup and use of the Electronic Music Synthesizer for the composition of electronic music. Prerequisite, 212 or permission.

309 Advanced Music Theatre Technique (1) W

ROSINBUM

Dramatic interpretation of musical style as represented by the major opera composers since Mozart. Prerequisite, 233.

310 Modal Counterpoint (3) A BABB

Sixteenth-century style. To be taken concurrently with 313. Prerequisites, 212 and 215.

311 Tonal Counterpoint (2) W BENSHOOF, VERRALL Basic techniques of Baroque counterpoint and

introduction to the fugue. To be taken concurrently with 314. Prerequisites, 212 and 215.

**312 Contemporary Idioms (3) Sp** Analytical studies of present-day composition techniques with emphasis on contrapuntal qualities. Prerequisites, 212 and 215.

- 313, 314 Music Before 1750 (3,3) A,W CLARKE, HARMAN, TERRY
  313: before 1600; 314: 1600-1750. To be taken concurrently with 310, 311. Prerequisites, 212, 215 for 313; 313 for 314.
- 320, 321, 322 Keyboard Transposition and Improvisation (2,2,2) A,W,Sp BABB
- 323, 324, 325 Accompanying (2,2,2) AW,W,Sp HOKANSON, O'DOAN Study and performance of music of different types and periods for voice or instruments in

326, 327, 328 Repertoire (1,1,1) A,W,Sp EICHINGER, HOKANSON For applied music majors.

334 Band Arranging (2) W WELKE Prerequisite, 212.

combination with the piano.

- 335 Keyboard Harmony (3) Sp BABB, BENSHOOF
- Prerequisites, 212 and permission.
- 337 History of Chamber Music (3) A MC INNES
- 338 Keyboard Performance Practices (2) AWSp KIND

Problems in interpreting early keyboard music with special reference to the harpsichord. Prerequisite, permission.

340 Music in General Education (3) AW An orientation to the broad scope of music in schools (K-12), including identification of musical concepts and skills and the development of strategies and evaluation techniques. Prerequisites, EDUC 302, EDPSY 304, and piano and voice competencies.

**379** Junior Recital (1) AWSp For participants in department honors program only.

380, 381, 382 Conducting (1,1,1) A,W,Sp EICHENBERGER, SOKOL, WELKE Prerequisite, 280.

391 Composition (2, max. 6) AWSp BEALE, BENSHOOF, BERGSMA, KECHLEY, SMITH, SUDERBURG, TUFTS, VERRALL

One half-hour private lesson and a one-hour laboratory session each week. Prerequisite, 291.

## Courses 400 through 423. Prerequisite, 314.

400 Medieval Music: to 1400 (3) A HARMAN

Gregorian chant through Machaut and Landini. (Not offered 1972-73.)

401 Early Renaissance Music: 1400-1525 (3) W HARMAN

Dunstable through Josquin. (Not offered 1972-73.)

402 Late Renaissance Secular Music: 1525-1630 (3) A HARMAN

The madrigal in Italy, England, and Germany. The Chanson, Jannequin through Lassus. (Not offered 1973-74.)

403 Late Renaissance Sacred and Instrumental Music: 1525-1630 (3) W HARMAN

Latin Church music, Willaert through G. Gabrieli; early Reformation Church music, Walther through Gibbons; instrumental music, Cabezon, the English virginal school, and Sweelinck. (Not offered 1973-74.)

404 Keyboard Music: 1630-1770 (3) A TERRY

Forms and styles: Frescobaldi through J.S. and C.P.E. Bach.

405 Keyboard Music: 1770-1850 (3) Haydn through Schumann.

406 Keyboard Music: 1850-1920 (3) Liszt through Debussy.

407 Baroque Solo Song (3) Monody and Cantata, Caccini through Handel.

408 The German Lied (3) W

Schubert through Strauss. (Not offered 1973-74.)

409 French Art-Song: 1850 to the Present (3) Sp TERRY

Fauré through Poulenc. (Not offered 1972-73.)

410 Chamber Music: 1660-1770 (3) Frescobaldi through Bach.

411 Chamber Music: 1770-1830 (3) Haydn through Schubert. (Not offered 1972-73.)

412 Chamber Music: 1830-1920 (3) Schumann through Ravel.

413 Orchestral Music: 1620-1760 (3) Sp HARMAN

Corelli through the Mannheim School. (Not offered 1973-74.)

414 Orchestral Music: 1760-1850 (3) A IRVINE

Haydn through Berlioz.

### 415 Orchestral Music: 1850-1920 (3) W IRVINE

Liszt through Elgar; the National Schools and the Impressionists.

416 Choral Music: 1600-1770 (3) W

HARMAN Monteverdi through Handel. (Not offered 1973-74.)

417 Choral Music of Bach (3) W TERRY

The cantatas and larger works. Choral compositions of Bach's immediate predecessors. (Not offered 1972-73.)

418 Choral Music: 1770-1850 (3) Sp TERRY

Large works for chorus and orchestra. Haydn through Berlioz. (Not offered 1972-73.)

419 Choral Music: 1850 to the Present (3) Sp TERRY

Selected choral masterpieces. Brahms through Britten. (Not offered 1973-74.)

420 Opera: 1600-1750 (3) Sp TROY

Monteverdi through Handel. (Not offered 1972-73.)

421 Opera: 1750-1850 (3) Sp

Gluck through Bellini. (Not offered 1973-74.)

422 Opera: 1850-1920 (3) A TROY

Wagner through Puccini.

TROY

423 Music in the Twentieth Century (3) Sp CLARKE

Western art music from Debussy to the present, emphasizing techniques adapted from other arts, sciences, continents, and centuries. (Not offered 1972-73.)

Conspectus of the History of Music to 424 1760 (5) W

HARMAN, TROY

A concentrated course in Renaissance, Baroque, and preclassical music. Intended primarily for senior transfers and graduates.

425 Conspectus of the History of Music from 1760 (5) Sp IRVINE, TROY

A concentrated course in Classical, nineteenth- and twentieth-century music. Intended primarily for senior transfers and graduates.

426 Music of Korea (3)

Prerequisites, 316, 317, 318 or permission.

427 Music of Africa (3)

Music of the different ethnic groups of Africa and their influence on each other. Prerequisites, 316, 317, 318, or permission.

428 Music of India (3) Prerequisites, 316, 317, 318, or permission.

429 Introduction to Ethnomusicology (3) A GARFIAS

Prerequisite, permission.

## 430 Organology (3) W

KAUFFMAN

A systematic study of musical instruments, involving the history, acoustical phenomena, and physical typologies of instruments from around the world, with emphasis upon non-Western music. Prerequisite, 429 or permission.

### 431 The Curriculum in Music Education (2) SD

Prerequisite, student teaching,

### 432 The General Music Class (3) Sp REEDER

The teaching of music and its literature in nonperforming classes on the junior and senior high school level. Prerequisite, 340.

## 433 Music of Latin America (3)

The Indian, African, and European music of the Spanish-, French-, and Portuguesespeaking New World countries. Prerequisites, 316, 317, 318, or permission.

434, 435, 436 Pedagogy (2,2,2) A,W,Sp HARRIS, HEINITZ, MOORE

Principles of effective studio teaching; survey and evaluation of teaching materials (Not offered 1972-73.)

438 Psychology of Music (3) A or W CARLSEN

A study of human response to musical phenomena, with particular emphasis upon perception, learning, measurement, and functional applications.

439 Music of Indonesia and the Philippines (3)

Prerequisites, 316, 317, 318, or permission.

440 Music in Early Childhood (3) A

SWANSON

Identification and selection of appropriate objectives, materials, teaching strategies and evaluation techniques used in music teaching from nursery school through grade 3, with consideration of various methods (e.g., Kodaly, Orff, etc.) for early childhood development in music. Prerequisite, Music 340.

## 441 Music in Later Childhood (3) Sp

SWANSON The identification and selection of appropriate objectives, materials, teaching strategies, and evaluation techniques, used in music teaching in grades 4 through 6, with consideration of various methods, e.g., Kodaly, Orff, etc., for later childhood development in music. Prerequisite, 340.

442 Instrumental Curriculum, Methods and Materials (3) A JUSSILA

A 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. Prerequisites, Music 340 and permission.

#### Choral Curriculum, Methods and 443

Materials (3) W

A 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 in-struction. Prerequisites, Music 340 and 'permission.

450 University Chorale (1, max. 12) AWSp EICHENBERGER (Formerly 200.)

451 Madrigal Singers (1, max. 12) AWSp KECHLEY

(Formerly 202.)

- 479 Senior Recital (1) AWSp
- 480 Sinfonietta (1, max. 6) AWSp KRACHMALNICK
- Chamber Music (1, max. 6) AWSp 481 HEINITZ

Prerequisite, graduate standing.

482 Opera Theatre (2, max. 6) AWSp KRACHMALNICK, ROSINBUM Preparation for participation in public per-

formance of roles in chamber opera. 483

- Collegium Musicum (1, max. 6) AWSp HEINITZ, KIND
- **Problems in Twentieth-Century** 484 Ensemble (1, max. 6) AWSp SMITH, SUDERBURG

Exploration of notation and performance problems in today's music; preparation for public performance.

486 Modal Counterpoint (3) W BABB

Prerequisite, 310.

487 **Tonal Counterpoint (3) Sp** VERRALL

The evaluation of fugal practice from the Baroque era to the present. Prerequisite, 311.

- Contemporary Idioms (3) W 488
- 489 Musical Forms (3) Sp

490 Orchestration (3) Sp

Composition (2, max. 12) AWSp 491 BEALE, BENSHOOF, BERGSMA, KECHLEY, SMITH, SUDERBURG, TUFTS, VERRALL

One half-hour private lesson and a one-hour laboratory session each week. Prerequisite, 391.

## 492, 493 Opera Direction and Production (4,4) A,W

ROSINBUM Practical experience with problems of the theater. Prerequisite, 492 for 493.

### 494 Music of Japan (3)

The music of Japan from earliest known record until 1700. Prerequisites, 316, 317, 318. or permission.

495 Music of Japan (3) The music of Japan from 1700 to the present. Prerequisites, 316, 317, 318, or permission.

## 496 Special Topics in Music Education (1 or 2, max. 10) S

Special studies designed to reflect contemporary emphases and concerns in the music education profession.

## 497 Music of China (3)

The music of China from the earliest times to the present. Prerequisites, 316, 317, 318, or permission.

## 498 Music of Spain (3)

The major stylistic period of the music of Spain, with a consideration of the social and historical contexts that formed the music; the music of Islam in terms of its influence in Spain and the vestiges of early Spanish music in the folk and popular music of Spain and Latin America.

499 Undergraduate Research (\*, max. 6) AWSp

## **Courses for Graduates Only**

#### 500 Seminar in Methods of Musical Research (3) AW

IRVINE

Music 500 is a prerequisite for all graduate history courses except 515, 516, 519.

501, 502, 503 Advanced Analysis (3,3,3) A,W,Sp

BEALE, BERGSMA, KECHLEY, SUDERBURG 501: chant to middle Baroque; 502: high Baroque through nineteenth century; 503: Impressionists to present.

504 Seminar in Medieval Music (3, max. 6) Sp

HARMAN

Prerequisite, 400 or permission. (Not offered 1972-73.)

505 Seminar in Renaissance Music

(3, max. 6) W

HARMAN

Prerequisite, one or more courses from 401, 402, and 403, or permission. (Not offered 1972-73.)

506 Seminar in Baroque Music (3, max. 6) A TERRY

Prerequisite, one or more courses from 404. 407, 410, 413, 416, 417, or 420, or permission.

507 Seminar in Rococo and Pre-Classical Music: 1700-1760 (3, max. 6) Sp HARMAN

Prerequisite, one or more courses from 404, 410, 413, 420, or permission. (Not offered 1972-73.)

508 Seminar in the Viennese Classical Period: 1760-1830 (3, max. 6) W TERRY

Prerequisite, one or more courses from 405, 411, 414, 418, or 421, or permission. (Not offered 1973-74.)

509 Seminar in Nineteenth-Century Music: 1830-1890 (3, max. 6) A RVINE

Prerequisite, one or more courses from 406, 408, 409, 412, 415, 419, or 422, or permission.

510 Seminar in Music Since 1890 (3, max. 6) Sp IRVINE

Prerequisite, one or more courses from 406, 408, 409, 412, 415, 419, 422, or 423, or permission.

511 Seminar in Field and Laboratory Methods (3)

KAUFFMAN

A study of the methodology of research in ethnomusicology along with practical experience in recording and processing field and laboratory materials. Prerequisite, 429 or permission.

## 512 Seminar in Ethnomusicology (3)

KAUFFMAN A study of methodological procedures in ethnomusicology applied to specific research problems. Prerequisite, permission.

## 513 Historiography (3) A

IRVINE Prerequisite, 500 or permission. (Not offered 1972-73.)

### 514 Systematic Musicology (3) A CARLSEN

The use of the scientific method and empirical research procedures in musical investigation.

## 515 Medieval Notation: to 1400 (3) Sp HARMAN

Gregorian Chant through the Mannered School. Prerequisite, permission. (Not offered 1973-74.)

516 Renaissance Notation: 1400-1600 (3) Sp HARMAN

Dunstable through De Rore; lute and keyboard tablatures. Prerequisite, 401 or permission. (Not offered 1972-73.)

### 517 Seminar in Musical Styles (3, max. 6) W CLARKE

Investigations into the stylistic criteria for specific composers and groups of composers. Prerequisite, permission.

## 518 Aesthetics (3) W

IRVINE

Aesthetic theories; practical aspects of aesthetics in relation to music criticism, composition, and performance. Prerequisite, permission. (Not offered 1973-74.)

## 519 Editing of Early Music (3, max. 6) Sp TERRY

The study of performance practices through the editing of vocal and instrumental music of the seventeenth and early eighteenth centuries. Problems of ornamentation, bowing, figured bass, notation, etc. Collaborative student preparation and conducting of old scores. Prerequisite, permission. (Not offered 1973-74.)

520 Seminar in American Music (3, max. 6) Sp CLARKE

Research in the life, works, and times of composers in the United States from colonial days to the present. Prerequisite, permission. (Not offered 1973-74.)

## 521 Selected Topics in Musical Perception (3) CARLSEN

Specialized problems in the aural perception of musical sounds in context. May be repeated for credit. Prerequisite, 438 or permission.

### 522 Contemporary Contrapuntal Technique (3) A VERRALL

A study of the art of invention, canon, and fugue in the twentieth century, from both analytic and practical viewpoints.

## 523 Music and Society (3) A SHRADER

### 524 Seminar in Music Education (3) W SWANSON

Special problems in the teaching and supervision of music in the elementary grades. Prerequisites, one year of teaching experience and permission.

## 525 Seminar in Music Education (3) W JUSSILA

Special problems in the teaching and administration of music in the secondary school and junior college. Prerequisites, one year of teaching experience and permission.

## 526, 527, 528 History of Theory (3,3,3) A,W,Sp SUDERBURG

526: ancient, medieval, early renaissance; 527: renaissance, baroque, early classic; 528: classic, romantic, twentieth century.

### 529 Practicum in Teaching Elementary Music Methods (3) Sp SWANSON

Elementary music education curriculum, methods, and materials. Prerequisites, 524 and teaching experience.

530 Seminar in Musical Learning (3, max. 6)

CARLSEN

A study of learning research as it relates to nonverbal musical learning. Prerequisite, 438 or permission.

### 531 Experimental Design in Musical Research (3) CARLSEN

Experimental and quasi-experimental research designs and the application of experimental research methods to the investigation of problems in music teaching and learning, performance, and theoretical studies. Prerequisites, 514, and Psychology 303 or Educational Psychology EDPSY 490.

532 Opera Direction and Production (4 or 6, max. 12) AWSp ROSINBUM

Practical experience with problems of the opera theatre.

## 533, 534, 535 Preceptoral Reading in Ethnomusicology (5,5,5) A,W,Sp GARFIAS, KAUFFMAN

Graduate course dealing with basic literature in ethnomusicology; laboratory and listening sections meeting concurrently, Music 533 with 316; 534 with 317; and 535 with 318.

## 536 Transcription and Analysis (3)

KAUFFMAN A study of practice in different notational analytical systems used in non-Western music. Prerequisite, 471.

### 559 Master's Recital (2, max. 4) AWSp Public performance in solo recital, chamber music, or conducting. For students in the Master of Music program. Prerequisite, permission.

### 580, 581, 582 Advanced Conducting (2,2,2) A,W,Sp KRACHMALNICK

## 583 Advanced Choral Conducting (3, max. 27) AWSp EICHENBERGER

590 Doctoral Recital (3-9, max. 18) AWSp Public performance in solo recital, chamber music, or conducting. For students in the Doctor of Musical Arts Program. Prerequisite, permission.

591 Graduate Composition (\*) AWSp BEALE, BENSHOOF, BERGSMA, KECHLEY, SMITH, SUDERBURG, TUFTS, VERRALL

## 595, 596, 597 Practicum in Systematic Musicology (2,2,2) A,W,Sp CARLSEN

Direct systematic research experience under the tutelage of a faculty member on a current faculty research project. The practicum is intended to complement courses in systematic research methodology by permitting the student to participate in actual systematic research activity. Required of all doctoral students in systematic musicology; open to all second-year graduate students in music. May be repeated for credit. Prerequisite, 514, which may be taken concurrently, or permission.

## 600 Independent Study or Research (\*) AWSp

- 700 Master's Thesis (\*) AWSp
- 800 Doctoral Dissertation (\*)

## MUSIC APPLIED

## **Courses for Undergraduates**

Courses 140 through 159 are private instruction primarily for majors not specializing in performance. Also available to qualified nonmajors. Prerequisites, examination and permission.

140 Private Instruction: Plano (2-3, max. 9) AWSp

GEISSMAR, HOKANSON, MOORE, O'DOAN, SIKI

- 141 Private Instruction: Violin-Viola (2-3, max. 9) AWSp MC INNES, SOKOL
- 142 Private Instruction: Voice (2-3, max. 9) AWSp CURTIS-VERNA, HARRIS, LISHNER, MESLER
- 143 Private Instruction: Violoncello (2-3, max. 9) AWSp HBINITZ
- 144 Private Instruction: Double Bass (2-3, max. 9) AWSp
   WARNER
- 145 Private Instruction: Organ (2-3, max.
  9) AWSp
  BICHINGER
- 146 Private Instruction: Flute (2-3, max. 9) AWSp skowronek, welke
- 147 Private Instruction: Oboe (2-3, max. 9) AWSp STORCH
- 148 Private Instruction: Clarinet (2-3, max.
  9) AWSp
  MC COLL, WELKE
- 149 Private Instruction: Bassoon (2-3, max.
  9) AWSp
  GROSSMAN
- 150 Private Instruction: Saxophone (2-3, max. 9) AWSp BRAZIL
- 151 Private Instruction: Horn (2-3, max. 9) AWSp LEUBA, WELKE
- 152 Private Instruction: Trumpet (2-3, max. 9) AWSp CUMMINGS, WELKE
- 153 Private Instruction: Trombone (2-3, max. 9) AWSp DEMPSTER
- 154 Private Instruction: Tuba (2-3, max. 9) AWSp RUSSELL
- 155 Private Instruction: Harp (2-3, max. 9) AWSp VOKOLEK
- 156 Private Instruction: Percussion (2-3, max. 9) AWSp SHRADER
- 157 Private Instruction: Harpsichord (2-3, max. -9) AWSp KIND
- 158 Private Instruction: Viola da gamba (2-3, max. 9) AWSp HEINITZ
- 159 Private Instruction: Non-Western Instruments (2-3, max. 9) AWSp

Courses 160 through 178 are for music majors specializing in performance.

- 160 Private Instruction: Plano (3-4, max. 12) AWSp GEISSMAR, HOKANSON, MOORE, O'DOAN, SIKI
- 161 Private Instruction: Violin-Viola (3-4, max. 12) AWSp MC INNES, SOKOL

- 162 Private Instruction: Voice (3-4, max. 12) AWSp CURTIS-VERNA, HARRIS, LISHNER, MESLER
- 163 Private Instruction: Violoncello (3-4, max. 12) AWSp HEINITZ
- 164 Private Instruction: Double Bass (3-4, max. 12) AWSp WARNER
- 165 Private Instruction: Organ (3-4, max. 12) AWSp BICHINGER
- 166 Private Instruction: Flute (3-4, max. 12) AWSp SKOWRONEK, WELKE
- 167 Private Instruction: Oboe (3-4, max. 12) AWSp STORCH
- 168 Private Instruction: Clarinet (3-4, max. 12) AWSp MC COLL, WELKE
- 169 Private Instruction: Bassoon (3-4, max. 12) AWSp GROSSMAN
- 170 Private Instruction: Saxophone (3-4, max. 12) AWSp BRAZIL
- 171 Private Instruction: Horn (3-4, max. 12) AWSp LEUBA, WELKE
- 172 Private Instruction: Trumpet (3-4, max. 12) AWSp CUMMINGS, WELKE
- 173 Private Instruction: Trombone (3-4, max. 12) AWSp DEMPSTER
- 174 Private Instruction: Tuba (3-4, max. 12) AWSp RUSSELL
- 175 Private Instruction: Harp (3-4, max. 12) AWSp VOKOLEK
- 176 Private Instruction: Percussion (3-4, max. 12) AWSp SHRADER
- 177 Private Instruction: Harpsichord (3-4, max. 12) AWSp
- 178 Private Instruction: Viola da gamba (3-4, max. 12) AWSp HEINITZ

Courses 240 through 259 are private instruction primarily for majors not specializing in performance. Also available to qualified nonmajors. Prerequisites, examination and permission.

- 240 Private Instruction: Piano (2-3, max. 9) AWSp GEISSMAR, HOKANSON, MOORE, O'DOAN, SIKI
- 241 Private Instruction: Violin-Viola (2-3, max. 9) AWSp MC INNES, SOKOL
- 242 Private Instruction: Voice (2-3, max. 9) AWSp CURTIS-VERNA, HARRIS, LISHNER, MESLER

- 243 Private Instruction: Violoncello (2-3, max. 9) AWSp HEINITZ
- 244 Private Instruction: Double Bass (2-3, max. 9) AWSp WARNER
- 245 Private Instruction: Organ (2-3, max. 9) AWSp EICHINGER
- 246 Private Instruction: Flute (2-3, max. 9) AWSp SKOWRONEK, WELKE
- 247 Private Instruction: Oboe (2-3, max. 9) AWSp STORCH
- 248 Private Instruction: Clarinet (2-3, max. 9) AWSp MC COLL, WELKE
- 249 Private Instruction: Bassoon (2-3, max 9) AWSp GROSSMAN
- 250 Private Instruction: Saxophone (2-3, max. 9) AWSp BRAZIL
- 251 Private Instruction: Horn (2-3, max. 9) AWSp LEUBA, WELKE
- 252 Private Instruction: Trumpet (2-3, max. 9) AWSp CUMMINGS, WELKE
- 253 Private Instruction: Trombone (2-3, max. 9) AWSp DEMPSTER
- 254 Private Instruction: Tuba (2-3, max. 9) AWSp RUSSELL
- 255 Private Instruction: Harp (2-3, max. 9) AWSp VOROLEK
- 256 Private Instruction: Percussion (2-3, max. 9) AWSp SHRADER
- 257 Private Instruction: Harpsichord (2-3, max. 9) AWSp KIND
- 258 Private Instruction: Viola da gamba (2-3, max. 9) AWSp HEINITZ
- 259 Private Instruction: Non-Western Instruments (2-3, max. 9) AWSp

Courses 260 through 278 are for music majors specializing in performance.

- 260 Private Instruction: Piano (3-4, max. 12) AWSp GEISSMAR, HOKANSON, MOORE, O'DOAN, SIEI
- 261 Private Instruction: Violin-Viola (3-4, max. 12) AWSp MC INNES, SOKOL
- 262 Private Instruction: Voice (3-4, max. 12) AWSp CURTIS-VERNA, HARRIS, LISHNER, MESLER
- 263 Private Instruction: Violoncello (3-4, max. 12) AWSp HEINITZ

- 264 Private Instruction: Double Bass (3-4, max. 12) AWSp WARNER
- 265 Private Instruction: Organ (3-4, max. 12) AWSp EICHINGER
- 266 Private Instruction: Flute (3-4, max. 12) AWSp SKOWRONEK, WELKE
- 267 Private Instruction: Oboe (3-4, max. 12) AWSp STORCH
- 268 Private Instruction: Clarinet (3-4, max. 12) AWSp MC COLL, WELKE
- 269 Private Instruction: Bassoon (3-4, max. 12) AWSp GROSSMAN
- 270 Private Instruction: Saxophone . (3-4, max. 12) AWSp BRAZIL
- 271 Private Instruction: Horn (3-4, max. 12) AWSp LEUBA, WELKE
- 272 Private Instruction: Trumpet (3-4, max. 12) AWSp CUMMINGS, WELKE
- 273 Private Instruction: Trombone (3-4, max. 12) AWSp DEMPSTER
- 274 Private Instruction: Tuba (3-4, max. 12) AWSp RUSSELL
- 275 Private Instruction: Harp (3-4, max. 12) AWSp VOKOLEK
- 276 Private Instruction: Percussion (3-4, max. 12) AWSp SHRADER
- 277 Private Instruction: Harpsichord (3-4, max. 12) AWSp KIND
- 278 Private Instruction: Viola da gamba (3-4, max. 12) AWSp HEINITZ

Courses 340 through 359 are private instruction primarily for majors not specializing in performance. Also available to qualified nonmajors. Prerequisites, examination and permission.

- Private Instruction: Piano (2-3, max. 9) AWSP
   GEISSMAR, HOKANSON, MOORE, O'DOAN, SIKI
- 341 Private Instruction: Violin-Viola (2-3, max. 9) AWSp MC INNES, SOKOL
- 342 Private Instruction: Voice (2-3, max. 9) AWSp CURTIS-VERNA, HARRIS, LISHNER, MESLER
- 343 Private Instruction: Violoncello (2-3, max. 9) AWSp HEINITZ
- 344 Private Instruction: Double Bass (2-3, max. 9) AWSp WARNER

- 345 Private Instruction: Organ (2-3, max. 9) AWSp EICHINGER
- 346 Private Instruction: Flute (2-3, max. 9) AWSp SKOWRONEK, WELKE
- 347 Private Instruction: Oboe (2-3, max. 9) AWSp STORCH
- 348 Private Instruction: Clarinet (2-3, max. 9) AWSp MC COLL, WELKE
- 349 Private Instruction: Bassoon (2-3, max. 9) AWSp GROSSMAN
- 350 Private Instruction: Saxophone (2-3, max. 9) AWSp BRAZIL
- 351 Private Instruction: Horn (2-3, max. 9) AWSp LEUBA, WELKE
- 352 Private Instruction: Trumpet (2-3, max. 9) AWSp CUMMINGS, WELKE
- 353 Private Instruction: Trombone (2-3, max. 9) AWSp DEMPSTER
- 354 Private Instruction: Tuba (2-3, max. 9) AWSp RUSSELL
- 355 Private Instruction: Harp (2-3, max. 9) AWSp VOKOLEK
- 356 Private Instruction: Percussion (2-3, max. 9) AWSp SHRADER
- 357 Private Instruction: Harpsichord (2-3, max. 9) AWSp KIND
- 358 Private Instruction: Viola da gamba (2-3, max. 9) AWSp HEINITZ
- 359 Private Instruction: Non-Western Instruments (2-3, max. 9) AWSp

Courses 360 through 378 are for music majors specializing in performance.

- 360 Private Instruction: Piano (3-4, max. 12) AWSp GEISSMAR, HOKANSON, MOORE, O'DOAN. SIKI
- 361 Private Instruction: Violin-Viola (3-4, max. 12) AWSp MC INNES, SOKOL
- 362 Private Instruction: Voice (3-4, max. 12) AWSp CURTIS-VERNA, HARRIS, LISHNER, MESLER
- 363 Private Instruction: Violoncello (3-4, max. 12) AWSp HEINITZ
- 364 Private Instruction: Double Bass (3-4, max. 12) AWSp WARNER
- 365 Private Instruction: Organ (3-4, max. 12) AWSp BICHINGER

- 366 Private Instruction: Flute (3-4, max. 12) AWSp SKOWRONEK, WELKE
- 367 Private Instruction: Oboe (3-4, max. 12) AWSp STORCH
- 368 Private Instruction: Clarinet (3-4, max. 12) AWSp MC COLL, WELKE '
- 369 Private Instruction: Bassoon (3-4, max. 12) AWSp OROSSMAN
- 370 Private Instruction: Saxophone (3-4, max. 12) AWSp BRAZIL
- 371 Private Instruction: Horn (3-4, max 12) AWSp LEUBA, WELKE
- 372 Private Instruction: Trumpet (3-4, max. 12) AWSp CUMMINGS, WELKE
- 373 Private Instruction: Trombone (3-4, max. 12) AWSp DEMPSTER
- 374 Private Instruction: Tuba (3-4, max. 12) AWSp RUSSELL
- 375 Private Instruction: Harp (3-4, max. 12) AWSp VOKOLEK
- 376 Private Instruction: Percussion (3-4, max. 12) AWSp SHRADER
- 377 Private Instruction: Harpsichord (3-4, max. 12) AWSp KIND
- 378 Private Instruction: Viola da gamba (3-4, max. 12) AWSp HEINITZ

Courses 440 through 459 are private instruction primarily for majors not specializing in performance. Also available to qualified nonmajors. Prerequisites, examination and permission.

- 440 Private Instruction: Piano (2-3, max. 18) AWSp GEISSMAR, HOKANSON, MOORE, O'DOAN, SIKI
- 441 Private Instruction: Violin-Viola (2-3, max. 18) AWSp MC INNIS, SOKOL
- 442 Private Instruction: Voice (2-3, max. 18) AWSp CURTIS-VERNA, HARRIS, LISHNER, MESLER
- 443 Private Instruction: Violoncello (2-3, max. 18) AWSp HEINITZ
- 444 Private Instruction: Double Bass (2-3. max. 18) AWSp WARNER
- 445 Private Instruction: Organ (2-3. max. 18) AWSp BICHINGER

- 446 Private Instruction: Flute (2-3, max. 18) AWSp SKOWRONEK, WELKE
- 447 Private Instruction: Oboe (2-3, max. 18) AWSp STORCH
- 448 Private Instruction: Clarinet (2-3, max. 18) AWSp MC COLL, WELKE
- 449 Private Instruction: Bassoon (2-3, max. 18) AWSp GROSSMAN
- 450 Private Instruction: Saxophone (2-3, max. 18) AWSp
   BRAZIL
- 451 Private Instruction: Horn (2-3, max. 18) AWSp LEUBA, WELKE
- 452 Private Instruction: Trumpet (2-3, max. 18) AWSp CUMMINGS, WELKE
- 453 Private Instruction: Trombone (2-3, max. 18) AWSp DEMPSTER
- 454 Private Instruction: Tuba (2-3, max. 18) AWSp RUSSELL
- 455 Private Instruction: Harp (2-3, max. 18) AWSp VOKOLEK
- 456 Private Instruction: Percussion (2-3, max. 18) AWSp SHRADER
- 457 Private Instruction: Harpsichord (2-3, max. 18) AWSp KIND
- 458 Private Instruction: Viola da gamba (2-3, max. 18) AWSp HEINITZ
- 459 Private Instruction: Non-Western Instruments (2-3, max. 18) AWSp

Courses 460 through 478 are for music majors specializing in performance.

- 460 Private Instruction: Piano (3-4, max. 18) AWSp geissmar, hokanson, moore, o'doan, siki
- 461 Private Instruction: Violin-Viola (3-4, max. 18) AWSp
   MC INNES, SOKOL
- 462 Private Instruction: Voice (3-4, max 18) AWSp CURTIS-VERNA, HARRIS, LISHNER, MESLER
- 463 Private Instruction: Violoncello (3-4, max. 18) AWSp
   HEINITZ
- 464 Private Instruction: Double Bass (3-4, max. 18) AWSp WARNER
- 465 Private Instruction Organ (3-4, max. 18) AWSp EICHINGER

- 466 Private Instruction: Flute (3-4, max. 18) AWSp SKOWRONEK, WELKE
- 467 Private Instruction: Oboe (3-4, max. 18) AWSp STORCH
- 468 Private Instruction: Clarinet (3-4, max. 18) AWSp MC COLL, WELKE
- 469 Private Instruction: Bassoon (3-4, max. 18) AWSp gROSSMAN
- 470 Private Instruction: Saxophone (3-4, max. 18) AWSp BRAZIL
- 471 Private Instruction: Horn (3-4, max. 18) AWSp LEUBA, WELKE
- 472 Private Instruction: Trumpet (3-4, max. 18) AWSp CUMMINGS, WELKE
- 473 Private Instruction: Trombone (3-4, max. 18) AWSp DEMPSTER
- 474 Private Instruction: Tuba (3-4, max. 18) AWSp RUSSELL
- 475 Private Instruction: Harp (3-4, max. 18) AWSp VOKOLEK
- 476 Private Instruction: Percussion (3-4, max. 18) AWSp SHRADER
- 477 Private Instruction: Harpsichord (3-4, max. 18) AWSp KIND
- 478 Private Instruction: Viola da gamba (3-4, max. 18) AWSp HEINITZ

## **Courses for Graduates Only**

Courses 560 through 578 are for graduate performance majors.

- 560 Private Instruction: Piano (3, max. 27) AWSp GEISSMAR, HOKANSON, MOORE, O'DOAN, SIKI
- 561 Private Instruction: Violin-Viola (3, max. 27) AWSp MC INNES, SOKOL
- 562 Private Instruction: Voice (3, max. 27) AWSp
- CURTIS-VERNA, HARRIS, LISHNER, MESSLER 563 Private Instruction: Violoncello (3,
- max. 27) AWSp HEINITZ
- 564 Private Instruction: Double Bass (3, max. 27) AWSp WARNER
- 565 Private Instruction: Organ (3, max. 27) AWSp EICHINGER
- 566 Private Instruction: Flute (3, max. 27) AWSp SKOWRONEK, WELKE

- 567 Private Instruction: Oboe (3, max. 27) AWSp STORCH
- 568 Private Instruction: Clarinet (3, max. 27) AWSp MC COLL, WELKB
- 569 Private Instruction: Bassoon (3, max. 27)AWSp GROSSMAN
- 570 Private Instruction: Saxophone (3, max. 27) AWSp BRAZIL
- 571 Private Instruction: Horn (3, max. 27) AWSp LEUBA, WELKE
- 572 Private Instruction: Trumpet (3max. 27) AWSp CUMMINGS, WELKE
- 573 Private Instruction: Trombone (3. max. 27) AWSp DEMPSTER
- 574 Private Instruction: Tuba (3, max. 27) AWSp RUSSELL
- 575 Private Instruction: Harp (3, max. 27) AWSp VOKOLEK
- 576 Private Instruction: Percussion (3, max. 27) AWSp SHRADER
- 577 Private Instruction: Harpsichord (3, max. 27) AWSp KIND
- 578 Private Instruction: Viola da gamba (3, max. 27) AWSp HEINITZ

## NEAR EASTERN LANGUAGES AND LITERATURE

**Courses for Undergraduates** 

ARABIC

101-102, 103 Elementary Arabic (5-5,5) A,W,Sp HEBR

101-102: an intensive study of grammar, with oral and written drill, and reading of simple texts; 103: reading of selected texts in literary Arabic.

201, 202, 203 Intermediate Arabic (5,5,5) A,W,Sp

ZIADEH

Reading of selected texts in literary Arabic, with continuing emphasis on grammar and syntax. Prerequisites, 103 for 201; 201 for 202; 202 for 203.

401 Adab Prose: Jähiz (3) A

HEER, MAC KAY, ZIADÉH Readings in early Arabic prose, especially the writings of Jähiz. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1973-74.)

402 Maqämät (Assemblies): Hamadhäni, Hariri (3) W

MAC KAY, ZIADEH

Reading of several maqāmāt (essays in rhymed prose) of al-Hamadhānī and al-Harīrī. Examination of the maqāmāt genre as a whole. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1973-74.)

## ARTS AND SCIENCES

## 403 Historians: Tabarī (3) Sp HEER, MACKAY, ZIADEH

Readings in Arab historians with particular reference to al-Tabarī and his school of historical writing. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1973-74.)

#### Qur'an and Tafsir (3) A 404

ZIADEH

Reading of various sections from the Qur'an with the relevant exegetical writings on religious, philological, and grammatical points. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1972-73.)

### 405 Hadith and Law (3) W ZIADEH

Selected readings from the traditions (hadith) of Muhammad, and from works on jurisprudence and law based on the holy texts. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1972-73.)

### 406 Islamic Political Theorists (3) Sp ZIADEH

Readings from the main political theorists: al-Baghdādī, al-Māwardī, and Ibn Khaldun. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1972-73.)

#### 411 **Desert Poetry: Pre-Islamic and**

Umayyad (3) A

MAC KAY, ZIADEH Reading and analysis of selected poems from pre-Islamic and Umayyad times. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1972-73.)

## 412 Urban Poetry: The New 'Abbäsid Poetry (3) W

HEER, MAC KAY, ZIADEH

Reading of the new poetry of the 'Abbāsid period and studying of the social and political factors that gave rise to it; Mutanabbī and Ma'arrī. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1972-73.)

## 413 Modern Poetry (3) Sp

HEER, ZIADEH

Study of the neoclassical poetry of the nineteenth and twentieth centuries, and the devel-opment of modern verse. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1972-73.)

### 414 Islamic Philosophical Literature (3) A HEER

Reading of selected texts on logic, physics, psychology, metaphysics, prophecy, and ethics by representative Islamic philosophers. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1973-74.)

## 415 Islamic Theological and Mystical Literature (3) W

HEER

Reading of selected prose texts representative of the various Islamic theological and mystical schools of thought. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1973-74.)

## 416 Modern Prose (3) Sp

HEER, ZIADEH

Selections from modern essays, fiction, and ideological writings. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1973-74.)

#### 490 Supervised Study (1-6, max. 18) AWSp HEER, MAC KAY, ZIADEH

Special work in literary texts for graduates and undergraduates. Prerequisite, 203 or equivalent.

## 499 Undergraduate Research (1-6, max. 18) AWSD

## HEBREW

1972-73.)

101-102, 103 Elementary Hebrew (5-5,5) A,W,Sp

PODET Introduction to Hebrew, emphasizing elements of grammar and reading of various styles found in the Hebrew Bible, post-Biblical and modern works, with some oral practice.

## 201, 202, 203 Intermediate Hebrew (5,5,5) A,W,Sp

PODET Selections from Biblical prose, Rabbinical texts, medieval and modern prose and poetry with some oral practice. Prerequisites, 103 for 201; 201 for 202; 202 for 203.

## 401, 402, 403 Hebrew Prophecy (3,3,3) A,W,Sp

411, 412, 413 Classical Hebrew Poetry

(3,3,3) A,W,Sp

CLEAR

## CLEAR Readings in the Hebrew prophets. Prerequi-

sites, 203 or permission for 401; 401 for 402;

402 for 403. (Offered alternate years; offered

Readings in classical Hebrew poetry: Psalms

and Wisdom literature. Prerequisites, 203 or

permission for 411; 411 for 412; 412 for 413.

(Offered alternate years; offered 1973-74.) **Advanced Post-Biblical Hebrew:** 421 Aggadic Narrative (3) A PODET Advanced readings in the Hebrew medieval narrative, concentrating on the Aggadic lit-

erature of the Midrash and Talmud. Oral practice will be included. Prerequisite, 203 or equivalent.

#### **Advanced Post-Biblical Hebrew:** 422 Narrative of the Haskala (3) W PODET

Advanced readings in the narrative of the Haskala, leading into the modern period. Oral practice will be included. Prerequisite, 203 or equivalent.

#### **Advanced Post-Biblical Hebrew:** 423 Modern Narrative (3) Sp PODET

Advanced readings in modern Hebrew narrative, with emphasis on the short narratives of Chaim Nahman Bialik. Oral practice will be included. Prerequisite, 203 or equivalent.

#### **Canaanite and Hebrew Inscriptions** 431 (3) Sp CLEAR

Readings in the Canaanite (Phoenician) and Hebrew inscriptions in facsimile. Studies of the development of the Canaanite script and dialects. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1972-73.)

### 441, 442, 443 Septuagint Studies (3,3,3) A,W,Sp (offered on request) CLEAR

Textual studies in the Greek version of the Bible in comparison with the Hebrew. Prerequisites, ability to read Greek and Hebrew for 441; 441 for 442; 442 for 443.

## 451, 452, 453 Classical Hebrew Liturgy: Siddir, Mahzör, Haggädäh (3,3,3) A,W,Sp PODET

Reading of the classical liturgy, including a

study of its development and changes. Reforms and modern variations in the liturgy. Prerequisites, 203 or permission for 451; 451 for 452; 452 for 453. (Offered alternate years; offered 1972-73.)

## 481, 482, 483 Readings in Torah, Nakh, and the Dead Sea Scrolls (3,3,3) A,W,Sp

## PODET

This course will use comparisons of selections to expose the advanced student to vari-ous styles of Biblical literature as well as material from the Dead Sea Scrolls relevant to the Bible. Form analysis. Lower and higher critical theories. The growth of the epic and the various styes of Biblical literatures. Prerequisites, 203 or permission for 481; 481 for 482; 482 for 483. (Offered alternate years; offered 1973-74.)

490 Supervised Study (1-6, max. 18) AWSp Special work in literary texts for graduates and undergraduates. Prerequisite, 203 or equivalent.

499 Undergraduate Research (1-6, max. 18) AWSD

## AKKADIAN

## 401, 402, 403 Elementary Akkadian (3,3,3) A,W,Sp

CLEAR

Introduction to the Akkadian language (Assyrian and Babylonian). Graded readings in Latin characters from historical, legal, and literary texts. Prerequisites, Hebrew or Arabic 203 or equivalent for 401; 401 for 402; 402 for 403. (Offered every third year; offered 1974-75.)

## 421, 422, 423 Intermediate Akkadian (3,3,3) A,W,Sp CLEAR

Readings in Akkadian Gilgamesh and Creation epics, historical descriptions. Introduction to the cuneiform script. Prerequisites, 403 for 421; 421 for 422; 422 for 423. (Offered every third year; offered 1972-73.)

## ARAMAIC

## 401 Biblical Aramaic (3) A

CLEAR

Introduction to Biblical Aramaic (Ezra, Daniel). Selections from Targumim. Prerequisite, Hebrew 203 or equivalent. (Offered alternate years; offered 1973-74.)

## 411 Aramaic Epigraphy (3) Sp

CLEAR Readings in the Aramaic Inscriptions and the Elephantine Papyri. Prerequisite, Hebrew 203 or equivalent. (Offered alternate years; offered 1973-74.)

## UGARITIC

401, 402, 403 Ugaritic Language and Literature (3,3,3) A,W,Sp CLEAR

Readings in the Ugaritic texts from Ras Shamra, Epic, Mythological, and other texts. Prerequisite, intermediate knowledge of a cognate language (Akkadian, Arabic, Aramaic, Hebrew). (Offered every third year; offered 1973-74.)

## PERSIAN

## 101-102, 103 Elementary Persian (5-5,5) A,W,Sp

LORAINE

Beginning course in pronunciation, conversation, grammar, and graded reading.

## 201, 202, 203 Intermediate Persian (5,5,5) A,W,Sp

Introduction to Persian literature, with continuing emphasis on grammar and syntax. Prerequisites, 103 for 201; 201 for 202; 202 for 203.

## 401 Sa'dī (3) A

LORAINE

Selected readings from the Gulistān, Bustān, and Dīwān, which represent a high point in classical Persian verse and prose and give great insight into Persian manners and ways of thought. Prosody will be taught, using the numerous short verses in various metres in the Gulistān as models. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1973-74.)

## 402 Lyric Poetry (3) W

LORAINE

Selections from various authors, chiefly up to Hāfiz. This course will introduce examples of the *ghazal*, mainly as an important literary type; it also will give an outline of the development of the type and will introduce the chief writers of it in the context of literary history. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1973-74.)

### 403 Firdawsi (3) Sp LORAINE

Selected readings from the *Shahnāma*. The course will introduce the particular style and vocabulary of the epic and will illustrate the legendary careers of certain well-known heroes. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1973-74.)

## 411 Siyāsat-nāma (3) A

LORAINE

The "Book of Government" of Nizām al-Mulk draws on the full range of traditional Persian wisdom and thus links itself to the  $Q\bar{a}busn\bar{a}ma$  and the works of Sa'dī. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1972-73.)

## 412 Rumi (3) W

LORAINE

Selected readings from the Mathnawi and poems from the Diwān-i Shams-i Tabriz. Students will be introduced to Rumi's unique style of anecdoe, illustration, and didactic. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1972-73.)

## 413 Häfiz (3) Sp

LORAINE Selected poems from the *Dīwān*. Prerequisite, 203 or equivalent. (Offered alternate years; offered 1972-73.)

**490** Supervised Study (1-6, max. 18) AWSp Special work in literary texts for graduates and undergraduates. Prerequisite, 203 or equivalent.

## 499 Undergraduate Research (1-6, max. 18) AWSp

### TURKISH

### 101-102, 103 Elementary Turkish (5-5,5) A,W,Sp

ANDREWS

Introduction to modern Turkish. Pronunciation and conversation, grammar and composition, graded reading. Latin characters used throughout.

## 201, 202, 203 Intermediate Turkish (5,5,5) A,W,Sp

ANDREWS

Introduction to modern Turkish literature. Prerequisites, 103 for 201; 201 for 202; 202 for 203.

### 400 Introduction to Ottoman Turkish (3) A ANDREWS

Introduction to Turkish in Arabic characters to cover the peculiar grammatical and syntactical problems of Ottoman. Prerequisite, 203, Arabic 103 or Persian 103.

### 401 Tanzimat Poetry and Prose (3) A ANDREWS

Readings from the poetry and prose of the Tanzimat period. Prerequisite, 400 or permission. (Offered alternate years; offered 1973-74.)

## 402 Early Ottoman Historians (3) W ANDREWS

Readings in the early *Tevarih-i Al-i Osman*. Prerequisite, 400. (Offered alternate years; offered 1973-74.)

## 403 Ottoman Travelers and Geography (3) Sp

### MC KAY

Introduction to the geographic literature of Ottoman Turkish: readings from traditional cosmographies, travel journals, sailing instructions (portulans), ambassadorial and secret service reports, etc. Prerequisite, 400. (Offered alternate years; offered 1973-74.)

## 411 Classical Ottoman Historians (3) A ANDREWS

Readings in the high classical narrative histories of Kemal Pasazade, Hoca Sa'duddin and other sixteenth- and seventeenth-century historians. Prerequisite, 400. (Offered alternate years; offered 1972-73.)

## 412 Ottoman Lyric Poetry (3) W

ANDREWS

Introduction to classical Ottoman poetry, including rhyme, meter, and rhetoric, through readings in Ottoman lyrics. Prerequisite, 400. (Offered alternate years; offered 1972-73.)

## 413 Ottoman Epic and Narrative Poetry (3) Sp

ANDREWS

Readings in major Ottoman epic and narrative poetry. Prerequisite, 400. (Offered alternate years; offered 1972-73.)

### 490 Supervised Study (1-6, max. 18) AWSp ANDREWS

Special work in literary texts for graduates and undergraduates. Prerequisite, 203 or equivalent.

## 499 Undergraduate Research (1-6, max. 18) AWSp

## NEAR EASTERN COURSES IN ENGLISH

## 210 Introduction to Islamic Civilization

and Culture (5) A ANDREWS, CLEAR, HEER, LORAINE, MACKAY, ZIADEH

Background and foundations of Islam; development of Islamic culture, with emphasis on the intellectual, literary, aesthetic, and associative aspects; the impact of the West and resulting modern problems.

### 220 Ancient Near Eastern Culture (5) W CLEAR

Ancient Near Eastern civilizations, with emphasis on the culture and civilization of the Northwest Semites.

### 420 Islamic Religious Literature in English (3) HEER

Readings in Islamic theology and mysticism.

## 422 Islamic Philosophical and Scientific Literature in English (3) HEER

Readings in philosophy, the physical sciences, and medicine.

## 430 Classical Islamic Institutions in English (3)

ZIADEH

Readings concerning Islam's principal political, administrative, religious, and educational institutions.

### 432 Islamic Literature on Jurisprudence and Law in English (3) ZIADEH

The origins of the *shari'ah*, its development throughout the Islamic period, and the modern reform of this law.

## 434 Islamic Literary Genres in English (5) ANDREWS, LORAINE, ZIADEH

Literary genres; literary theory; principal literary authors of Arabic, of Persian, and of Turkish and their works. From the beginnings to the modern period.

## 450 The City of Cairo: History, Topography, and Monuments (3)

MAC KAY

Survey of the physical development and the economic and social organization of an Islamic city, as exemplified in the history of Cairo from the first establishment at Fustat to the present day. Consideration of the major styles of Islamic architecture, as represented in existing monuments of Cairo.

# 451 City of Istanbul: History, Topography, and Monuments (3)

MAC KAY

Survey of the physical development and the economic and social organization of Istanbul from the first foundation at Byzantium to the present day. Consideration of principal monuments, both Byzantine and Islamic.

**490** Supervised Study (1-6, max. 18) AWSp Special work in Near Eastern Studies for graduates and undergraduates.

499 Undergraduate Research (1-6, max. 18) AWSp

# Courses for Graduates Only

## ARABIC

471, 472, 473 Arabic as a Second Near Eastern Language (3,3,3) A,W,Sp HEER

Designed for graduate students with some proficiency in a Near Eastern language who plan to embark upon a second Near Eastern language, Arabic. The student will be expected to participate fully in the elementary Arabic course; however, his work, wherever possible, will be supervised by his major language instructor who, in consultation with the instructor of elementary Arabic, will assign supplementary work designed to accelerate the student's ability to use Arabic in conjunction with his major language. The major language instructor will also participate in determining a grade for the course. Prerequisites, above-elementary knowledge of one Near Eastern language (not Arabic), permission of major language instructor, and graduate standing.

600 Independent Study or Research (\*) AWSp

## HEBREW

471, 472, 473 Hebrew as a Second Near Eastern Language (3,3,3) A,W,Sp PODET

Designed for graduate students embarking upon the study of Hebrew as their second Near Eastern language, this series is organized in the same manner as Arabic 471, 472, and 473, and the prerequisites are analogous.

NEAR EAST

- 520 Seminar on Near Eastern Civilization and Thought (3, max. 27)
- 530 Seminar on Near Eastern Literature (3, max. 27)

Prerequisite, reading knwoledge of Arabic, Persian, or Turkish.

600 Independent Study or Research (\*) AWSp

## 700 Master's Thesis (\*) AWSp

## PERSIAN

471, 472, 473 Persian as a Second Near Eastern Language (3,3,3) A,W,Sp LOBAINE

Designed for graduate students embarking upon the study of Persian as their second Near Eastern language, this series is organized in the same manner as Arabic 471, 472, and 473, and the prerequisites are analogous.

## 600 Independent Study or Research (\*) AWSp

## TURKISH

### 471, 472, 473 Turkish as a Second Near Eastern Language (3,3,3) A,W,Sp ANDREWS

Designed for graduate students embarking upon the study of Turkish as their second Near Eastern language, this series is organized in the same manner as Arabic 471, 472, and 473, and the prerequisites are analogous.

## 600 Independent Study or Research (\*) AWSp

## **OCEANOGRAPHY**

## **Courses for Undergraduates**

101 Survey of Oceanography (5) AWSpS 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.

## 102 Man and the Ocean (3) A

Designed to study in more detail the benefits and the scientific problems created by man's activities' impinging on the oceanic environment. Topics include the problems of, and potential for, the extraction of food, fresh water, inorganic minerals, gas, and oil from sea water or the sea floor; the ocean as a sink for such wastes as heavy metals, pesticides, radioactive materials, gases, etc. Prerequisite, 101 or permission.

## 109H Survey of Oceanography—Honors (5) Sp

ENGLISH

Origin and extent of the oceans; nature of the sea bottom; causes and effects of currents,

waves, and tides; animal and plant life in the sea. Not intended for oceanography majors. Prerequisites, College of Arts and Sciences Honors Program and permission.

## 110, 111, 112 Lectures in Oceanography (1,1,1) A,W,Sp

Lectures intended for oceanography majors. Students who might major in oceanography can learn more about the field. May be entered any quarter.

### 180H Lower-Division Tutorial-Honors (6) S

Research with a departmental program. Prerequisites, College of Arts and Sciences Honors Program and permission.

## 203 Introduction to Oceanography (5) Sp

A description of the oceans and their relation to man; physical, chemical, biological, and geological aspects of the sea; areal distribution and seasonal cycles of properties; currents; factors affecting populations. Intended for science majors. Prerequisite, sophomore standing in a science curriculum, or permission.

## 280H Introduction to Oceanography— Honors (5) Sp

Descriptive and regional oceanography covering the physical, chemical, biological, and geological aspects of the sea. Intended for science majors. Prerequisites, sophomore standing in College of Arts and Sciences Honors Program and permission.

## 360 Methods and Instruments in Oceanography (3) Sp LISTER, MARTIN

The oceanographic environment: design and maintenance requirements for shipboard and for overside equipment. Modern sensing tech-

for overside equipment. Modern sensing techniques and sampling considerations, the fundamentals of popular telemetry and recording methods; navigation. Calibration and stability of instruments; the effects of pressure and soft water; unattended instrument platforms. Prerequisite, 402 or 418.

## 380H Upper-Division Tutorial—Honors (6) S

Research under faculty supervision. Prerequisites, junior standing in College of Arts and Sciences Honors Program and permission.

## 385 The Oceans I (10) S

Application of basic scientific principles to water on the surface of the earth. Institute for high school teachers. Open to selected participants only. Held at Skagit Valley College. (Subject to annual N.S.F. approval.)

### 386 The Oceans II (10) S

Application of basic scientific principles to the solid earth and its atmosphere. Sequential institute for high school teachers. Open to selected participants only. Prerequisite, 385. Held at Skagit Valley College. (Subject to annual N.S.F. approval.)

## 388 Oceanography for Science Teachers

## (5) S DUXBURY, FLEMING

A survey of marine science for secondary

school teachers. Emphasis on material that can be adapted for use in the high school. Prerequisites, 20 credits in natural sciences and permission.

## 401, 402 General Physical Oceanography I, II (5,5) A,W

AAGAARD, BARNES, COACHMAN, LARSEN Physical properties and processes; theories and methods involved in ocean currents, waves, and tides. Not open to physical oceanography majors. Prerequisites, for 401, one year of chemistry, one year of physics, Mathematics 126; 401 for 402.

## 403 General Biological Oceanography (5) W KACZYNSKI

Organisms of the sea; quantitative distribution; interrelationships of organisms; influence of environment; methods of sampling. Intended for oceanography majors (other than those in the biological option) and students in related fields. Prerequisite, 203 or 401 or 417, or permission.

## 405 General Geological Oceanography (5) Sp CREAGER, MC MANUS, MERRILL

Shorelines and nearshore sedimentation; structure and morphology of the continental terrace and deep-sea floor; sediment types and distribution; marine geological methods and applications. Not open to majors in geological oceanography. Prerequisites, 402 or 419 (or concurrent registration), Geological Sciences 205.

## 406 Introduction to Geological Oceanography (5) A

Coastal processes and shoreline development; topography and sediment distribution on the continental terrace and deep-sea floor; geology and geophysics of mid-ocean ridges. Intended for oceanography majors (other than those in the geological option) and students in related fields. Prerequisite, permission.

## 415 Fundamentals of Underwater Acoustics (3) A SANDS

Vibrating strings, bars, and membranes; plane and spherical acoustic waves; transmission and reflection at boundaries. Prerequisites, 402 or 418, Mathematics 126 or 136H, or permission.

## 416 Applications of Underwater Acoustics (2) W

SANDS

Transducers and arrays, absorption and refraction in sea water, sound channels and bottom effects, ambient noise, scattering, passive and active tracking, acoustic telemetering. Prerequisite, 415.

## 417, 418 Physical Oceanography I, II (5.5) A.W

AAGAARD, BARNES, COACHMAN, SMITH Geographic and hydrodynamic aspects of oceanography. Topics: physical properties of sea-water; observed distributions of properties and currents; budgets; kinematics; hydrostatics; momentum dynamics of ocean circulation; vorticity dynamics; viscosity; Ekman's studies; eddy fluxes; estuaries. Prerequisites for 417: Mathematics 427, which may be taken concurrently, Physics 223, Chemistry 160, or permission; for 418: 417 and Mathematics 428, which may be taken concurrently.

### 419 Ocean Tides and Waves (5) Sp LARSEN, MARTIN, SMITH

Theory of surface waves; wave forecasting, transformation of waves in shallow water, wave forces. Tide Theory: analysis and prediction of tides and tidal currents. The course includes laboratory and computer simulation. Prerequisite, 418 or permission.

## 421 Chemical Oceanography (3) A,W

CARPENTER, HEALY, RICHARDS Physical and chemical properties of sea water and marine products; processes determining the chemical make-up of the oceans. Prerequisite, 401 or 417 (or concurrent registration in one).

## 422 Theoretical Chemical Oceanography (2) W

HEALY, RICHARDS

Physical-chemical aspects of high-ionicstrength solutions as related to seawater. Kinetics, thermodynamics, and heterogenous equilibria are included. Prerequisites, 421 and, Chemistry 350, 351, or permission.

## 423, 424 Chemical Oceanography Laboratory (2,2) AWSp,W

HEALY, PIPER, RICHARDS

Laboratory problems in the analytical and physical chemistry of sea water and marine materials. Prerequisites for 423; 421, Chemistry 221; for 424; 422 and 423, 423 and 424 may be taken concurrently with 421 and 422, respectively.

## 433 Biological Oceanography: Organisms and Processes (3) W

FROST, LEWIN

Marine organisms with emphasis on bacteria, the microscopic plants, the protozoa, and smaller animals; biological processes affecting the sea. Recommended for non-biologists. Prerequisites, 401 or 417 and Biology 101-102, or permission.

## 434 Biological Oceanography: Organisms and Environments (3) W

FROST, LEWIN

Organisms of the plankton, nekton, and benthos; their adaptations to ocean environments and their relationships to each other. Prerequisites, 401 or 417, and 20 credits in biological sciences, or permission.

### 435 Biological Oceanography: Quantitative Aspects (3) Sp BANSE

Quantitative distribution in time and space of pelagic and bottom organisms in the open ocean and on the shelf; rates of processes. Prerequisite, 433 or 434, or permission.

### 443 Regional Oceanography (3) Sp FLEMING

Application of modern methods to the comprehensive description of selected areas of the oceans. Prerequisite, advanced senior standing.

## 444 Design and Analysis of Oceanographic Experiments (3) A

KELLEY

Planning of field and laboratory experiments in oceanography; evaluation and processing of oceanographic data. Prerequisite, Quantitative Science 281 or permission.

## 450 Geological Oceanography (5) A

Shore processes; structure and morphology of the continental terrace and deep-sea floor; marine sedimentary deposits and stratigraphy; geological history of ocean basins and sea water. Prerequisites, major in geological oceanography or Geological Sciences 401- or 417 (or concurrent registration), or permission.

# 451 Geochemistry of Marine Sediments (2)

Study of chemical aspects of the more abundant minerals in marine sediments; their origin or mode of formation; their isotopic and chemical composition; their rate of deposition; their distribution and relative importance in the major sedimentary cycle; their influence on the chemical composition of sea water. Prerequisite, one year of general chemistry.

## 452 Physical Sedimentology (3) Sp SMITH

An introduction to theoretical and experimental techniques used in studying erosion, transportation, and deposition of sediment. Analysis of sediment samples, initial motion of sediments, bed-load motion, suspension of sediment by turbulent flows, erosion and deposition of sediment by turbulent flows, mass movement of sediments, and applications of sediment transport theory to problems of geological interest. Prerequisite, 402 or permission.

## 453 Sedimentary History of the Ocean Basin (2) Sp

Synthesis of introduction to chemical, physical, and biological processes of sedimentation and to marine geophysics, in terms of the historical record of sediments and the geological development of the ocean basins. Prerequisites, 450, 451, 452, or concurrent registration in same.

## 454 Biogenic Sediments I (3) A

ECHOLS

Ecology and systematics of plant and animal groups contributing to Neogene marine sediments. Emphasis on microfossils. Prerequisites, 433 or 434, and 435, 450 or Geological Sciences 321 or 430, or permission.

# 455 Biogenic Sediments II (3) W

Survey of silicate microorganisms and microfossils with emphasis on their geological and geographical occurrences and their application to deep-sea stratigraphy. Prerequisite, 454 or permission.

### 456 Acoustic and Seismic Techniques (2) W BENNETT

Acoustic data-taking techniques; analysis and interpretation of acoustic bathymetry and seismic reflection and refraction data. Prerequisite, 415 or permission.

## 457 Marine Sedimentation (3) Sp

STERNBERG

Origin, transportation, and deposition of marine sediments; marine sedimentary environments; physical aspects of marine sedimentary processes. Prerequisite, 452 or permission.

## 458 Chemical Aspects of Marine Sediments (3) W

CARPENTER

A survey of minerals in marine sediments: their origin or mode of formation, their isotopic and chemical composition, their rate of deposition, their chemical alteration after deposition, their distribution and relative importance in the major sedimentary cycle. Prerequisite, Chemistry 160.

## 460-461 Field Experience in Oceanography (1)-(1-5) AWSpS, AWSpS

Work ashore and on research vessels; design of experiments; cruise planning; chemical, physical, biological, geological, and geophysical analyses; preparation of reports. One or more cruises may be required. One credit for 460- and one credit for -461 are given for the cruise; additional credits in -461 can be earned by arrangement. Prerequisites, permission.

## 462 Applications of Oceanography (2) W FLEMING

Analysis of special cases involving application

of oceanography to practical problems. Prerequisite, a physical or biological science major or permission.

# .480H Undergraduate Research—Honors (6)

Independent research. Prerequisites, 180H or 380H, and permission.

### 485 Topics in Oceanography (2) A

A series of weekly lectures on oceanographic topics, including physical and chemical properties of water, motions, life in the sea, geological features, data collection and analysis, etc. For nonmajors. Prerequisite, upper-division standing in science.

## 488H Field Experience—Honors (2-6, max. 6) AWSp

Participation in extended oceanographic field operations on a research vessel; data analysis and reduction, report preparation. Prerequisites, 380H or 480H, and permission.

## 489H Undergraduate Thesis-Honors

### (1-6, max. 6) AWSp A theoretical or experimental contribution to oceanography. Prerequisites, 480H and permission.

## 499 Undergraduate Research (1-3, max. 6) AWSp

Research on assigned topics which may involve laboratory work, field work, or literature surveys. Prerequisite, permission.

## **Courses for Graduates Only**

## 505 Current Problems in Geological Oceanography (1)

Discussion of research topics which are currently being investigated within the Department. Prerequisite, permission.

## 511, 512, 513 Marine Hydrodynamics I, II, III (4,4,4) A,W,Sp

CRIMINALE, LARSEN, RATTRAY

Methods for solving problems in physical oceanography. Prerequisite, a major in a physical science.

## 514 Seminar in Physical Oceanography (1, max. 9) AWSp

Discussion of selected problems of current interest in physical oceanography. Prerequisites, 402 or 419, and permission.

## 515 Waves (4) A

## LARSEN

Application of marine hydrodynamics principles to wave motion in oceans. Prerequisite, 513. (Offered only in even-numbered years.)

## 516 Ocean Circulation (2) W

## ARONS, RATTRAY

Hydrodynamic theories concerning origin and characteristics of major ocean currents. Prerequisite, 513. (Offered only in even-numbered years.)

## 517 Oceanography of Inshore Waters (5) Sp BARNES, RATTRAY

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, 512. (Offered only in odd-numbered years.)

## 518 Seminar in Dynamical Oceanography (1; max. 9) AWSp

Selected problems of current importance con-

cerning the dynamics of the ocean. Concentrates on those topics which are considered fundamental, of central importance to most of the areas of applications.

### 519 Interaction of the Sea and Atmosphere (5) Sp CRIMINALE

Interchange of heat, water, and energy; study of budgets and of mechanisms of exchange: Prerequisites, 418, Atmospheric Sciences 462. (Offered only in even-numbered years.)

## 520 Seminar (0) AWSp

## 521 Seminar in Chemical Oceanography (\*, max. 9) AWSp

Lectures, discussions, and readings on selected problems of current interest. Prerequisite, permission.

## 523 Advanced Problems in Chemical

Oceanography (1-4, max. 18) AWSp Field and laboratory work on selected problems of current interest. Prerequisites, 424 and permission.

## 530 Marine Primary Productivity (3) Sp ANDERSON

General concepts of marine phytoplankton production; laboratory and field studies; critical examination of special problems. Not open to students who have taken 534. Prerequisites, 433 or 434, and 435, and permission.

## 531 Seminar in Biological Oceanography (\*, max. 9) AWSp

Lectures, discussions, and work on selected problems of current interest. Prerequisite, permission.

### 532 Marine Microbiology (1-4) Sp ORDAL

Ecology and biochemistry of marine bacteria. Prerequisites, Microbiology 400 and permission.

## 533 Zooplankton Ecology (3-6) S

Identification of plankton animals; evaluation of sampling methods; rate measurements on selected species; work on ecological problems. (Offered for 6 credits only in even-numbered years at Friday Harbor Laboratories.) Prerequisite, permission.

## 534 Phytoplankton Ecology (6) S

Contemporary problems in marine phytoplankton investigations. Evaluation of methods used in field and laboratory studies. (Offered only in even-numbered years at Friday Harbor Laboratories.) Prerequisite, permission.

## 535 Methods in Plankton Research (3) W Methods of sampling and analysis of standing

stock as affected by the ecology of plankton.

## 536 Benthos Ecology (3) Sp

Distributions, abundances, and interrelationships of the organisms of the ocean floor; methods of sampling and analysis. Prerequisite, permission.

### 537 Environmental Physiology of Marine Microalgae (4) A LEWIN

Culture and nutrition of marine unicellular algae; use of algal cultures for the study of problems in biological oceanography. Prerequisite, permission.

## 538 Identification and Structure of Marine Benthic Communities (2) Sp

Sampling gear and sampling techniques; qualitative and quantitative methods for identification and ordination of communities; structure of benthic communities; biomass, productivity and benthos/fish relationships; historic review of benthos research. Prerequisite, permission.

## 540 Seminar in Geometronics (1-3) AWSp KELLEY

Lectures and discussions on selected problems in the applications of statistics in earth science. Prerequisite, Quantitative Science 383.

### 544 Statistical Models in Oceanography (3) W

KELLEY, WALSH

Multivariate analysis: regression, trend surface analysis, factor analysis, discriminant functions, and stochastic-process models in oceanography. Prerequisite, Quantitative Science 383 or permission.

## 548 Topics in Physical Oceanography (1-4, max. 9) AWSp

Lecture series on topics of major importance in physical oceanography.

## 550 Seminar in Geological Oceanography (\*, max. 9) AWSp

Lectures, discussions, and field and laboratory work on selected problems of current interest. Prerequisite, permission.

### 551 Marine Sediments (2) Sp MC MANUS

Topics in interpreting environmental significance of marine sediments. Prerequisite, permission.

## 553 Research Techniques in Marine Geochemistry (2)

Analytical techniques and instruments applicable to problems of marine geochemistry. Prerequisite, Chemistry 351.

## 554 Research Techniques in Marine Geology (3) A

CREAGER

Planning field programs; selection of equipment and survey procedures; collection, analysis, compilation, and presentation of bathymetric and sediment data; evaluation of techniques and results. Prerequisites, 450, 453 or 551 (which may be taken concurrently).

## 555 Marine Geochemistry (3) CARPENTER, PIPER

Topics in geochemistry of the oceans and marine sediments. Prerequisites, Chemistry 351 and permission.

## 556 Advanced Marine Geology (\*, max. 9) AWSp

CREAGER, MC MANUS

Contemporary problems in marine geology; concepts supporting or at variance with accepted hypotheses; discussion of recent advances. Prerequisite, permission.

### 560 Fluid Mechanics of Erosion and Sediment Transport (3) W SMITH

Advanced study of the erosion, deposition, and transportation of sediments by turbulent flows. Emphasis on the use of theoretical fluid mechanics to formulate and solve problems of bed load and suspended load transport of sediments, erosion, and deposition of sediments, erodible boundary-wave problems, turbidity currents, beach erosion. Prerequisites, 452, 511, and permission.

# 561 Seminar in Geological Fluid Mechanics (3) Sp SMITH, STERNBERG

Reading and discussion of topics of current interest in geological fluid mechanics. Course work will include a report on a specialized topic. Prerequisite, permission.

## 570 Simulation Analysis of Marine Systems (5) Sp

WALSH

An introduction to the analytical methods of systems ecology. Simulation models are used in comparative analyses of the structure, of the nutrient and energy flow, and of the sensitivity of response in representative aquatic ecosystems. Prerequisites, Biology 472, FORTRAN, Mathematics 126, Quantitative Science 382, or permission.

## 571 Gravity and Geomagnetic Interpretation (3) A

BENNETT, BURNS

Fundamental concepts; the earth's magnetic field; instrumentation and reduction of magnetic measurements, interpretation of magnetic data; gravity measurements, reduction of gravity observations; interpretation of gravity anomalies. Offered jointly with the Geophysics Program as Geophysics 571. Prerequisites, Physics 323 or equivalent, Geological Sciences 450, or permission.

## 573 Terrestrial Magnetism (3) Sp 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. Offered jointly with the Geophysics Program as Geophysics 573. Prerequisite, Geophysics 453.

## 581 Analysis of Sediments and Sedimentary Rocks (5) A

KELLEY, STEWART, WHETTEN

Methods of analysis of sediments and sedimentary rocks, and statistical evaluation, presentation, and interpretation of data. Offered jointly with the Department of Geological Sciences as Geological Sciences 581. Prerequisites, Geological Sciences 423, Mathematics 281 or Quantitative Science 281, or equivalent.

- 600 Independent Study or Research (\*) AWSpS
- 700 Master's Thesis (\*) AWSpS

800 Doctoral Dissertation (\*)

## PHILOSOPHY

## **Courses for Undergraduates**

100 Introduction to Philosophy (5) AWSp Introduction to major philosophical questions relating to such matters as ethics, the existence of God, the foundations of knowledge, and the nature of the real world. The number and nature of the problems studied and the works read vary from instructor to instructor.

110 Introduction to Social Ethics (5) AWSp The nature of a good social order and right social action. The rival ideals of aristocracy, fascism, liberalism, and socialism, with emphasis upon the nature and ideals of democracy.

## 113 Philosophy and Racial Conflict (5)

A study of some of the intellectual causes

of racial conflict. Relations between racial and international conflicts are examined.

## 120 Introduction to Logic (5) AWSp

Elementary mathematical logic. The nature of deductive arguments and how they differ from inductive arguments. The nature of validity and the relationships of logical symbolism to language.

## 200 Types of Philosophy (5)

A course in philosophy at the introductory level. The content of the course is entirely at the discretion of the instructor.

### 201 Philosophical Analysis (3) THOMAS

Basic course in logic and the analysis of discourse: determining the structure of reasoning in argued discourse, evaluating reasoning, clarity, the analysis of concepts. Taught with application to a variety of problems in primary philosophical writings. Intended pri-marily for potential philosophy majors. Prerequisite, one philosophy course.

## 215 Introduction to Ethics (5) MISH'ALANI, RICHMAN

Systematic study of typical analyses of the distinction between good and evil, right and wrong. The appeals to custom, theology, reason, human nature, and happiness as standards for solution of moral problems. Readings in Plato, Hume, Kant, Bentham, and Mill.

230 Philosophic Issues in World Affairs (2) Philosophic issues in the conflict between soviet and liberal interpretations of democracy, and the bearing of these differences on world order. Ideals of the more neutralist nations. Philosophical basis of a world order.

## 231 Philosophy of Human Rights (2)

Historical development of the concept of human rights with particular attention to original sources.

### 250 Introduction to Epistemology (3) MARKS, SMALL

Introduction to some of the problems involved in general philosophical accounts of knowledge or in philosophical accounts of our knowledge of certain kinds of statements, e.g., statements about the external world, a priori statements, statements about the past, statements about other minds.

#### 253 Introduction to the Philosophy of Language (5)

SMALL

An introduction to 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. Prerequisite, 120 or permission.

#### 260 Introduction to Philosophy of Science (3)

CLATTERBAUGH, THOMAS

An examination of formal languages, the nature of probability, the problem of induction, and determinism.

## 267 Introduction to Philosophy of Religion (5)

CHAMBLESS, DIETRICHSON

A study of Western religious thought. Examination of the problem of evil, the nature of mysticism, atheism, theism, and the relationship between religion and morality.

## **280H** Introduction to Philosophical Studies (5, max. 10)

An intensive analysis of selected philosophical problems for students who have shown a special aptitude and interest in philosophy. Prerequisites, one course in philosophy and permission of the honors adviser.

### 286 Introduction to India's Philosophies (3) POTTER

Survey of major tendencies in recent Indian thought in the light of their origins in classical Indian philosophy. Readings in such writers as Nagarjuna, Samkara, Gandhi, Aurobindo.

### 320 History of Ancient Philosophy (5) A CLATTERBAUGH

The pre-Socratics; Plato and Aristotle; the Stoics, Epicureans, and Skeptics; Plotinus.

### 321 History of Medieval Philosophy (5) A BOLER

Development of main lines of philosophical thought in the Latin West from 400-1400, with emphasis on Augustine, Anselm, Abelard, Aquinas, and Occam. Prerequisite, 320 or permission.

### 322 History of Modern Philosophy (5) W COBURN

Development of philosophical ideas from beginning of the Renaissance through the Con-tinental Rationalists, the British Empiricists, and Kant.

#### 325 History of Nineteenth-Century Philosophy (5)

BURKE

Post-Kantian idealism: Fichte, Schelling, Hegel, and Schopenhauer. Development of absolute idealism in England. Resurgence of empiricism in England and America. Prerequisite, 322 or permission.

326 History of Recent Philosophy (5) Sp A survey of the main problems in Philosophi-cal Analysis from the English Realist reaction against Idealism to the present. Prerequisite, 120 or permission.

## 347 Philosophy in Literature (3)

Study of philosophical ideas expressed in great works of literature.

348 Philosophy in the Romantic Poets (2) A study of the philosophical ideas implicit in the great poetry of the Romantic Period.

## 370 Intermediate Logic (5) A CHATEAUBRIAND, KEYT

An advanced treatment of sentential logic. Proof theory, model theory, and their interrelations.

## 410 Social Philosophy (3)

Philosophical theories of the nature of society. The epistemological, metaphysical, and ethical issues in the conflict between individualism and collectivism.

## 412 Indian Philosophy (3)

POTTER Historical survey of the major systems and the traditional problems of philosophy in India. Readings in Buddhism, Nyaya, Samkhya, and Vedanta. Prerequisite, 100 or 286 or permission.

### 413 Studies in Indian Philosophy (3, max. 9) POTTER

Study of one or more individual figure or problem in Indian philosophy selected by the instructor. Prerequisite, 412.

### 414 Philosophy of Law (3) STEGLER

Nature and function of law. Relation of law to morality. Logic of legal concepts. Prerequisite, 110 or 215, or permission.

### 415 Chinese Philosophy (5) SHTH

Development of Chinese philosophy from the sixth century B.C. to modern times. Empha-sis on Confucianism, Mohism, Taoism, Legalism, the Dialecticians, Buddhism, and Neo-Confucianism; re-evaluation of them in the light of new trends of thought after contact with the West.

## 416 Neo-Confucianism (5)

SHIH

Systematic study of Neo-Confucianism, its background and development with emphasis on the Rationalistic school of Ch'eng-Chu and the Idealistic school of Lu-Wang. Prerequisite, 415 or permission.

## 421 Studies in Medieval Philosophy

(3, max. 9) BOLER

Detailed study of an individual figure or problem in Medieval Philosophy (of the Latin West), selected by the instructor. Prerequisite, 321.

## 422 Studies in Continental Rationalism (3. max. 9)

CLATTERBAUGH, MARKS

A study of the philosophical system, or some part of the philosophical system, of one or more of the major continental Rationalists: Descartes, Spinoza, Leibniz. Prerequisite, 322 or permission.

## 424 American Philosophy (3)

BOLER

- The philosophies of Pierce, Royce, Dewey,
- and James. Recent developments in analytic
- and speculative philosophy. Current issues and problems. Prerequisite, 322 or permission.

## 431 Philosophy of Plato (3)

CLATTERBAUGH, KEYT A reading of selected middle and late dialogues. (Alternates with 433.) Prerequisite, 320 or permission.

## 433 Philosophy of Aristotle (3)

KEYT A study of the Aristotelian system with emphasis on two major works. (Alternates with 431.) Prerequisite, 320 or permission.

## 436 British Empiricism (3)

MARKS, THOMAS

Development of empiricism in writings of Locke, Berkeley, and Hume. Detailed attention to application of empiricist views of origin and nature of ideas to the problems of substance, self, nature, causation, mathematics, and induction. Prerequisite, 322 or permission.

## 437 Philosophy of Hume (3)

MARKS

Study of principles and methods employed by Hume in elaboration of his system of philosophy, comprising his analyses of knowledge, the passions, and morals. Prerequisite, 822 or permission.

## 438 Philosophy of Kant (3)

DIETRICHSON A systematic study of The Critique of Pure Reason. Prerequisite, 322 or permission.

439 The Later Philosophy of Wittgenstein (3)

MARKS

A detailed study of topics in the later philosophy of Wittgenstein. Particular attention will be directed to the *Philosophical Investigations*. Prerequisite, 322 or permission.

## 440 Advanced Ethics (3)

RICHMAN

A critical examination of the concepts and judgments of value, including an analytical treatment of the notions of right and wrong, obligation, good and evil, and the relationship between ethical and aesthetic value. Prerequisite, 215 or permission.

### 443 Philosophy and Linguistics (3) SMALL

A study of some of the connections between recent linguistics and philosophy, primarily philosophical problems that arise in the attempt to understand current linguistic theories and the implications of linguistics for philosophy. Offered jointly with the Department of Linguistics as Linguistics 443. Prerequisite, permission.

## 445 Philosophy of Art (5)

A critical examination of characteristic accounts of the nature of art, artistic activity, the aesthetic experience, and the artist and his art in relation to society. The philosophy of criticism: the role of the critic, and problems in interpretation and evaluation of works of art.

## 446 Development of Aesthetic Theory (5)

The historical development of aesthetics, emphasizing such major figures as Plato, Aristotle, Plotinus, Hume, Kant, and Hegel. Prerequisite, 100 or 445, or permission.

## 447 Philosophy of Literature (3)

CHAMBLESS, MISH'ALANI Inquiry into concepts, values, and presuppositions necessary for the creation of traditional literary forms of epic, dramatic, and lyric poetry.

## 450 Epistemology (3) RICHMAN

Problems in the theory of knowledge, the nature, possibility, criteria, and limitations of knowledge; critical evaluation of subjectivism and realism, dogmatism and skepticism, intuitionism, pragmatism, empiricism, rationalism, and positivism; theories of meaning, truth, and perception; synthesis of various positions around the scientific method. Prerequisite, 250.

## 453 Philosophy of Language (5) SMALL

Theories of meaning, reference, predication, and related concepts. Typical authors include Frege, Russell, Strawson, and Austin. Prerequisite, 120 or permission.

## 456 Metaphysics (3)

BOLER, COBURN, DIETRICHSON A critical examination of alternative metaphysical theories on such topics as the nature of substance, causality, the self, freedom, space, time, monism, pluralism. Prerequisite, one history of philosophy course, or permission.

## 458 Phenomenology (5)

BURKE

The contribution of phenomenology to selected topics in the theory of meaning, philosophy of mind, ontology, and epistemology.

460 Philosophy of Science (5) CLATTERBAUGH Concepts and methods fundamental in mathematics and in physical and social sciences. Relations of the sciences to each other as well as to ethics, religion, and philosophy. Speculations on the nature of the world suggested by past and present scientific theories. Operationist tendencies in recent interpretations of science. Prerequisite, 100, 120, or 260.

## 461, 462 Philosophy of Man and Culture I, II (3,3)

MISH'ALANI

Examination of philosophically interesting concepts, e.g., death, the person, obligation, through the analysis of cultural patterns; the relation between nature and culture; theories of human society; the nature of magic in relation to science and religion; the nature of myth. Prerequisite, 461 for 462.

## 463 Philosophy of Mind (3)

MARKS, THOMAS Theories of the nature of mind, the relation between mind and body, the self, memory, the unconscious, introspection, and our knowledge of other minds. Prerequisite, 100.

### 464 Philosophical Psychology (3)

Philosophic analysis of relations between mental events and their expression, especially their linguistic expression. Prerequisites, 100, 326, or 463.

## 465 Philosophy of History (5)

Analyses of basic concepts employed in historical interpretation, and some of the principal philosophers of history: Plato, St. Augustine, Hegel, Marx, Spengler, Toynbee, etc.

## 466 Philosophy of the Social Sciences (3) CROCKER

Examination of fundamental issues in the methodology and the interpretation of the social sciences. Particular emphasis on value orientation and objectivity, functionalism, reductionism, and the status of idealized models. Prerequisites, 120, 260, or 460, or course beyond introductory level in a social science.

## 467 Philosophy of Religion (5) DIETRICHSON

A critical examination of three approaches to religion: reason, intuition, faith. Prerequisite, one history of philosophy course, or 267, or permission.

### 469 Existentialist Philosophy (3) DIETRICHSON

A critical study of major ideas in the philosophies of Kierkegaard, Heidegger, Sartre, and Marcel. Prerequisite, 322 or 325 or 326, or permission.

## 470 Advanced Logic (5) W KEYT

An advanced treatment of predicate logic. Proof theory, model theory, and their interrelations.

## 472, 473, 474 Logical Theory I, II, III (3,3,3) A,W,Sp

CHATEAUBRIAND

Selected topics in logic, philosophy of language, and philosophy of mathematics. Prerequisite, 470 or permission.

## 480H Honors—Philosophical Studies (3, max. 6)

Discussion and the writing of philosophical essays on advanced topics. The reading materials vary from year to year. For selected junior and senior honors students only.

## 484 Reading in Philosophy (1-5, max. 15) AWSp

Reading of approved philosophical works. (The name of the staff member with whom research will be done *must* be indicated in registration.) Prerequisite, permission of adviser.

## 490 Undergraduate Seminar (4)

An intensive study in some philosophical problem. A seminar intended to prepare undergraduate majors for graduate work. Prerequisite, permission.

## **Courses for Graduates Only**

- 514 Seminar in Legal Philosophy (3, max. 12) SIEGLER
- 520 Seminar in Ancient Philosophy (3, max. 12) KEYT
- 521 Seminar in Medieval Philosophy (3, max. 12) BOLER
- 522 Seminar in Modern Philosophy (3, max. 12)
- 526 Seminar in Recent Philosophy (3, max. 12)
- 540 Seminar in Ethics (3, max. 12)
- 545 Seminar in Philosophy of Art (3, max. 12)
- 550 Seminar in Epistemology (3, max. 12)
- 556 Seminar in Metaphysics (3, max. 12)
- 563 Seminar in Philosophy of Mind (3, max. 12) THOMAS

Prerequisites, at least two courses related to philosophy of mind and permission.

- 565 Seminar in Philosophy of History (3, max. 12)
- 567 Seminar in Philosophy of Religion (3, max. 12) DIETRICHSON
- 570 Seminar in Logic (3, max. 12)
- 584 Reading in Philosophy (1-4, max. 12) AWSp

Intensive reading in the philosophical literature. (The name of the staff member with whom research will be done *must* be indicated in registration.) Prerequisite, permission of the graduate adviser.

- 586 Seminar in Indian Philosophy (3, max. 12)
- POTTER

Prerequisite, 412.

587 Contemporary Analytic Philosophy (3, max. 12) BICHMAN

600 Independent Study or Research (\*) Prerequisite, permission of the graduate adviser.

- 700 Master's Thesis (\*) AWSp
- 800 Doctoral Dissertation (\*)

## PHYSICAL AND HEALTH EDUCATION

Specific areas in Physical and Health Education are designated by area letters. These letters must precede course numbers on the student's Official Program. Designation letters and their definitions are:

PEDNC—Physical Education: Dance H ED—Health Education PE—Physical Education RECPL—Recreation Planning and Administration

## **PHYSICAL EDUCATION: DANCE**

## Courses for Undergraduates PEDNC

278 Intermediate Folk Dance (3) Sp

Prerequisite, Physical Education PE 127 or permission.

## PEDNC

282 Fundamentals of Rhythm (2) W

Understanding of fundamental rhythm concepts and their application in the development of technique and style in basic dance forms.

## PEDNC

283 Contemporary Dance (2) W SKINNER

Understanding of fundamental rhythm concepts and their application in the development of technique and style in contemporary dance forms.

## PEDNC

## 309 The School Dance Program, Secondary (2) A

Practice in basic skills in folk, square, and social dancing; methods and opportunity for presentation; source materials; organization of coeducation dance program. Prerequisite, 282.

## PEDNC

310 Traditional Dance Forms (3) Sp

Dance and rhythmic activities appropriate for older children; folk and ethnic dance, American traditional dances, and creative forms of dance.

## PEDNC

## 311 Rhythmic Activities for Small Children (2) W

## SKINNER

Activities suited to the kindergarten and primary child. Educational value, significance in child growth and development, and methods of presentation.

## PEDNC

355 Dance Composition (2, max. 6) AWSp SKINNER

Practice in modern dance; analysis of choreography; creative work. Prerequisite, permission.

## PEDNC

**364** History of Dance (3) Sp Survey of the function and form of dance from primitive culture in its present art form, with emphasis on Western civilization.

## HEALTH EDUCATION

## **Courses for Undergraduates**

H ED

250 Contemporary Health Concepts (2) AWSpS COOLEY, MILLS Investigation of contemporary health problems and the scientific concepts and the knowledge essential to the comprehension and the solution of these problems within society.

### H ED

292 First Aid (2) AWSpS

HENDERSHOTT, MAC LEAN, REEVES Student may meet requirements for both Standard and Advanced American Red Cross First Aid certification.

### H ED

330 Safety and Accident Prevention (2) Sp MAC LEAN, MILLS

Pertinent problems and programs in accident prevention. Special consideration is given to home, industrial, institutional, recreational, and transportation safety.

## H ED

350 Foundations of Health Behavior (2) AWSpS

Biosocial influences on the health of the individual, including physical and emotional responses to health and disability. Emphasis is on the health problems of the school and college population. Prerequisite, 250.

### H ED

## 351 School Health Programs (3) WSp

Overview of the school health program, including underlying principles and legal responsibilities, with emphasis on health services, health instruction, and healthful school living. Interrelationships with other community health agencies also is considered. Prerequisite, 350. (Formerly 451.)

### H ED

## 352 Health Implications of the School Environment (3) ASp

MILLS

Implications for health instruction of school policies, procedures, facilities, and personnel. Prerequisite, 351. (Formerly 465.)

### H ED

## 353 Theory and Practice of Health Education (3) AW

COOLEY

Application of motivation and learning concepts to health education. Prerequisite, 352. (Formerly 453.)

## H ED

481 Human Sexuality and Education (3) AWSp

Scientific exploration of physiological, psychological, and cultural aspects of sexual development. Expression, problems, and adjustment of youth and adults. Basic concepts underlying sex education. Prerequisite, permission.

## H ED

498 Special Studies in Health Education (2-6, max. 6) AWSp COOLEY, MILLS

Prerequisite, permission.

### H ED

499 Undergraduate Research (3, max. 6) AWSp

COOLEY, MILLS

Prerequisite, permission.

## **Courses for Graduates Only**

### H ED

503 Seminar in Health Education (3, max. 9) Sp COOLEY, MILLS Prerequisites, 453, 465 or permission.

## H ED

## 505 Program Development and Evaluation (3) W

Emphasis on conceptual models, program determinants, organizational variability, and reciprocal effects of evaluative techniques in school health education. Prerequisite, 353 or equivalent.

### H ED

## 508 Administrative Relationships in the Health Education Program (3) Sp ABERNATHY, REEVES

Decision making, management theory, and interagency programs.

### H ED

590 Research Analysis and Design in School Health Education (3) AS COOLEY

Review and analysis of research pertinent to school health programs. Emphasis is given to research design, procedures, and interpretation. Prerequisite, Biostatistics 472 or Educational Psychology EDPSY 490.

### H ED

600 Independent Study or Research (\*) AWSpS

H ED

700 Master's Thesis (\*) AWSpS

## PHYSICAL EDUCATION Courses for Undergraduates

## 101 through 199

Courses designated II, III, or IV carry prerequisites of I, II, or III, respectively, or evidence of proficiency equivalence in that activity; level I courses are for beginners only. Auditors are not allowed to take 100-level courses.

## PE

## 100 Adapted Swimming (1) AWSp

For physically limited students who need an individually designed program. Prerequisite, permission.

### PE

## 101 Aquatic Art (1) AWSp

Prerequisites, well-coordinated front crawl, back crawl, breaststroke, front dive, and underwater swimming.

## PE

## 102 Life Saving (1) AWSp

Prerequisite, ability to swim 440 yards (American Red Cross certification possible).

## PE

Prerequisite, permission.

103 Skin Diving (1) AWSp

Prerequisite, 102 or 108 or equivalent.

## PE

104 Springboard Diving (1) AWSp Prerequisites, ability to swim fifty yards and to tread or float for five minutes.

PE

## 106, 107, 108, 109 Swimming I, II, III, IV (1,1,1,1) AWSpS,AWSpS,AWSpS,AWSpS

(1,1,1,1) AWSpS,AWSpS,AWSpS,AWSpS Level II for students who can swim twentyfive feet but not fifty yards. Level IV prerequisite, ability for fifty yards' crawl and reasonable proficiency on side and back.

110 Swimming V: Intercollegiate (1) AWSp

81

112 Water Polo (1) AWSp Prerequisite, 108 or equivalent. 114, 115 Canoeing I, II (1,1) SpS,S Prerequisite, ability to swim fifty yards and to swim, tread, or float for fifteen minutes. Following hour must be free for travel time. Fee charged. PE 117 Crew I (1) ASp Prerequisite, 107 or equivalent. Crew V: Intercollegiate (1) AWSp 119 Prerequisite, permission. PE 120 Sailing I (1) ASpS Must have hour following class free for travel time. Prerequisite, ability to demonstrate water safety. PE 123, 124, 125 Contemporary Dance I, II, III (1,1,1) AWSp,AWSp,Sp Concepts and techniques of dance as a modern art form. Prerequisites, 123 for 124; 124 for 125, or permission. PE International Folk Dance I (1) AWSp 127 PE 128 Korean Dance (1) PE 129 Jazz Dance (1) PE 130 Social Dance I (1) AWSp PE 132 Adapted Activities (1) AWSp For students with physical problems and disabilities. Prerequisite, permission. PE 133, 134 Archery I, II (1,1) AWSp,Sp PE 136, 137 Badminton I, II (1,1) AWSp,WSp PE 139 **Baseball V Men: Intercollegiate (1)** AWSp Prerequisite, permission. PE 140 Basketball II (1) AW Prerequisite, ability to play official basketball. 142 Basketball V: Intercollegiate (1) AW Prerequisite, permission. PE 143, 144, 145 Bowling I, II, III (1,1,1) AWSp,AWSpS,WSpS Fee charged. PE 146 Boxing I (Men) (1) PE **Conditioning (1) AWSp** 147 PE 148, 149 Fencing I, II (1,1) AWSp,WSp PE

150 Field Sports I (1) ASp

PE 152 Football V Men: Intercollegiate (1) ASp Prerequisite, permission.

**PE** 153 Golf I (1) AWSpS Following hour must be free for travel time. Fee charged.

PE

**155** Golf V: Intercollegiate (1) AWSp Prerequisite, permission.

PE

156, 157 Gymnastics I, II (1,1) AWSp,AWSp For women: modern gymnastics floor exercise, balance beam, vaulting, uneven bars, tumbling, and trampoline. For men: floor exercise, pommel horse, rings, vaulting, parallel bars, horizontal bars, tumbling, and trampoline.

PE 159 Gymnastics V: Intercollegiate (1) AWSp Prerequisite, permission.

160 Handball I (1) AWSp

PE

163 Judo I (1) AWSp

PE

167, 168 Mountain Climbing I, II (1,1) S,S Fee charged.

PE

169, 170, 171 Riding I Horsemanship, II and III English (1,1,1) AWSp,AWSp, WSp

Fee for lessons and transportation; insurance recommended.

PE 173, 174 Skating—Ice I, II (1,1) AWSp,WSp

Fee for lessons and skates; insurance recommended.

- PE
- 175 Ski Conditioning (1) AW

PE 176, 177, 178 Skting I, II, III (1,1,1) WSp,WSp,WSp Fee for lessons and transportation; insurance recommended.

PE 179 Skiing V: Intercollegiate (1) AW Prerequisite, permission.

- PE 180 Soccer (1) A
- PE

182 Softball II (1) Sp Prerequisite, ability to play official softball.

PE 183 Special Activities (1) AWSp Prerequisite, permission only.

PE

184 Squash I (1) AWSp

PE 187, 188, 189 Tennis I, II, III (1,1,1) ASpS,ASpS,ASpS

PE 191 Tennis V: Intercollegiate (1) AWSp Prerequisite, permission. PE

192 Track I (1) Sp

PE 193 Track V: Intercollegiate (1) AWSp Prerequisite, permission.

PE 194 Volleyball I (1) AWSp

PE 195 Volleyball V: Intercollegiate (1) AW Prerequisite, permission.

PE 196 Weight Training (1) AWSp

PE 198 Wrestling I Men (1) ASp

PE

199 Wrestling V Men: Intercollegiate (1) AW

Prerequisite, permission.

## PE

## 201 Meaning and Modification of Movement (2) WSp

Assessment and interpretation of personal movement skill and activity preference. Course designed for nonmajors.

PE ..

203 Effort Control: Relaxation Techniques (2) AWSp

WOODS Recognition and management of residual muscular tension through relaxation; theories, implications, techniques, laboratory, and discussion.

PE

## 204 Figure and Posture Control (2) AWSp Effects of exercise on weight, contour, and condition; postural adjustments for efficiency in the movement skills of daily living. Laboratory, lecture, and discussion.

PE

## 205 Basic Biomechanics for Nursing (2) AWSp

Mechanical analysis of movement tasks, with emphasis on conservation of energy and prevention of muscular strain and injury. Laboratory sessions include manipulation of patients. Prerequisite, Conjoint (Med) 316.

PE

## 210 Performance Precisions and

Choreographic Principles in Gymnastics (2, max. 4) WSp

Techniques beyond the introductory level, with optional emphasis on floor exercise or apparatus. Prerequisite, 157 or 281 or permission.

PE

216 Scuba Diving (2) AWSp

Scientific principles and techniques of SCUBA (Self-contained Underwater Breathing Apparatus) diving, based on marine physics, physiology, and medical requisites to a safe exposure in an underwater environment. Prerequisites, swim underwater (no fins) one pool length (twenty-five yards); tread water for ten minutes; medical examination. Fee charged.

PE

225 Survey of American Folk Dance (2) Sp Folk dance forms characteristic of the United States; traditional dances and emergence of modified forms; performance, analysis, and interpretation.

PE

250 Introduction to Movement Analysis (4) AWSp WALTZ Exemplary topics in the study of human movement, including behavioral, experiential, and interpretive perspectives. (Formerly Physical Education 231.)

### PE

264 Skills and Materials in Track and Field and Weight Training (2) A HUGHES

(Will not be offered after 1972.)

- PE
- Skills and Materials in Individual 266 Sports (2) Sp

(Will not be offered after 1972.)

## PE

#### 271 Field Sports (2) A MAC LEAN

Strategy, interaction, and movement effectiveness in field sports.

### PF.

## 273 Individual Sports (2) Sp FOX, PURDY

Development of an understanding of individual and dual projectile activities through the application of mechanical principles and com-mon movement patterns. (Will not be offered after 1972.)

## PE

281 Women's Gymnastics (2) W MAC LEAN

Principles and application of mechanics to gymnastics.

## PE

#### Aquatics (1) 284

MAC LEAN

Basic hydromechanics and application to aquatic movement. Prerequisite, 108 or equivalent.

## PE

#### 290 Officiating (2) ASp

HENDERSHOTT Techniques of officiating for men: football,

basketball, track and field, swimming, tennis, volleyball, softball, and speedball.

## PE

## 295 Water Safety Instructor Course (2) WSp

BUCKLEY, MAC LEAN

(WSI certification) Designed to prepare stu-dents for employment as teachers or administrators in aquatic programs. Prerequisites, 102 and American Red Cross lifesaving certificate.

## 304 Officiating (2, max. 4) AW

Techniques of officiating, opportunity for women's national and local ratings (volley-ball, Autumn Quarter; basketball, Winter Ouarter).

PE

## 312 Physical Fitness Activities for Children (21/2) S

Movement activity that contributes to physical fitness and motor efficiency; performance standards as related to physical growth and development levels; criteria and techniques for evaluation of physical performance of children.

## PE

# 314 Movement Exploration for Children (3)

Theory and techniques of movement exploration, utilizing time, space, force, and flow variables as elements of movement organization.

### PE

316 Structure of Movement Activities for Children (3) W

Analysis of movement activities—early childhood to adolescence. Emphasis on variability and patterning in movement and perceptual skills, activity structure, and factors affecting performance. Prerequisites, 325 and 365. (Formerly 365.)

## PE

320 Conditioning and Physical Fitness (2) A Critical analysis of conditioning techniques and programs, considering elements of fit-ness, biomechanical principles of exercise, and specificity of movement performance requirements. Prerequisite, 332.

## PE

325 Growth and Motor Development (3) AWSD

## SMOLL

Factors influencing the physical growth and the development of movement skills during infancy, childhood, and adolescence. Interre-lationships of motor and other aspects of development.

## DF

## 331, 332, 333 Human Kineoenergetics (3,3,3) AW, WSp, SpA

DOOLITTLE, HUTTON, WOODS

Maturational and functional explanations of movement potential; interaction human among structural patterning, mechanisms, regulatory processes, and external physical forces; reciprocal effects of moving and potential for movement. Prerequisites, Zoology 118, 119 or 208, Biological Structure 301, Physical Education 250 for 331; 331 for 332; 332 for 333.

## PE

336 Athletic Training and Conditioning (2) W

Prerequisite, Health Education H ED 292 or permission.

## PE

340 **Administration of Intramural Sports** (3) A

## PE

350 Learning and Movement Performance (5) AWSp PURDY

Interrelationships among perceptual mecha-nisms, individual characteristics, and tasks, organizational, and situational variables as related to the learning of movement skills. Prerequisite, Psychology 100.

## PE

358 Methods of Teaching Gymnastics (2) HUGHES

Prerequisite, 165 or permission. (Will not be offered after 1972-73.)

## PE

PE

#### Workshop in Gymnastics (3) S 359 HUGHES

Lectures, practice, and supervised teaching in gymnastics. Prerequisite, 358 or equivalent.

#### 361 Methods of Teaching Wrestling (2) A SMITH

Men only. (Will not be offered after 1972-73.)

## PE

- Methods of Teaching Sports (2) 363
  - PEEK

# Organization, presentation, and evaluation, student lesson plans in teaching team sports, the school physical education program. Pre-requisites, 264, 265, 266. (Will not be offered after 1972-73.)

## PE

364 Methods of Teaching Aquatics (2) Prerequisite, 164 or equivalent, or permission. (Will not be offered after 1972-73.)

## 365 Applied Movement Learning (4) AWSp

FOX, PEEK Relationships among goals, content, and process in the teaching of movement skills. Prerequisite, 350.

## PE

## 366 Practicum (1, max. 3) AWSp

FOX. HUGHES Prerequisites, Health Education H ED 292 and permission.

## PE

370 Coaching of Football (2) Sp OWENS

## PE

- 371 Coaching of Basketball (2) A
- PE
  - 372 Coaching of Track and Field (2) W SHANNON
  - PE 373 Coaching of Baseball (2) Sp

## PE

410 Social Correlates of Movement Forms and Patterns (3) WSp ABERNATHY, WALTZ

Play, dance, games, and sports with reference to groups, roles, values, and interaction. Prerequisites, 250 and Sociology 110.

## PE

#### Sport in the United States (3) Sp 412 MORFORD

Relations of sport to American culture, with emphasis on issues, problems, and trends.

## PE

#### 413 Athletics in the Ancient World (3) A MORFORD

Role and significance of games and physical activities in ancient societies, with special emphasis on Greek athletics and Roman spectacles.

## PE

### 414 Rise of Sport (3) W MORFORD

Study from the historical perspectives of the interrelationship of sport and culture from the age of chivalry to the age of international olympianism.

Problems, limitations, and benefits of exercise

in the alleviation of cardio-pulmonary handicaps, with particular attention to the middle-

aged population. Prerequisite, 331 or human

anatomy, physiology, and physiology of exer-

Study of activities suited to the interests, ca-

83

## PE

PE

436

cise, or permission.

WOODS

#### 434 **Exercise and Cardio-Pulmonary Irregularities (3) S** DOOLITTLE, HUTTON

Adapted Activities (3) Sp

pacities, and limitations of students with handicaps. Prerequisites, 333, 350 or permission.

## PE

#### 438 **Developmental Motor Activities for the** Exceptional Child (3) A WOODS

Principles of developmental motor activities and their application in the education of the exceptional child. Prerequisites, 325 and 333, or permission.

## PE

#### 450 The School Physical Education Program (3) ASp

PEEK

Problems of organization and conduct. Prerequisites, 365 and 460.

## PE

### 455 Measurement and Evaluation in **Physical Education (4) AW** FOX

Consideration of evaluative tools available in the physical education setting, including criteria for tool selection and development and application and uses of resulting data. Prerequisite, Educational Psychology EDPSY 308 or permission.

## PE

#### 460 **Perspectives in Physical Education (3)** WSp

LAWSON

Traditional views of physical education examined with reference to research findings and dynamics of program change. Prerequisites. 250, 325, 333, 350, 410. (Formerly 345.)

### PE

#### **Programs in Elementary Physical** 478 Education (21/2) SpS HORNE

Progress and problems in modern programs. Offered jointly with the College of Education as Educational Curriculum and Instruction EDC&I 425.

## PE

## 480 Biomechanics (3) W

Experimentation with the integration of the physical laws of the universe and the structure and function of the human body with the requirements of various movement tasks. Prerequisite, 332 or permission.

### PE

#### 485 **Philosophical Perspectives of Human** Movement (3) Sp

RENICK

The mind-body dichotomy and selected philosophical positions in human movement study, including investigation of contemporary issues in sport, athletics, and physical education.

## PE

#### **Contemporary Perspectives in the** 490 Study of Human Movement (3) ASp WALTZ

Consideration of ways in which inquiry in the arts and sciences of human movement can be approached. Prerequisite, senior standing or permission.

## PE

#### Problems in Athletics (3) W 493 MORFORD

Place of interschool athletics in education. Control, finance, eligibility, safety measures, publicity, and public relations. Qualifications

and duties of coaches, managers, and officials. Prerequisites, 450 and 460.

## PE

PE

498, 498H Special Studies in Physical Education (2-3, max. 6) AWSp, AWSpS Prerequisite, permission.

499, 499H Undergraduate Research (2-3, max. 6) AWSp, AWSp Prerequisite, permission.

## **Courses for Graduates Only**

## PE

#### 501 Seminar in Human Movement Studies (3, max. 9) WSp

Examination of selected topics in human movement study. Specific content variable with current developments in the field and with interests of the instructor. Prerequisite, permission.

## PE

#### 502 **Issues in Physical Education** (3, max. 9) A

Issues, problems, and trends in physical education and other movement centered programs: relationship of changes in direction or focus to emergent knowledge; social, political, or other factors. Prerequisite, graduate student in physical education or permission.

## PE

#### 506 The Curriculum in Physical Education (3) W

FOX, LAWSON

Selection and organization of program content in relation to characteristics and needs of pupils and local conditions. Prerequisite, 460 or permission.

## PE

#### 507 **Supervision in Physical Education** (21/2) S

PEEK

Functions, supervisory organization, evaluation, workshops, in-service education, application of democratic leadership to specific program and personnel problems. Prerequi-sites, 450 and 460, or permission.

## PE

#### 520 **Advanced Growth and Motor** Development (3) W

SMOLL

Studies in movement development, focused on analysis of physical growth, motor development, and interrelationships among modifying variables. Designed to prepare students for research in developmental aspects of motor performance. Prerequisite, 325 or permission.

## PE

#### 540 **Physiological Bases of Physical** Conditioning (3) A DOOLITTLE

Investigation of principles of overload, specificity and progression, together with the underlying physiological mechanisms as they relate to physical condition of the organism for movement stress. Prerequisite, 333 or permission.

## PE

#### 552 **Neural Control Systems of Movement** (3) W HUTTON

Neuroanatomical and neurophysiological mech-\ anism governing skeletal muscle and patterning of movement, including consideration of plasticity and modification of motor control systems. Prerequisite, 333 or permission.

PE

#### 553 Neurophysiological and Behavioral **Correlates of Movement (3) Sp** HUTTON

Cross-disciplinary approach to selected topics pertinent to the study of movement behavior, e.g., volitional movement, visuo-motor interrelations and perception, drugs and motor perperformance, proprioceptions, and feedback. Prerequisites, 333, 552, Zoology 118 or 208, or permission.

## PE

#### **Advanced Learning and Movement** 562 Performance (3) A PURDY

Interrelationships among situational and conditional variables as related to learning and performance of movement skills, emphasis on practice factors. Prerequisite, 350 or permission.

## PE

590 Research in Human Movement (3) AW Research procedures appropriate to the solution of human movement problems. Prerequisite, statistics or permission.

### PE

## 591 Research Seminar (3, max. 9) WSp

Problems and procedures in research unique to specific areas of specialization in human movement study and physical education. Content variable: physical education programs, kineoenergetics, learning and movement performance, sociocultural correlates of movement, movement experience, and esthetics. No more than 3 credits in any one area. Prerequisites, 590 and permission.

## PE

#### 600 Independent Study or Research (\*) AWSoS

PE

700 Master's Thesis (\*) AWSpS

## **RECREATION PLANNING AND** ADMINISTRATION

# **Courses for Undergraduates**

## RECPL

## 314 Introduction to Community Recreation (5) A

HOVIS

Historical and analytical overview of organized recreation; emphasis on community recreation services provided by public, private, voluntary, and commercial agencies; compari-son evaluation and coordination of these services. Prerequisites, Sociology 110, Psychology 100, or permission.

## RECPL

## 324 The Recreation Program (5) W

Examination of a broad spectrum of recreation program activities, techniques, and materials through lectures, discussion, and participation. Includes laboratory experience. Prerequisite, 314.

## RECPL

## 334 Conduct of Recreation (2) Sp

Leadership in operation of areas and facilities. Duties and responsibilities, personnel regulations. Motivating and conducting a diversified program. Prerequisite, 324.

## RECPL

#### **Organization and Administration of** 344 Camp Programs (3) Sp

educational and social significance of The camping; organization of activities and problems of administration. Prerequisite, 314.

## RECPL

## 354 Recreation Practicum (3) AWSpS HOVIS

Directed experience in recreational activities and program services for the enhancement of leadership techniques. Prerequisites, 314 and permission.

## RECPI.

### 384 Camp Counseling (3) S HUGHES

On-the-job experience in camp counseling. Students are quartered at Camp Waskowitz, act in the capacity of camp counselors for select groups, and assist in the direction of evening and Sunday educational and social activities.

### RECPL

## 434 Administration of Recreation (5) W

Practices and procedures in management and operation of areas and facilities. Duties and responsibilities, personnel regulations, and staff organization. Motivating and conducting a diversified program. Prerequisite, senior standing.

## RECPL

### 454 Recreation Internship (6) AWSpS HOVIS

On-the-job experience under agency executives and their supervisors for experiences in all phases of administration and supervision. Prerequisites, senior standing and permission.

## **Courses for Graduates Only**

## RECPL

## 504 Public Recreation (3) A

Legal basis and responsibilities; internal organization; financial support and budgeting. Acquisition, constructon, development, main-tenance, and operation of areas and facilities. Personnel selection and management.

## RECPL

## 524 Seminar in Community Resources for Recreation (3) W

Functional analysis of integrated community recreation services. Experience in recreation fact finding, analysis, and evaluation. Study of pertinent problems and needs in the field.

### RECPL

600 Independent Study or Research (\*) AWSpS

## RECPL

700 Master's Thesis (\*) AWSpS

## PHYSICS

## **Courses for Undergraduates**

## 101-102, 103 Physics for Teachers

(5-5,5) A,W,Sp

Basic concepts of physics, with particular emphasis on background needed for confident use of the new science-curriculum materials in the schools. Serves general education objectives by simultaneously dealing with historical, philosophical, and humanistic aspects of science. Prerequisites, 101- for -102; -102 for 103.

110, 111, 112 General Physics (5,5,5) A,W,Sp Basic concepts of physics, their origin, and their impact on society and the Western intellectual tradition. Not open to students majoring in mathematics, the natural sciences, or engineering. Prerequisites, 110 for 111; 111 for 112.

# 114, 115, 116 General Physics (4,4,4) AWSpS, AWSpS, AWSpS

Concurrent registration in 117, 118, 119 recommended and may be required by individual departments. 114: mechanics and sound. Prerequisites, some working knowledge of trigonometry, one year of high school physics or one quarter of any college-level physical science. 115: heat and electro-magnetism. Prerequisite, 114. 116: light and modern physics. Prerequisite, 115.

## 117, 118, 119 General Physics Laboratory (1,1,1) AWSpS, AWSpS, AWSpS

117: mechanics and sound laboratory. Prerequisite, 114 or concurrent registration in 114. 118: heat and electromagnetism laboratory. Prerequisite, 115 or concurrent registration in 115. 119: light and modern physics laboratory. Prerequisite, 116 or concurrent registration in 116.

The courses 121, 122, 123, 131, 132, 133, 221, and 222 taken together make up the general physics sequence for science and engineering students.

121, 121H Mechanics (4) AWSpS, AWSpS Basic principles of Newtonian and relativistic mechanics. Prerequisites, one year of high school physics or permission, concurrent or previous Mathematics 124 or 134H.

## 122, 122H Electromagnetism and

Oscillatory Motion (4) AWSpS, AWSpS Basic principles of electromagnetism, the mechanics of oscillatory motion. Prerequisites, 121 or 121H, concurrent or previous Mathematics 125 or 135H.

## 123, 123H Waves (4) AWSpS, AWSpS

Electromagnetic waves, optics, quantum waves, and waves in matter. Prerequisites, 122 or 122H, concurrent or previous Mathematics 126 or 136H.

## 131, 132, 133 General Physics

Laboratory (1,1,1) WSpS, ASpS, WAS Experimental topics in physics for science and engineering majors. Prerequisites, 121 for 131; 122 and 131 for 132; 123 and 132 for 133.

221 Quantum Physics (3) A ( Introduction to the physics of atoms, molecules, and nuclei; elementary quantum phys-ics. Prerequisites, 123 or 123H, concurrent or previous Mathematics 126 or 136H.

## 222 Statistical Physics (3) WSp

Heat, thermodynamics, and the statistical description of matter. Prerequisites, 221 (may be concurrent), Mathematics 126 or 136H.

223 Elementary Mathematical Physics (3) Sp Applications of mathematics to physics, particularly as illustrated by classical mechanics. Prerequisites, 123 or 123H, and Mathematics 238.

## 231, 232 Electric Circuits Laboratory (3,3) W,Sp

Basic linear elements in DC, AC, and transient circuits; solid-state and vacuumtube devices; electrical measurements. Prerequisites, 123 or 123H. Mathematics 126 or 136H for 231; 231 for 232.

## 321, 322, 323 Electromagnetism (3,3,3) A,W,Sp

Charges at rest and in motion; dielectric and magnetic media; electromagnetic waves; relativity and electromagnetism; physical optics. Prerequisites, 123 or 123H, Mathematics 327 for 321; 321 for 322; 322 for 323.

324, 325 Quantum Mechanics (3,3) A,W Introduction to non-relativistic quantum mechanics. Prerequisites, 221, Mathematics 327 for 324; 324 for 325.

327 Introduction to Nuclear Physics (3) W A study of nuclear structure including nuclear reactions, fission, particle accelerators, and nuclear instrumentation; applications of nuclear phenomena in atomic energy and astrophysics. Not open to students who have completed 422. Prerequisite, 221 or permission.

## 331 Optics Laboratory (3) Sp

Optical and spectroscopic measurements. Prerequisite, concurrent or previous 323.

## 400 Basic and Modern Physics (11) S

A review of the fundamental and modern developments in physics with suggestions for lecture demonstration and laboratory. Pri-marily for Summer Institute students. Prerequisite, permission.

### 401, 402, 403; 401H, 402H, 403H Special Problems (\*, \*, \*) AWSpS, AWSpS, AWSpS

Supervised individual study. Prerequisite, permission.

405 Laboratory for Physics Teachers (3) S Laboratory work in selected topics in teaching physics, especially at the high school and lower-division college level. Prerequisite, one year of college physics.

## 407-408, 409 Physics for Teachers (5-5,5) A,W,Sp

Basic physics, providing background and perspectives needed for teaching new elementary science materials such as AAAS, ESS, SCIS, etc. Intended for in-service elementary teachers or graduate students preparing for elementary (or secondary nonscience) teaching. Not applicable as credit toward a physics degree. Prerequisite, permission.

421 Atomic and Molecular Physics (3) A A survey of the principal phenomena of atomic and molecular physics. Prerequisites, 323 and 325, or permission.

#### 422 Nuclear and Elementary Particle Physics (3) W

A survey of the principal phenomena of nuclear and elementary particle physics. Prerequisites, 323 and 325, or permission.

## 423 Solid State Physics (3) Sp

A survey of the principal phenomena of solid state physics. Prerequisites, 323 and 325, or permission.

# 424, 425, 426 Mathematical Physics

425, 420 value (3,3,3) A,W,Sp Advanced classical mechanics. 425, 424: 426: Mathematical techniques of particular use in physics, including partial differential equations. Prerequisites, 323 and 325, or permission for 425; 425 for 426.

427 Applications of Physics (1-3, max. 12) Current applications of physics to problems in the sciences and technology. Prerequisite, permission.

428 Selected Topics in Physics (1-3, max. 12) Prerequisite, permission.

# 431, 432, 433 Modern Physics Laboratory (3,3,3) A,W,Sp 431, 432: Measurement in modern atomics,

molecular, and solid state physics. Prerequisites, 30 credits in physics or permission. 433: Techniques in nuclear and elementary particle research. Prerequisite, 327 or 422, or permission.

## 440 Basic Concepts of Physical Science (3) Sp

Deals with the nature and origin of some of the basic concepts of the physical sciences. Not open to science or engineering majors. Prerequisite, junior standing.

## 485H, 486H, 487H Senior Honors Seminar (1,1,1) A,W,Sp

Prerequisite, permission.

## **Courses for Graduates Only**

505, 506 Analytical Mechanics (3,3) A,W Topics from mechanics and applied mathe-matics including variational principles, La-grange's equations, Hamilton's equations, and canonical transformations.

# 509, 510, 511 Atomic, Molecular, and

Nuclear Structure (2,2,2) A,W,Sp Fundamental experiments and concepts of modern physics; introduction to quantum theory and application of quantum mechanics to problems in atomic, molecular and nuclear structure. This course should be particularly appropriate to graduate students in other areas of science and engineering who wish to acquire some understanding of modern physics.

## 513, 514, 515 Electromagnetism and Relativity (4,4,4) A,W,Sp

Properties of electric and magnetic fields in free space and material media; boundary value problems; radiation from accelerated charges and electromagnetic waves; the theory of special relativity leading to a relativistic formulation of electromagnetism and particle dynamics.

## 517, 518, 519 Quantum Mechanics (4,4,4) A,W,Sp

Physical and historical basis for quantum theory; solutions of the Schrödinger wave equation for discrete and continuous energy eigenvalues; representation of physical varia-bles as operators and matrix formulation of quantum mechanics; theory of angular mo-mentum; identical particles; elementary col-lision theory; various approximation methods for solution of the Schrödinger equation.

#### 520 Seminar in Physics, History, and Society (\*) Sp

Lectures and discussions on subjects of current interest in physics, but which are not included in conventional courses. Emphasis is on relationships between physics and other disciplines and activities. Prerequisite, graduate standing or permission.

## 524, 525 Thermodynamics and Statistical Mechanics (3,3) A,W

Statistical mechanical basis for the fundamental thermodynamical laws and concepts; applications of thermodynamic reasoning to selected physical problems; classical statistical distribution functions; quantum statistical mechanics; introduction to equilibrium manybody problems. Prerequisite, 517 or concurrent registration in 517.

## 527, 528, 529 Current Problems in Physics (1,1,1) A,W,Sp

Introduction to current research topics for beginning graduate students.

## 530 Physics Colloquium (\*) AWSp Seminar. Prerequisite, permission.

531 Seminar in High Energy Physics (\*) AWSp

## Prerequisite, permission.

Seminar in Atomic Collisions and 532 Spectroscopy (\*) AWSp Prerequisite, permission.

533 Journal Colloquium (\*) AWSp Seminar. Prerequisite, permission.

Seminar in Magnetic Resonance and Solid State Physics (\*) AWSp 534 Prerequisite, permission.

535 Seminar in Nuclear Physics (\*) AWSp Prerequisite, permission.

536 Seminar in Low Temperature and Solid State Physics (\*) AWSp Prerequisite, permission.

537 Seminar in Theoretical Physics (\*) AWSp Prerequisite, permission.

Seminar in Cosmic Ray Physics (\*) 538

AWSp Prerequisite, permission.

539 Seminar in Problems of Physics Education (\*) AWSp Prerequisite, permission.

Survey of Elementary Particle Physics 541 (3)

A survey of topics in elementary particle physics. Intended for the nonspecialist having a background of quantum mechanics. Prerequisite, 519.

## 542 Survey of Nuclear Physics (3)

A survey of topics in nuclear physics. Intended for the nonspecialist having a background of quantum mechanics. Prequisite, 519.

543 Atomic and Molecular Physics Survey (3)

A survey of topics in atomic and molecular physics. Intended for the nonspecialist having a background of quantum mechanics. Prerequisite, 519.

544 Solid State Physics Survey (3) A survey of solid state physics. Intended for the nonspecialist having a background of quantum mechanics. Prerequisite, 519.

550 Theory of Spectra (3) Sp Selected topics in atomic spectroscopy. Prerequisite, 519.

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.

557, 558, 559 High Energy Physics (3,3,3) Basic experimental facts and theoretical framework of elementary particle physics. Various topics of current research will be taken up in the second quarter. Prerequisite, 519.

## 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.

## 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. Prerequisites, 506 and 515.

566 Advanced Quantum Mechanics (4) A Second quantization; applications to the many-body problem; Klein-Gordon equation; radiation theory; elementary meson theory. Prerequisite, 519.

## 567, 568, 569 Theory of Solids (3,3,3)

A three-quarter course covering the funda-mentals of solid state physics. Various topics in solid state physics are covered in more detail bringing knowledge up to the current literature. Prerequisite, 519.

570, 571 Quantum Field Theory (3,3)

Emphasis will vary in different years between relativistic quantum field theory and the many-body problem. Prerequisite, 566.

574 Collision Theory (3) Emphasis will vary in different years among topics involving elementary particles, nuclei, and atoms and molecules.

576 Selected Topics in Experimental Physics

Prerequisite, permission.

578 Selected Topics in Theoretical Physics (\*)

Prerequisite, permission.

- 600 Independent Study or Research . (\*) AWSpS
- 800 Doctoral Dissertation (\*)

## **POLITICAL SCIENCE**

## **Courses for Undergraduates**

## GENERAL

101 Introduction to Politics (5) AWSp Basic themes and enduring problems of politics (power, authority, conflict, legitimacy, etc.), as revealed through one of the major foci of politics, such as international rela-tions, developing areas, urban politics, comparative European politics, political philoso-phy, or American politics generally. Primarily for prospective majors.

## 102 American Government and Politics (5) AWSp

Analysis and evaluation of the values, the institutions, the processes, and the policies of the American political system in the context of contemporary problems. Primarily for nonmaiors.

### 204 Introduction to Political Science (5) **AWSn**

Survey of the four major subfields of political science (political philosophy, comparative politics, international relations, American politics), each presented by faculty specializing in that area; accompaned by a comprehensive overview of the discipline as a whole. Pri-marily for prospective majors. Political Science 101, 201, or 202 recommended.

# 205 Preparatory Seminar in Political Analysis (5) AWSp

Intensive study of the basic concepts and the principles of one of the four major subfields of political science (political philosophy, comparative politics, international relations, Amercan politics). Limited to twenty students. Prospective majors only. Prerequisite, permission.

## 210 Ethnic Minorities and American Politics (5) W

Roles of ethnic groups in American politics; the situation of minorities in urban society; sources of tension and frustration; historical relationship of Blacks to the political process; protest as political activity; urban services and urban politics; the effect of national politics and policies on urban minorities.

#### 211 The Future of American Minorities (5) w

CHANDLER, SHEPRO

Exploration of the alternatives open to different minority groups in the United States; their development and place in American politics, the possibilities of community formation, integration, separatism, competitive economic structures, coalitions, etc. Prerequisite, 210 or permission.

## 313 Patriarchal Politics (5) Sp IGLITZIN

Analysis of political theory, historical and contemporary, including writings of the women's liberation movement on the political role of women in society. Emphasis is on empirical studies of the "apolitical" woman, and on the process of political socialization in various cultural contexts. Field research on women's participation in political decision making.

## 398H Honors Seminar (5, max. 15) AWSp Intensive and advanced studies in various aspects of political science. Open only to participants in the departmental honors program.

#### 499 Individual Conference and Research (2-5, max. 10) AWSp .

Open to qualified majors in the senior year. No more than one registration in 499 under the same instructor will be permitted. A second registration with a different instructor may be permitted only in very exceptional cases and with departmental approval. Prerequisite, permission of instructor.

## POLITICAL THEORY AND PUBLIC LAW

302 Field Experience in Politics (5, max. 10) AWSp

BEST, CHANDLER, LAMARE

Classroom analysis of political theory and of methods of political research, combined with extensive field research in contemporary problems of government and politics experienced by people of the Seattle community.

## 311 Theories of Modern Government (5) ASp

The principal political ideas of recent times with particular reference to their significance for democracy and liberal values. An introduction intended especially for other than political science majors.

### 312 Radicalism in American Politics (5) W IGL.ITZIN

Exploration of the varieties of radical dissent in American politics. The historical roots, extending back to the eighteenth century and beyond, of both left and right contemporary radical movements are examined. Radical elements in American political thought, e.g., anarchism, nonresistance, abolitionism, feminism, socialism, libertarianism, etc., are discussed. The relationship of radical to "ordinary" politics is explored, as is the more general implication for American society of the radical challenge. Prerequisite, an introductory course in political science.

## 362 Introduction to Public Law (5) A SCHEINGOLD

The general significance of the legal order; private rights and public duties; nature of the judicial process; sources of law.

## The Western Tradition of Political

Thought: Ancient and Medieval (5) A Origin and evolution of major political concepts from ancient Greece to the eighteenth century which underlie much contemporary thinking. A background in history is desirable. Prerequisite, 101, 201 or equivalent.

#### The Western Tradition of Political 412 Thought: Modern (5) W

Continuation of 411, treating materials from the seventeenth century through the early nineteenth, Hobbes through Hegel. Prerequisite, 411 or permission.

## 413 Contemporary Political Thought (5) Sp Developments from the eighteenth century to the present, as a basis for contemporary philosophies of democracy, communism, and

fascism. Prerequisite, 411 or equivalent.

## 414 Chinese Political Thought (5) Sp

Theories of the Oriental state as exhibited in the writings of statesmen and philosophers. (Offered alternate years; offered 1973-74.)

#### The Theory of Political Society (5) A 415 CASSINELLI

The nature of political society, its institutions, and its beliefs. Analyses of the concepts of governing, law, community, values, power, authority, stability, and change.

#### Economic Approaches to Political 416 Analysis (5) W

BISH

Application of economic theory and methodology to political phenomenon. Emphasis on theory construction, with application in the American context. Offered jointly with the Department of Economics as Economics 452. Prerequisites, Economics 201, 400 or equivalent.

## 418 American Political Thought (5) W

Major thinkers and movements from the Colonial period to the present.

## 460 Introduction to Constitutional Law (5) ASp

SCHEINGOLD Growth and development of the United States. Constitution as reflected in decisions of the Supreme Court; political, social, and economic effects

461 The Courts and Civil Liberty (5) W Cases and literature bearing on protection of constitutionally guaranteed private rights, with particular reference to period since 1937.

#### Law, Justice, and Public Order (5) A 464 SCHEINGOLD

Investigation of the political problems and value choices associated with the enforcement of criminal law. Particular attention will be devoted to variations in the distribution of resources among participants in the criminal law system, e.g., police, attorneys, defendants, and judges, and the consequences for the realization of constitutional rights. Prerequisite, junior or senior standing.

### 465 Law and Public Policy (5) W SCHEINGOLD

Investigation of the relationship between law and public policy, with particular attention to problems of social, economic, and political change. The course will consider 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.

## **GOVERNMENT, POLITICS,** AND ADMINISTRATION

#### 350 Government and Interest Groups (5) Sp GOTTFRIED

Agrarian, labor, professional, business, and ethnic interest in politics; impact on representative institutions and governmental processes. Prerequisite, 101 or equivalent.

#### 351 The American Democracy (5) ASp BONE, GOTTFRIED

Selected aspects and problems of contemporary American government: parties and politics; the presidency; Congress; the role of the Supreme Court; civil rights and civil liberties. Prerequisites, 101 or equivalent, or junior standing, and permission of instructor.

#### The American Constitutional System 360 (3) A

Fundamental principles, function, evolution, and unwritten constitution; recent tendencies.

#### 370 Government and the American

Economy (5) W Government regulation, promotion, and services affecting such principal interest groups as business, labor, agriculture, and consumers. The independent regulatory agencies, public ownership, government corporations, and the cooperative movement.

## 450 Political Parties and Elections (5) A BONE

Theories of American parties, campaigns and voting behavior; party leadership; political socialization and participation. Political Science 101 recommended.

## 451 The Legislative Process (5) W

BONE

Organization and procedure of Congress; state legislative politics; lobbying; legislative roles; the theory and practice of representative government. Prerequisite, 101 or permission.

452 Political Processes and Public Opinion (5) W BEST

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.

## 453 The State Legislature (5) W

BONE

Intensive study of American state legislatures, with special reference to the Washington State Legislature. Student's schedule must permit spending 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 or general studies special projects courses. Prerequisites, upper-division standing and permission.

### 470 Public Bureaucracies in the Political Order (5) ASp KAGI, KROLL

An analysis of the growth, power, and roles of governmental bureaucracies in America; conflict and conformity with American political thought, other political institutions, and publics in policy making.

# 471 Administrative Processes (5) W

Focus upon the theories of organization and social control processes (primarily personnel and budgeting) utilized in American governmental bureaucracies; special problems of responsiveness, executive and political direction, and regional administration.

## 472 Introduction to Administrative Law (5) Sp

KAGI

The legal context of American administration, the public function, public management, administrative powers, the nature of judicial control.

## 473 Administration in Modern Democracies (5) W

KROLL

The changing formal and informal structure of administrative organization and processes in non-communist urban-industrial societies; the nature and role of bureaucracy; the effect of attitudes toward the state on administrative practices. Prerequisites, 470 and one or more of 346, 444, 445, or permission of instructor.

## 474 Administration in Developing Nations (5) Sp

KROLL

Administrative aspects of governmental change and modernization in developing nations; colonial influences on administration; problems of establishing new nations and adapting to change in established states; bureaucratic development and behavior; theories of development administration. Prerequisites, 470 and at least one course in the politics of developing nations, or permission of instructor.

**480** Metropolitan Area Government (5) W Conceptual problems in metropolitan analysis; urban governmental systems; regional political decision making structures; metropolitan, state, and federal relations; value implications of formal organization. Offered jointly with the College of Architecture and Urban Planning as Urban Planning 460.

## 481 Urban Government and Administration (5) A

Reform ideology; formal organization, external relations; structure and distribution of influence and leadership; role of bureaucracies; policy issues.

## 482 State Government (5) Sp BEST

Focus on the structures, processes, and policy outputs of state governments in the United States.

### 483 Technology, Environment, and Urban Policy (5) Sp

Examination of the interrelation between technological and environmental change and policy formation in urban political systems. The estimation of the impact of technology and social change upon environment. 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. Prerequisite, one course in state and local government or permission.

### 487 Intergovernmental Relations (5) W GORE

Analysis of the content and dynamics of the relations between federal, state, and local governments, with emphasis upon patterns in these relationships which reflect program structures.

### 490 Analysis of Political Behavior (5) AW BEST

Examination of concepts, techniques, and results of research on political behavior.

### 491 Political Behavior Methodology (5) W FRANCIS

Course will emphasize numeric and symbolic approaches to the study of political phenomena. Consideration will be given to typologies, scales, measurement techniques, sampling of elites, and selected multivariate procedures and the results of their application to legislative, voting, judicial, and administrative behavior. Prerequisite, 490 or permission.

## COMPARATIVE GOVERNMENT AND INTERNATIONAL RELATIONS

## 321 American Foreign Policy (5) W

TODD Constitutional framework; major factors in formulation and execution of policy; policies as modified by recent developments; the principal policy makers—President, Congress, political parties, pressure groups, and public opinion. Prerequisite, 102.

## 322 Diplomatic Practices and Procedures (5) ASp RILEY

Department of State; diplomatic and consular services; American diplomatic practice and procedure.

## 323 International Relations of the Western Hemisphere (5) W

The Monroe Doctrine; Pan-Americanism; special interests in the Caribbean; hemisphere solidarity; the "Good Neighbor" policy; Latin America and World War II; Latin America and the United Nations.

## 324 Contemporary International Relations in Europe (5) Sp HITCHNER

European diplomacy and international relations between the two world wars; problems of European integration; contemporary developments.

## 328 The United Nations and Specialized Agencies (5) A TODD

The structure and functions of the United Nations and specialized agencies; accomplishments; proposals for strengthening; relations of regional bodies and member states.

### 341 Government and Politics of Canada (5) A

A critical analysis of parliamentary institutions, political parties, and the federal system in Canada. Prerequisite, 101 or equivalent.

## 342 Government and Politics of Latin America (5) A

MYHR

An 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. Prerequisite, upper-division standing.

## 343 Government and Politics of Southeast Asia (5) A

LEV

Analysis of the organization and functioning of government and politics in the countries of Southeast Asia, with attention given to the nature of the social and economic environments which condition them. Political Science 101 recommended.

### 346 Governments of Western Europe (5) A HITCHNER

Modern government and politics of Great Britain, France, and Germany.

## 347 Governments of Eestern Europe (3) W RESHETAR

Survey of the Communist regimes of Poland, Hungary, Czechoslovakia, East Germany, and the Balkans. (Offered alternate years; offered 1972-73.)

# 348 The European Community (5) W

The movement toward a political union of European states; national, international, and supranational elements in the law and politics of the community.

### 408 Problems of Peace and Conflict Resolution (3) W TODD

Study of factors involved in conflict and in conflict resolution; application to international and other problems. Lectures, discussions, and readings in social psychology, political science, and economics. Offered jointly with the Department of Economics as Economics 408.

## 420 Foreign Relations of the Soviet Union (5) W

RESHETAR Ideological, historical, and strategic components of Soviet foreign policy; Comintern, Cominform, and international Communist movement; Soviet policy in foreign trade, international law and organization, and in specific geographic areas.

### 425 International Law (5) A ROHN

History and present status of international law. Feedback between law and politics in international relations. Current trends in treaties and court cases.

### 426 World Politics (5) A MODELSKI

The nation-state system and its alternatives; world distributions of preferences and power; structure of international authority; historical world societies and their politics.

## 427 International Government and Administration (5) A

Comparative study of regional and general governmental international organizations.

## 429 International Relations in the Far East (5) ASp

HELLMANN

Analysis of the relations among the nations of East and Southeast Asia in the context of the global international system.

## 430 Government and Politics in the Middle East and North Africa (5) W

Breakdown of traditional society and the problems of building modern political systems.

432 American Foreign Policy in the Far East (5) W

TAYLOR

Relationship to diplomacy, trade, and internal politics.

433 International Relations in Southeast Asia (5) W

Analysis of the problems affecting the relations among the countries of Southeast Asia. Prerequisites, 101, 343, or permission.

434 International Relations of South Asia (5) W BRASS

Interrelationships of domestic, interstate, and extra-regional forces and their effects upon the resolution or expansion of interstate conflicts in South Asia.

### 435 Japanese Government and Politics (5) A HELLMANN

Government and politics of Japan with emphasis on the period since 1945.

## 439 Government and Politics of

Sub-Saharan Africa (5) W A survey of government and politics in the countries of tropical Africa, with major emphasis on political development and national integration in former British Africa. Prerequisite, 101 or permission of instructor.

### 440 Government and Politics of South Asia (5) Sp BRASS

A comparison of problems of national integration and political development in India, Pakistan, and Ceylon.

## 441 Political Institutions of the Soviet Union (5) A

RESHETAR

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.

## 442 Government and Politics of China (5) A

TOWNSEND

Introduction to post-1949 government and politics, with emphasis on problems of political change in modern China. Prerequisite, junior standing.

### 443 Constitutional Regimes (5) W CASSINELLI

•Analyses of modern and premodern types of political regimes concerned with social stability, with special attention to contemporary representative democracy.

## 444 Revolutionary Regimes (5) Sp

Analyses of the several types of political regimes concerned with effecting fundamental social change; emphasis on the twentieth century.

### 445 Comparative Political Institutions (5) W HITCHNER

Comparative study of the nature, structure, and function of the major institutions of government, including the party, executive, legislature, and judiciary. Prerequisites, 101 and one 300-level course in comparative government, or permission.

## 447 Comparative Politics in Selected Systems (5) W

Comparative study of nationally inherent and globally derived aspects of national political systems. Emphasis will be on the extranational influences on national political cultures, governmental and political organization, and political processes in two or three national political systems. Prerequisite, permission of instructor.

## 448 Comparative Federal Systems (5) Sp

An intensive analysis of the development and operation of typical federal systems in established states, and comparisons with those recently adopted in developing areas. Attention will be devoted to legal, political, and socioeconomic problems in these federal regimes.

## 449 Politics of Developing Areas (5) ASp

BRASS, HELLMANN, MYHR, TOWNSEND Comparative study of problems of national integration and political development in the new states of Asia and Africa. Prerequisite, junior standing.

## **Courses for Graduates Only**

### 504 Seminar on the Modernization of Japan (5) A HELLMANN

Historical and theoretical approach to social, political, economic, and psychological problems of modernization in Japan. Offered jointly with the Department 'of History as History of Asia HSTAS 526. Prerequisite, permission.

### 506 Contemporary Problems, Domestic and Foreign (3) S

## 511 Studies in Ancient and Medieval

Political Theory (3, max. 6) A. Selected topics. Prerequisite, permission of instructor.

## 512 Studies in Modern Political Theory (3, max. 6) W

Selected topics from the sixteenth to the nineteenth centuries. Prerequisite, permission of instructor.

## 513 Studies in Recent and Contemporary

Political Theory (3, max. 6) Sp Selected topics from nineteenth and twentieth centuries. Prerequisite, permission of instructor.

## 514 Seminar in Problems of Political Theory (3, max. 9) Sp

CASSINELLI, GORE

Selected topics, historical and conceptual, national, regional, and universal. Prerequisite, permission of instructor.

## 515 Scope and Methods in Political Science (3) AW

GORE Inquiry into the philosophic foundations of various approaches in political science and their possible contributions to an understanding of politics. Substantial background in philosophy, as well as in political science, is highly desirable.

## 519 Theories of Decision Making (3) Sp FRANCIS

A survey of the several theories of collective decision making, including analysis of alternative strategies and the spectrum of decisional functions associated with each strategy.

### 520 Seminar on the Foreign Policy of the Soviet Union (3) Sp RESHITAR

Selected topics in the development, methods, and objectives of the foreign policy of the Soviet Union. Prerequisite, permission.

## 521 Theories of International Relations (3) Sp

MODELSKI

Review of contemporary theory, research, and methodology in the study of world politics. Prerequisites, 426 and permission.

### 522 Seminar in World Politics and Organizations I (3) W MODELSKI

Principles of world politics and problems of world order: war and systemic conflict. Prerequisites, 426 and permission.

## 523 Seminar on World Elites (3) Sp

Basic concepts of elite studies. Elitism. Local, national, and global elites. The representativeness, cohesion, and performance of elites. Methods in the study of elites.

### 524 Seminar in World Politics and Organizations III (3) Sp TODD

The United Nations: selected problems.

### 525 International Law I: Policy (3) A ROHN

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, 425 or permission.

# 526 International Law II: Treaties (3) W

Classical and modern views of treaties. Quantitative research in treaties as a reflection of trends in international law and politics. Global, regional, and national treaty patterns. Prerequisite, 425 or permission.

## 527 International Law III: Courts (3) Sp ROHN

Past and present roles of courts and quasijudicial agencies in the development of international law. International judicial behavior. Prerequisite, 425 or permission.

## 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.

### 530 Seminar in Regional Foreign Policy (3) Sp

Regionalism in the world order and economy; the "region" as a basis of foreign policy; foreign interests and policies of the major regions of the world: the U.S.S.R., Central Europe, Western Europe, the British Empire, the Middle and Near East, the Far East, and Latin America. Prerequisite, permission of instructor.

### 531 Problems of Southeast Asian Politics (3) LEV

Inquiry into selected domestic and international problems. Prerequisite, permission of instructor.

### 532 The Chinese Political System (3) W TOWNSEND

Examination of key approaches, interpreta-tions and secondary literature in the study of contemporary Chinese politics. Prerequisite, permission.

## 533 Seminar on Contemporary Chinese Politics (3) Sp

TOWNSEND

Research on selected problems in contemporary Chinese politics. Prerequisite, 532 or permission.

### 534 American Foreign Policy Formation (3) A DENNY

American foreign policy viewed whole, in-cluding defense policy, the relationships of foreign policy to domestic policies and priorities, and the full range of historical, constitutional, institutional, political, and theoretical questions related to the formation and execution of foreign policy in this broad sense. Offered jointly with the Graduate School of Public Affairs as Public Policy 534. (Formerly 528.)

## 538 Government and Politics in the Middle East and North Africa (3) Sp

Study of 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 instrumentalities of change; and problems of international relations and regional conflict and integration.

## 539 Politics in Sub-Saharan Africa (3) Sp

Selected problems of government and politics in the countries of Sub-Saharan Africa. Prerequisite, 439 or permission.

540 Seminar in Modern Indian Politics (3) Sp BRASS

Research problems in contemporary Indian politics.

#### 541 The Soviet Political System (4) A

RESHETAR Critical appraisal of the principal research methods, theories, and types of literature dealing with the government and politics of the Soviet Union. Prerequisite, permission.

#### 542 Seminar in Commonwealth Governments (3) Sp

Comparative analysis of the government and

politics of selected Commonwealth states; the Commonwealth as an institution.

#### 543 Seminar in British Government (3) Sp HITCHNER

Advanced studies in British parliamentary government.

## 544 Problems in Comparative Government (3, max. 9) W

CASSINELLI, HITCHNER

Selected problems in the comparative analysis of political institutions, organizations, and systems.

- 545 Seminar on Japanese Government and Diplomacy (3, max. 6) W HELLMANN
- **Seminar in Problems of Soviet Politics** 546 (3) W RESHETAR

Selected problems of Soviet domestic politics. Prerequisite, 541 or permission.

547 Problems in Latin American Political Systems (3) Sp MYHR

Prerequisite, permission of instructor.

548 Comparative Political Parties (3) WSp BONE, BRASS

An examination of the role of political parties in the modern state. Similarities and differences in the origins and development of political parties and the functions they per-form, both in established democracies and in the developing countries, will be discussed.

#### **Problems of Political Development** 549 (3, max. 9) Sp

BRASS

Comparison of aspects of political change and development in both contemporary and historical developing societies.

## 550, 551, 552 Seminar in Politics (3,3,3) A,W,Sp

## BONE, GOTTFRIED

Topical and regional studies of political associations in the United States; leading principles and motivations of political action and leadership; legislative processes; methodology and bibliography.

## 553 Public Opinion (3) W

BEST Selected problems in opinion formation, characteristics, and the role of public opinion in the policy-making process. Prerequisite, 452 or permission of instructor.

### 554 Legislative Politics (3, max. 6) AW BONE, FRANCIS

Selected problems in legislative processes and leadership, state, and national. Prerequisite, 451 or equivalent.

562, 563, 564 Public Law (3,3,3) A,W,Sp Constitutional and legal concepts governing governmental authority and institutions and the conduct of governmental activities.

#### 570 The Administrator and the Policy Process (3) A

KAGI, KROLL

Context of public administration from the perspective of the administrator. Through case and research materials and field inquiries and interviews, the manifold roles and functions of the administrator are examined, particularly as he relates himself and his work to the process of implementing, making, and

changing public policy. Offered jointly with the Graduate School of Public Affairs as Public Administration 501.

## 571 Public Policy and Administration (3) W KAGI, KROLL

Interaction between the bureaucracy and those institutions, organizations, and groups involved in the policy process. Analyses of current policy problems are made from this perspective. Offered jointly with the Graduate School of Public Affairs as Public Administration 502.

#### 572 Administrative and Executive Leadership (3) Sp

KAGI, KROLL

The 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 the Graduate School of Public Affairs as Public Administration 503.

### 573 Public Management: Program Planning and Design (3) A SHIPMAN

Topics include the policy context of planning and programming, the institutionalization of purpose, the planning process, activity design, work scheduling and measurement, and program evaluation. Offered jointly with the Graduate School of Public Affairs as Public Administration 521.

### 574 Public Management: Budgeting (3) W LYDEN, PEALY

Budgeting as a management process. Study of formulation and administration of government budget, including the role of budgeting in the policy process, approaches to budget formulation and analysis, the development of the PPB approach, and aspects of budget administration such as revenue estimating, allotment control and cost accounting. Offered jointly with the Graduate School of Public Affairs as Public Administration 522.

### 575 Public Management: Personnel (3) ASp LYDEN

Study of line-staff decision making in the acquisition and use of human resources in public organizations, including evaluation of job responsibilities, establishment of compen-sation levels, collective bargaining, selection and placement, performance appraisal, incentive management, and training. Offered jointly with the Graduate School of Public Affairs as Public Administration 523,

#### Administrative Problems: Micro-576 Organization (3) A

SHIPMAN

Analysis and solution of problems involving the interaction of individuals and groups within organizations. Emphasis is placed upon the differences between the traditional and behavioral approaches to the understanding of the governmental organization, the motivation of the persons involved in the decision to produce, the nature of the decision to participate, the nature of conflict and innovation, and the limits of rationality. Offered jointly with the Graduate School of Public Affairs as Public Administration 511.

#### Administrative Problems: Macro-577 Organization (3) W SHIPMAN

Analysis and solution of problems inherent in the characteristics and behavior of largescale organization and multi-agency complexes. Systems approaches are interrelated with social systems theory; functional problems are interrelated with types of organizations resulting from the public purpose served, and information flows are analyzed. Emphasis is given to concepts of organizational effectiveness and change. Offered jointly with the Graduate School of Public Affairs as Public Administration 512.

## 578 Administrative Problems: Program Analysis (3) Sp

SHIPMAN

Applicability of systems approaches and systems modeling to various types of program problems. Emphasis is upon comprehensive program planning, approaches to factoring of alternatives, the evaluation of cost-utility relationships, and the assessment of alternative options or "trade-offs" in activity components of large-scale action programs. Offered jointly with the Graduate School of Public Affairs as Public Administration 513.

## 579 Comparative Administrative Systems (3) W

KROLL Methodological problems of research in comparative administration. Theoretical and substantive aspects of administrative systems in urban-industrial and developing nations. Offered jointly with the Graduate School of Public Affairs as Public Administration 551.

## 580, 581, 582 Seminar in Metropolitan and Urban Planning Problems (3,3,3) A,W,Sp

The metropolitan community; nature, characteristics, functions, governmental structure, and intergovernmental relations. Urban planning; theory, law and administration, policy determination, and public relations. Methods and devices for plan implementation. Drafting local ordinances for planning, zoning, subdivision control, and urban renewal.

## 584 Approaches to Subnational Government (3) A

An analysis of current approaches and concepts in the study of subnational government—urban, state, and regional public organization.

## 585, 586 Local, State, and Regional Politics and Administration (3,3) W,Sp

Exploration and analysis of political and organizational behavior at the local, state, and regional levels of government, with emphasis upon methodology and field research.

## 590 Seminar in Political Behavior (3, max. 6) WSp

BEST. GORE

Analysis of behavioral research in selected fields of political science.

## 594 Multivariate Policy Analysis (3) W FRANCIS

Substantive focus on measurable attributes of public policy, including comparative and longitudinal analysis. Selected topics may include spending patterns and performance measures relating to cities, states, nations, or international organizations. Statistical analysis will include examples taken from several areas: (1) data transformations, (2) partial and multiple correlation and repression. (3) causal inference, (4) factor analysis, (5) distributive lag moceling. Prerequisite, 491 or permission.

## 600 Independent Study or Research (\*)

700 Master's Thesis (\*)

800 Doctoral Dissertation (\*)

## **PSYCHOLOGY**

## **Courses for Undergraduates**

100 General Psychology (5) AWSp FIELDS

Introductory survey of various fields of work in scientific and professional psychology, illustrating basic principles derived from experimental studies of human and animal behavior, including applications in the measurement, prediction, and development of human capabilities. Not open to students who have taken 101, 102, or 190.

## 101, 101H Psychology as a Social Science (5) AWSpS, W or Sp

BEACH, FRASER, MC KEEVER, ROBINSON, R. SMITH

Introductory survey of the scientific study of human behavior, covering experiments, observations, and theories relating to individual differences, personality, development, motivations, social behavior, deviant behavior, genetics and physiology of behavior, learning and cognitive processes, and sensory and perceptual processes. Discussion often centers around major social problems and the research psychologists' efforts to help characterize and solve these problems. Participation in experiments as a subject is required. 101H includes more extensive reading in texts and source material; a term paper is required. Prerequisite for 101H, permission of College of Arts and Sciences honors program adviser. Not open to students who have taken 100, 102, or 190.

## 102, 102H Psychology as a Natural Science

(5) AWSpS, W or Sp

BOLLES, DOUGLAS, SACKETT, M. SMITH, TELLER, WOODBURNE

Introductory survey of the study of behavior from a natural science viewpoint. Discussion often centers around the components and mechanisms of behavior. Topics will include the evolution, genetics, and physiology of behavior, learning processes, motivation, individual differences, development, social behavior, and sensory, perceptual, and cognitive processes. Participation in experiments as a subject is required. 102H includes more extensive reading in texts and source material; a term paper is required. Prerequisite for 102H, permission of College of Arts and Sciences honors program adviser. Not open to students who have taken 100, 101, or 190.

## 200 Comparative Animal Behavior (5) A ALCOCK

Introduction to the methods and findings of comparative animal behavior. Emphasis will be placed on the reasons for studying the behavioral differences and similarities between animal species. Behavior will be viewed as part of each species' adaptation to its natural habitat. The importance of the findings of comparative animal behavior to understanding of human behavior will be discussed. No formal prerequisites, although 102 or Biology 210 is recommended.

## 201, 201H Laboratory in Human

Performance (5) AWSpS, W or Sp NELSON

Lectures and laboratory on selected aspects of human learning, perception, and performance.

201H includes more extensive reading in texts and source material and greater emphasis on original student experiments. Prerequisites, 100 or 101 or 102; for 201H, permission of College of Arts and Sciences honors program adviser.

## 202, 202H Laboratory in Animal Learning (5) AWSpS, W

R. SMITH

Lectures and laboratory on selected aspects of animal learning. Operant techniques with the rat are stressed. 202H includes more extensive reading in texts and source material and greater emphasis on original student experiments. Prerequisites, 100 or 101 or 102; for 202H, permission of College of Arts and Sciences honors program adviser.

## 203, 203H Laboratory in Animal Behavior (5) AWSp

ALCOCK, LOCKARD

Experience with a variety of animal species and a variety of experimental procedures and instrumentation. 203H includes more extensive reading in texts and source material and greater emphasis on original student experiments. Prerequisites, 100 or 101 or 102 and 200 or Biology 212, or equivalents; for 203H, permission of College of Arts and Sciences honors program adviser.

### 205 Introduction to Personality and Individual Differences (4) AWSpS R. SMITH

Introduction to basic concepts and methods within the field of personality and background for more intensive study in the field of personality. Prerequisite, 100 or 190, or equivalent.

## 210 Psychology of Human Sexual Behavior (3) AWSp

WAGNER

Survey of the current literature concerning the development of human sexual behavior. Physiological and psychological components of human sexuality and its deviations will be considered.

## 211 Introduction to the Logic of Behavioral Science Experimentation I (3) AWSpS BOBROW, LUMSDAINE, PAGANO

How science phrases and attempts answers to inquiries about behavior; translating questions into hypotheses that can be investigated by systematic observation or laboratory manipulation; elements of an experiment; and problems of generalizing the results of an experiment. Replaces 302 as statistics requirement for majors registered in the psychology bachelor of arts programs.

## 212 Introduction to the Logic of Behavioral Science Experimentation II (3) AWSpS BOBROW, LUMSDAINE, PAGANO

Experimental logic introduced in 211 applied to representative experiments in psychology; selecting experimental designs; problems of experimental control; and interpreting analyses of experimental data. Prerequisite, 211. Replaces 303 as statistics requirement for majors registered in the psychology bachelor of arts programs.

## 222 Survey of Physiological Psychology (3) ASpS

DOUGLAS

Introduction to the brain and how it works. Learning, memory, sleep, the senses, and the emotions are considered in detail. Intended primarily for students who do not intend to specialize in physiological psychology. Prerequisite, major standing in a biological science or either 100 or 101 or 102.

#### 250 Racism and Minority Groups (4) AWSpS

## SUE, WAGNER

Survey of the problems of racism and their effects upon minority groups, with particular emphasis on the conditions related to the development of mental health. Emphasis will be placed on the situation of the Black, Chicano, Indian, and Oriental groups.

### 260 Psychological Aspects of Poverty (3) Sp CANON

Information about the psychological effects of poverty and related social phenomena; the effects on psychological development, person-ality, mental health, and social behavior. Where possible, remedial steps will be discussed.

## 302 Statistical Methods I (3) AWSpS

EDWARDS, HUNT, C. LUNNEBORG, ONCKEN 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, Mathematics 124 or 157, and major status. Required for majors in the psychology bachelor of science programs or in the psychology honors or distinction programs. Ad hoc honors credit available to students in the honors or distinction programs. Prerequisite, permisson of departmental honors adviser.

#### 305 **Deviant Personality (5) AWSpS** KOHLENBERG, SARASON, SUE

Introduction to the field of psychopathology; analysis of forms, nature, and causes of disorders of behavior and personality. Prerequisite, 10 credits in psychology, including 100 or 101 or 102, or equivalent.

#### 306 **Developmental Psychology (5) AWSpS** FINKEL, SLABY

An analysis of psychological development of the child in relation to biological, physical, and sociological antecedent conditions from infancy to adolescence. Prerequisite, 100 or 101 or 102.

## 314 Statistical Inference in Psychological Research (3) AWSpS

EDWARDS, HUNT, C. LUNNEBORG, ONCKEN Hypothesis testing and its probabilistic and statistical basis. Development and application of techniques of statistical inference commonly 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. Prerequisites, 302 (or 212 and Mathematics 124 or 157), and major status. Replaces 303 for majors registered in the psychology bachelor of science program, or in either the departmental honors or distinction programs. Ad hoc honors credit available to students in the honors or distinction programs. Prerequisite, permission of departmental honors adviser.

#### 320 Field Analysis of the Behavior of Young Children (3)

Objective analysis of the behavior of young children with interpretations of data for research and guidance purposes. One hour weekly arranged for supervised observation in the Day Care Center, Prerequisite, 306 or equivalent.

## 345 Social Psychology (5) AWSpS CANON, FRASER, MITCHELL

A study of the interaction of the individual and the group with emphasis upon interpersonal processes, social motivation, attitude formation and change, leadership, and the relation between personality and social be-havior. Prerequisite, 100 or 101 or 102, or equivalent.

### 350H Research Seminar in Psychology (2, max. 6) AWSp

Presentations by professors and advanced honors or distinction students concerning the rationale, methodology, and progress of their research projects. To be taken quarterly by all junior honors and distinction candidates in conjunction with 498 and 499. Meets jointly with 450H. Prerequisites, 201H and 202H or 203H, or equivalents, and permission of departmental honors adviser.

## 355 Survey of Cognitive Psychology (5) W or Sp

BEACH, BORROW, NELSON

Empirical and theoretical approaches to thinking, problem-solving, and concept formation. Prerequisite, 10 credits in psychology, includ-ing 100 or 101 or 102, or equivalent.

#### Laboratory in Social Psychology (5) 361 W or Sp

## FRASER, STOTLAND

Practice and discussion of methods of systematic observation, content analysis, etc.; experimental manipulation in social psychology; individual research projects. Prerequisites, 212 or 314, 345 and major standing, or permission.

## 400 Learning (5) AWSpS BOLLES, NELSON

Experimental research and basic theories primarily in animal learning. Prerequisite, 100 or 101 or 102.

#### 403 Motivation (5) AWSp

BERMANT, BOLLES, LOCKARD, M. SMITH Theory and research on reinforcement, punishment, frustration, preference, instinctual mech-anisms, and other factors controlling animal behavior. Prerequisite, 100 or 101 or 102.

#### **Advanced Personality Theory and** 405 Research (5) ASp CARR. DOERR

A more intensive survey of theoretical concepts in the field of personality and a more detailed review of experimental methods and experiments in the field of personality. Prerequisite, 205 or equivalent.

#### **Instrumentation for Behavioral** 406 Scientists (5) A or Sp

PAGANO

Training in electricity and electronics to enable understanding, selection, and use of basic general-purpose psychological research apparatus. Topics include direct- and alternatingcurrent circuits, measuring instruments, directcurrent power supplies, amplifiers, relays, transducers, and biolelectrical recording. Emphasis is on first-hand experience with research-caliber equipment. Registration limited to 15. Prerequisites, junior or senior major standing and permission. (Offered alternate years; offered 1972-73.)

## 407 History of Psychology (5) W or Sp BERMANT, BOLLES

Historical and theoretical background of the basic assumptions of modern psychology. Such doctrines as behaviorism, determination, and associationism are considered as well as the men who developed them. Prerequisite, 400 or equivalent.

#### 409 Ethology (3) W

ALCOCK, ORIANS Perception, nervous integration, movement, motivation, instinct, learning, and social behavior in animals, with emphasis upon their evolution and selective significance. Offered jointly with the Department of Zoology as Zoology 409. Prerequisites, 200 or Zoology 210 and 212, or equivalents.

#### 410 **Deviant Development (5) AWSp** STROTHER

Introduction to developmental deviations, including sensory-motor handicaps, mental retardation, brain injury and emotional disturbances. Particularly for students interested in advanced work in clinical psychology or special education. Prerequisites, 305 and 306, or equivalents.

### 414 Cognitive Development (5) WSp DALE

Exploration of the various aspects of cognitive development, with particular attention to the following areas: concept formation, intelligence and its measurement, creativity, cognitive styles, and language development. There also will be emphasis on alternative theoretical approaches to the general questions of cognitive development. Prerequisite, 306.

### 416 Animal Behavior (5) A, W or Sp LOCKARD

Analysis of laboratory experiments, field investigations, and current theory of the behavior of animals from protozoa to man, including theoretical accounts of selected problems. Prerequisite, 200 or 203 or 10 credits in biology or zoology.

#### Ethology and Human Behavior (3) W 417 ALCOCK

A seminar for undergraduates with primary emphasis on a critical reading of recent litera-ture which has claimed that ethology is relevant for an understanding of human behavior. Prerequisite, 200 or equivalent.

### 421 Neural Basis of Behavior (5) ASp WOODBURNE

Anatomical and physiological principles involved in the integrative action of the nervous system and the results in behavior of this neural activity. Prerequisites, 100 or 101 or 102 and 10 credits in biology or zoology.

### 422 Physiological Psychology (5) W DOUGLAS

Physiological mechanisms in behavior, including those basic to emotion, fatigue and sleep, learning, and memory. Prerequisite, 100 or 101 or 102, or equivalent.

## 423 Sensory Basis of Behavior (5) Sp

MAKOUS Sensory and perceptual phenomena; sensory equipment; theories of sense-organ function. Prerequisites, 15 credits in psychology, including an introductory course.

#### 424 Vision and Its Physiological Basis (5) A TELLER

Phenomena of human vision, including: spectral sensitivity, color vision, spatial interac-tions, light and dark adaptation, distance perception, and binocular interaction. Techniques for study of vision in human subjects will be included. The correlation of human visual functioning with known optical, biochemical, anatomical, and physiological factors will be stressed. Prerequisite, permission. Some background in physical or biological science is recommended.

## 425 Surgical and Histological Techniques (5) W

WOODBURNE

Practicum in important surgical and histological techniques used in psychophysiological experimentation. Registration limited to six students. Prerequisites, 421 and permission. (Offered alternate years; offered 1972-73.)

## 430 Problems of Assessment (3) Sp C. LUNNEBORG, SAX

Appraisal of human differences and the use of such appraisals in evaluation, selection, and classification. Emphasis on utilization of psychological tests and related measures. Prerequisite, 212 or 302.

### 434 Laboratory in Human Vision (5) W MAKOUS

Introduction to the techniques of research in visual psychophysics. Students will learn to align and calibrate basic optical systems, and will replicate some classical vision experiments and/or carry out their own experiments. Prerequisites, 424 and permission. Limited to ten students.

## 441 Perception (5) ASp

CULBERT, FINKEL A consideration of the ways in which experience is organized. Perceptual aspects of the various sensory modalities, relations between physical and psychological dimensions, nonstimulus determiners of the perceived world, and mediational feedback are among the central topics treated experimentally and theoretically. Prerequisite, 15 credits in psychology.

## 442 Measurement and Design in Attitude Research (5) A

ONCKEN

Lectures briefly cover major theories of attitude formation and change and problems of research design and measurement in studies of attitude formation and change. Laboratory sessions are devoted to a study of traditional, as well as more recent, approaches to the measurement of attitudes. Theoretical implications of various measurement techniques are stressed. Students are required to undertake a report on an attitude measurement project. Prerequisites, 212 or 314 and 345, or equivalents.

### 443 Social Psychology of Prejudice (3) W CANON

Examination of social psychological theory and research regarding the development, maintenance, and dissolution of prejudicial attitudes, with particular emphasis on anti-Black sentiment. Prerequisite, 345.

## 444 Social Influence and Attitude Change (3) W or Sp

CANON, ONCKEN

Discussion of research on the nature and effects of social influence, with special emphasis on attitude formation and change, conformit, behavior, "brainwashing", prejudice, and propaganda. Prerequisite, 345.

### 445 Theories of Social Psychology (5) W STOTLAND

Individual determinants of social behavior, processes, and outcomes of social interaction, their effects on the individual and groups. Prerequisites, 345 and senior or graduate major standing.

### 446 Objective Assessment of Personality (3) Sp EDWARDS

• Methods and techniques of observing and measuring personality variables. Problems of research design in personality and social psychology. Prerequisites, 205 and 302, or permission. (Extra credit may be earned for research activity by registering concurrently in 499 with the permission of the instructor.)

### 447 Psychology of Language (5) W CULBERT

Psychological principles applied to linguistic development and organization; language in both its stimulus and response aspects. Prerequisite, 15 credits in psychology.

## 448 Seminar in Psychology (1-15)

Study of selected research topics of contemporary interest. May be repeated for credit. Quarterly listings of specific offerings are available at departmental advisory office. Prerequisite, major standing.

## 450H Research Seminar in Psychology (2, max. 6) AWSp

Presentations by professors and advanced honors students concerning the rationale, methods, and progress of their research projects. To be taken quarterly by all senior honors and distinction candidates in conjunction with 498 and 499. Meets jointly with 350H. Prerequisites, 201H and 202H or 203H, or equivalents, and permission of departmental honors adviser.

## 457 Language Development (3) W

DALE

The study of first-language acquisition and use by children. Emphasis will be placed on theoretical issues and research techniques. Offered jointly with the Department of Linguistics as Linguistics 447. Prerequisites, senior or graduate major standing.

## 461, 462 Human Learning and Memory (5,5) A,W

## MC KEEVER

Selected experimental problems and theoretical interpretations relevant to verbal behavior and learning. Discussion in the first quarter will emphasize acquisition and transfer (461) and in the second quarter retention and forgetting (462). Prerequisites, 211 or 302 or equivalent for either course; neither course prerequisite to the other.

## 468 Information Processing (4)

HUNT

Human thought is treated 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 that subsequently can be used in rational problem solving; detailed discussion of theoretical models of attention, memory, and recall; cognitive models of rational problem solving. Prerequisites, 201 and 355, or equivalents.

# 475 Computing in Behavioral Sciences (5) W

The application of computers to research problems in the behavioral and social sci-

ences; functional and performance characteristics of batch processing, interactive and control computing systems; computing languages; computer methods of data processing, control of experiments, and automated instruction. Prerequisites, upper-division or graduate standing in behavioral or social sciences, some knowledge of statistics and computer programming, or permission of instructor.

## 497 Undergraduate Field Work (1-3, max. 6) AWSpS

P. LUNNEBORG

Individual consultation with faculty member and supervised practicum experience in a broad range of community settings and agencies dealing with psychological problems. Prerequisites, junior or senior major standing and permission of supervising instructor.

## 498 Readings in Psychology (1-3, max. 9) AWSpS

Reading in special interest areas under supervision of staff members. Discussion of reading in conference with instructor. The name of the staff member with whom research will be done should be indicated in registration. Prerequisite, permission of supervising instructor.

## 499 Undergraduate Research (1-3, max. 9) AWSpS

The name of the staff member with whom research will be done should be indicated in registration. Prerequisite, permission of supervising instructor.

## **Courses for Graduates Only**

## SEMINARS AND SPECIAL TOPICS

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. Students registering for independent study or research courses must receive permission of the instructor.

## 500 Learning and Motivation (3) Sp BOLLES

A general survey of animal learning and motivation; emphasis on recent problems, findings and theoretical developments; topics may include avoidance learning, cyclic behavior, defensive behavior, food preferences, incentive motivation, noncontingent reinforcement, and territoriality. Prerequisite, graduate major standing.

## 503 Advanced Social Psychology (3) W STOTLAND

Problems in person perception; attitude; socialization; and group processes. Prerequisite, graduate major standing.

### 504 Theories and Issues in Developmental Psychology (5) A BEE

An examination of major theoretical approaches to the study of human development, with presentation of representative empirical literature for each theory. Selected research areas will also be discussed, including such topics as language, intelligence, and parent-child interaction. Prerequisite, graduate standing.

## 505 Perceptual and Cognitive Development (5) W

FINKEL

Coverage of the cognitive, as opposed to the

social or personality side, of development. Discussion of theoretical notions used to conceptualize cognitive development is emphasized. Heavy emphasis placed on Piaget's theory of intellectual development. Other topics include infancy, perceptual development, information processing in children and adults, language acquisition, and development of problem-solving abilities. Prerequisite, graduate major standing.

## 506 Personality and Social Development (5) Sp

SLABY

A survey of the theories and empirical literature in the area of personality and social development of children. Prerequisite, firstyear graduate standing.

## 508 Research Methods in Social Psychology (3) Sp

MITCHELL, ONCKEN

Examination of research problems most typically encountered by social psychologists. Various types of research settings are examined and evaluated, and factors relevant to the validity of experiments are discussed. Prerequisite, 515.

### 509 Leadership (3) A FIEDLER

A critical review of leadership literature and research with emphasis on empirical studies on leadership selection, training, and prediction of group and organizational effectiveness. Prerequisites, 345 and 514, or equivalents.

### 510 Consistency Theories in Social Psychology (3) Sp CANON

Theoretical and empirical work that focuses on the ramifications of a need or pressure for cognitive consistency; dissonance, balance, and congruity theories will be critically evaluated on the basis of current research. Prerequisites, 503 and graduate major standing.

## 511 Experimental Approaches to Personality (3) W

SARASON

A survey of current methodology and experimental research in the area of personality. Topics include the relationships of anxiety, hostility, need achievement, and personal styles to behavior. Prerequisite, graduate major standing or permission.

## 514-515 Experimental Design (3-3) A,W EDWARDS

The design of experiments and the analysis of experimental data in the behavioral sciences. Required of all first-year graduate majors. Must be taken in sequence. Prerequisite, elementary statistics or permission.

## 516 Psychometric Techniques (3) Sp C. LUNNEBORG

Topics in regression analysis, measurement reliability and validity, and the development of models for prediction, selection, and classification. (Offered alternate years; offered 1972-73.)

### 517 Mathematical Psychology (3) Sp ROSE

Application of mathematics (drawn from set theory, finite mathematics, and probability theory) in the areas of measurement, psychophysics, and learning. Open to undergraduates with permission of instructor. Prerequisite, 515 or equivalent. (Offered alternate years; offered 1973-74.)

### 518 Mathematical Models of Learning (3) ROSE

Application of mathematical models in basic learning situations, such as paired-associate learning, concept formation, partial reinforcement and probability learning. Open to undergraduates with permission of instructor. Prerequisites, 515 or 517 or Mathematics 391, or permission of instructor. (Offered alternate years; offered 1972-73.)

## 520 Teaching Practicum in Psychology (3) Sp BOBROW

Seminar will make use of videotape, both for providing and discussing models of excellent teaching in psychology and for allowing the student to view his own teaching efforts. The aim is to help the student become a good teacher of psychology. Prerequisites, graduate major standing and permission.

## 524 Cognitive Approaches to Human Memory (3) W

NELSON

Survey of cognitive approaches to human memory. Theories and behavioral data base of the following areas are examined: perceptual memory; short-term memory; acquisition, organization, and retention of information in long-term memory; relation between reinforcement and memory. Prerequisite, 400 or equivalent.

### 525 Psychodiagnostic Testing (3) Sp ZARO

Training in administration, scoring, and interpretation of individual intelligence tests, projective tests, and other major clinical techniques. Required of all first-year graduate majors in clinical psychology. Prerequisite, graduate major standing.

### 528 Decision Processes (5) Sp BEACH

Literature on predecisional diagnosis of environmental states relevant to subsequent decisions, various models for decisions, and relevant evidence for decisions. Open to undergraduates with permission. Prerequisite, 303 or equivalent.

### 532 Factor Analysis and Multivariate Measurement (5) A C. LUNNEBORG

Special quantitative techniques, including matrix algebra, used in multivariate psychological research. Theoretical foundations of factor analysis. Computational procedures and application of fact or analytic models to psychology. Emphasis will be on the development and use of appropriate computer techniques. Prerequisite, 314 or equivalent. (Offered alternate years; offered 1973-74.)

## 540 Seminar in Clinical Psychology (2) BECKER, BROEDEL, KOHLENBERG, SARASON,

R. SMITH, STROTHER, SUE, WAGNER

May be repeated for credit. Prerequisite, permission.

### 541 Seminar in Cognitive Processes (2) BORROW, NELSON

May be repeated for credit. Prerequisite, permission.

## 542 Seminar in Animal Behavior (2)

ALCOCK, BOLLES, LOCKARD May be repeated for credit. Prerequisite, permission.

# 543 Seminar in Developmental Psychology (2)

DALE, FINKEL, ROBINSON, SLABY

May be repeated for credit. Prerequisite, permission.

### 544 Seminar in Experimental Psychology (2) M. SMITH

May be repeated for credit. Prerequisite, permission.

## 545 Seminar in Human Learning (2)

LUMSDAINE, MC KEEVER, NELSON May be repeated for credit. Prerequisite, permission.

## 546 Seminar in Learning (2) LOCKARD, MC KEEVER, NELSON,

ROSE, SMITH May be repeated for credit. Prerequisite, permission.

## 547 Seminar in Motivation (2)

BERMANT, BOLLES, LOCKARD, M. SMITH May be repeated for credit. Prerequisite, permission.

### 548 Seminar in Perceptual Processes (2) CULBERT

May be repeated for credit. Prerequisites, 441 and permission.

## 549 Seminar in Physiological Psychology (2) BERMANT, DOUGLAS, HUNT, PAGANO, ROTH, WOODBURNE

May be repeated for credit. Prerequisite, permission.

## 550 Seminar in Psycholinguistics (2)

CULBERT, DALE, KOHLENBERG May be repeated for credit. Prerequisites, 447 and permission.

## 551 Seminar in Psychophysics (2)

MAKOUS, TELLER May be repeated for credit. Prerequisite, permission.

## 552 Seminar in Quantitative Techniques (2) EDWARDS, C. LUNNEBORG, ROSE

May be repeated for credit. Prerequisite, permission.

## 553 Seminar in Social Psychology (2)

FIEDLER, FRASER, STOTLAND May be repeated for credit. Prerequisite, permission.

### 554 Seminar in Decision Processes (2) BEACH

May be repeated for credit. Prerequisite, permission.

## 555 Seminar in Programmed Learning (2) LUMSDAINE

May be repeated for credit. Prerequisite, permission.

## 560 Seminar (\*)

May be repeated for credit. Prerequisite, permission.

## 585 Experimental Problems in Clinical Psychology (5) Sp

## SARASON

Analysis of research and theories of concepts and processes of deviant behavior. Prerequisite, permission.

## 586 Psychological Approaches to Rehabilitation (3) W or Sp SARASON

Survey of psychological approaches to the rehabilitation of persons with a variety of types of disabilities. Emphasis is placed on reactions to physical disability, the concept of work, the assessment of disabled persons, and

### 591 Introduction to Clinical Psychology (3) A WAGNER

Introduction to clinical psychological problems, methods, and techniques. Required of all first-year graduate majors in the clinical psychology training program. Prerequisite, graduate major standing.

## 592, 593 Clinical Methods (6,6) AWSpS, AWSpS

ZARO

Advanced training in the application of clinical psychological testing and interviewing. Prerequisites, 591 and graduate major standing. Required of all second-year graduate majors in the clinical psychology training program.

### 594 Advanced Personality Theory (3) A R. SMITH

Theoretical problems in the study of personality development relating to the psychodynamics of personality organization. Required of all graduate majors in the clinical psychology training program. Prerequisite, 405 or permission.

## 595 Psychopathology (3) A or W

Major historical and contemporary theories or psychopathology and research in the main categories of the behavior disorders. Required of all graduate majors in the clinical psychology training program. Prerequisites, 594 and permission.

## 596 Theories and Systems of Psychotherapy (3) A

BROEDEL

A review of some of the principal theories and systems. Prerequisites, 595 and permission. Required of all graduate majors in the clinical psychology training program.

## 597 Field Work (3-5, max. 36) AWSpS BECKER, BROEDEL, KOHLENBERG, SARASON, R. SMITH, STROTHER, SUE, WAGNER

Prerequisites, second-year graduate major standing and permission.

## 599 Readings in Psychology (\*) AWSpS

Selected topics. The name of the staff member with whom readings will be done should be indicated in registration. Prerequisite, permission of instructor.

- 600 Independent Study or Research (\*) AWSpS
- 700 Master's Thesis (\*) AWSpS

800 Doctoral Dissertation (\*) AWSpS

## **ROMANCE LANGUAGES AND LITERATURE**

Courses in English translation appear at the end of the departmental listing.

## ROMANCE LINGUISTICS AND LITERATURE, GENERAL AND COMPARATIVE

## **Courses for Undergraduates**

401 Introduction to Romance Linguistics (3) AWSpS CONTRERAS, HANZELI, KLAUSENBURGER,

SAPORTA

Descriptive analysis of the phonological, morphological, and syntactical structures of the modern Romance languages. Prerequisites, the equivalent of two college years of a Romance language, French or Spanish 409, or permission.

## 402 Introduction to Romance Linguistics (3) Sp

## KLAUSENBURGER

Comparative historical survey of the development of the principal Romance tongues. Prerequisite, Romance 401 or permission.

### 475 The Teaching of Foreign Literature (3) KELLER

The methodology of teaching a foreign literature, with demonstrations by the instructor and practice by students; preparation of lectures; study of discussion techniques. Offered jointly with the College of Education as Educational Curriculum and Instruction EDC&I 435. Prerequisites, senior standing and permission.

## **Courses for Graduates Only**

505, 506 Advanced Romance Linguistics (3,3) Advanced problems in the phonological, morphological, and syntactical analysis of the Romance languages. Descriptive, comparative, and historical considerations. Prerequisites, French 401, 402, or Spanish 400, or French or Spanish 541, 542.

## 521, 522 Seminar in Romance Linguistics (3,3)

Specific problems in linguistic analysis of the Romance languages. Prerequisites, Romance 401, 402.

## 531 Problems in Romance Linguistics (2-5, max. 10)

CONTREERAS, HANZELL, KLAUSENBURGER Group seminars, or individual conferences, are scheduled under this number to meet special needs. Prerequisite, permission of the Graduate Program Adviser.

## 581, 582 Methodology and Bibliography of Research (3,3) A,W

W. LEINER, NOSTRAND

Bibliographical resources for Romance literatures; recurrent types of research problems and the accumulating methodology; standards of evidence; the evaluation and organization of evidence; the philosophies of literary history and its relation to bibliography and criticism.

## 584, 585, 586 Seminar in Romance Culture (3,3,3)

NOSTRAND

Individual and collective research in the evolution of concepts common to Romance literatures and cultures. Open to graduates of this and other departments.

## 590 Special Seminar and Conference (3-9, max. 18)

Group seminars, or individual conferences, are scheduled under this number to meet special needs. Prerequisite, permission of the Graduate Program Adviser.

## 599 Graduate Readings (\*)

Group seminars, or individual conferences, are scheduled under this number to meet special needs. Prerequisite, permission of the Graduate Program Adviser.

600 Independent Study or Research (\*)

## CATALAN

535 Catalan Language and Literature (3, max. 9) ALGEO, FIELD

## FRENCH

## 101-102, 103 Elementary (5-5,5) W,AWSp,AWSp

Methods and objectives are primarily oralaural. Oral practice in the Language Laboratory is required. No credit is granted for 101until -102 (or a more advanced course, as approved by the Department) has been completed satisfactorily. Prerequisite for -102: 101- or college equivalent, or placement test; for 103: -102 or college equivalent, or placement test.

## 111-112, 113 Elementary (5-5, 5)

Administered by the Division of Independent Study. Basic study of French grammar and idiomatic usage of the language. No credit is given for 111- until -112 has been completed. The three courses correspond to 101-102, 103, but students who wish to transfer to day school courses must satisfactorily complete placement examinations, including an oral proficiency test. All assignments are written, but oral practice is provided through purchase and use of tape recordings. Purchase of a tape recording, available only from the Division of Independent Study, is highly recommended.

## 201, 202 Intermediate (5,5) AWSp,AWSp

Intensive practice in reading and writing. Systematic review of French grammar. Oral practice through imitation of assigned dialogues and free oral composition. Prerequisite for 201: 103 or college equivalent, or placement test; for 202: 201 or college equivalent, or placement test.

## 221 French Expository Prose (5) AWSp

Readings in and discussion of classical and modern French texts, primarily in the sciences and social sciences: Montesquieu, Comte, Seignobos, Bernard, and others. Recommended for students planning to pursue scientific disciplines. Satisfies the foreign language proficiency requirement for the College of Arts and Sciences. Cannot be used by majors as a prerequisite to French 410, 411, 412. Prerequisite, 202 or college equivalent, or placement test.

## 222 Introduction to French Literature (5) AWSp

Transition between reading for content on the intermediate level and the critical reading ability required for more advanced courses in French literature. Introduction to problems of style, genre, and aesthetics. Prerequisite, 202 or college equivalent, or placement test.

237 Conversational French (2-8, max. 8) For participants in the Foreign Study Program. Prerequisites, 103 or college equivalent, and permission.

## 297 French Civilization (3 or 6) S

For participants in the Foreign Study Program. Readings on aspects of French literary tradition: discussion of social and cultural values as reflected in French literature. Field trips to sites of literary, historical, and artistic interest. Substantial paper (written in English), and higher degree of participation, required for 6 credits. Course conducted in English. Prerequisites, two years of college French, and permission. 301, 302, 303 Advanced French (5,5,5) Prerequisites, 222 or college equivalent, or placement test for 301; 301 for 302; 302 for 303.

## 307 Composition (3) S

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, 222 or college equivalent, and permission.

### 327 Advanced Conversation (2, max. 8) AWSp

Prerequisite, 222 or college equivalent, or placement test.

## 337 Conversational French (2-8, max. 8) Sp or S

For participants in the Foreign Study Pro-gram. Prerequisites, 222 or college equivalent, and permission.

## 350 Drama (3)

Generic study of French drama. Prerequisite, 222, or college equivalent, or placement test.

## 351 Poetry (3)

Generic study of French poetry. Prerequisite, 222, or college equivalent, or placement test.

## 352 Fiction (3)

Generic study of French fiction. Prerequisite, 222, or college equivalent, or placement test,

353 Imaginary Voyages in French Literature (3)

KERN

Careful study of texts dealing with imaginary voyages in French literature. Texts will be taken from Cyrano de Bergerac's voyage to the moon, entitled Les Etats de la Lune; Montesquieu's Les Lettres persanes; Voltaire's Candide; Jules Verne's Le Tour du monde en quartre-vingts jours; the poetry of Baude-laire; and the plays of Ionesco. Prerequisite, 222 or equivalent.

#### 354 The Idea of Progress in French Literature (3)

KELLER

Study of the growth of the idea of progress in the seventeenth and eighteenth centuries, as seen in several writers of the classical and post-classical periods and in the Enlighten-ment. Attention will be given to the basic and permanent issues involved in discussions of progress, but readings will be from Pascal, Fontenelle, Perrault, Voltaire, the Encyclopédie, and Condorcet. Prerequisite, 222 or equivalent.

### 390 Supervised Study (2-5, max. 20) AWSp Prerequisite, permission of the instructor and the Undergraduate French Adviser.

397 French Civilization (3 or 6) S For participants in the Foreign Study Program. Readings on aspects of French literary tradition; discussion of social and cultural values as reflected in French literature. Field trips to sites of literary, historical, and artistic interest. Taught in French. Substantial paper (written in French), and higher degree of participation, required for 6 credits. Prerequisites, two years of college French, and permission.

### The Phonological Structure of French 400 (3)

HANZELI

A linguistic study of the French sound system. Prerequisite, Romance 401 or Linguistics 400

## 401 The Morphological Structure of French (3)

HANZELI

A linguistic study of French morphology. Prerequisite, Romance 401 or Linguistics 400.

#### 402 The Syntactic Structure of French (3) HANZELI

A linguistic study of French syntax. Prerequisite, Romance 401 or Linguistics 400.

## 403 Background of Modern French (3) KLAUSENBURGER

Linguistic analysis of the important developments in the history of the French language from its Latin origin to contemporary speech. Prerequisite, the equivalent of two college years of French.

## 404 Old French (3)

### FIELD

Designed for acquisition of reading facility in Old French through intensive study of selected texts. Prerequisite, Romance 401.

## 407 Advanced Composition (3) S

For participants in the Foreign Study Program. Compositions on topics of considerable complexity and difficulty relating to French civilization. Emphasis on matters of style rather than on grammar. Prerequisites, 3 credits at the 300 level, or college equivalent, and permission.

## 408 Explication de Texte (3)

Close study of short pieces of French prose and poetry. The method consists of a liter-ary analysis of the text from the different viewpoints: biographical, historical, etc. Lectures, discussion, and student explications.

## 409 Advanced Phonetics (3) AWSp CREORE

Training in diction and oral expression; interpretation of literary texts; phonetics as a teaching device. Prerequisite, 301 or equivalent.

## 410 Survey of French Literature: 1500-1700 (3) A

Renaissance and classical period. Prerequisite, 9 credits of 300-level literature courses. (Formerly 304.)

# 411 Survey of French Literature: 1700-1850

## (3) W Age of enlightenment, preromanticism, and

## romanticism. Prerequisite, 9 credits of 300level literature courses. (Formerly 305.)

## 412 Survey of French Literature: 1850 to the Present (3) Sp

Realism, naturalism, symbolism, and twenti-eth-century literature. Prerequisite, 9 credits of 300-level literature courses. (Formerly 306.)

#### Survey of French Literature: Honors 413 Discussion (1, max. 3) AWSp

Concurrent registration in 413 is required of "College Honors" and "With Distinction" students enrolled in 410, 411, 412. Prerequisite, permission of honors adviser. (Formerly 314, 315, 316.)

#### 420 Fiction: 1600-1680 (3)

## W. LEINER

303.

### 421 Fiction: 1680-1800 (3) ELLRICH

Prerequisite, 9 credits at the 300 level, above 303.

## 424 Fiction: 1800-1850 (3)

DALE, HERSCHENSOHN Prerequisite, 9 credits at the 300 level, above 303.

## 425 Fiction: 1850-1900 (3)

DALE, HERSCHENSOHN . Prerequisite, 9 credits at the 300 level, above 303.

## 426 Fiction: 1900-1950 (3)

JONES, KERN, J. LEINER Prerequisite, 9 credits at the 300 level, above 303.

## 427 Fiction Since 1950 (3)

JONES, KERN, J. LEINER Prerequisite, 9 credits at the 300 level, above 303.

#### 437 **Advanced Conversational French**

(2-8, max. 8) For participants in the Foreign Study Pro-gram. Prerequisites, 327 or equivalent, and permission.

## 441 Poetry: Renaissance (3)

CREORE, KELLER

Prerequisite, 9 credits at the 300 level, above 303.

## 442 Poetry: Baroque (3)

W. LEINER Prerequisite, 9 credits at the 300 level, above 303.

## 444 Poetry: Romantic (3)

DAVID, HERSCHENSOHN

Prerequisite, 9 credits at the 300 level, above 303.

## 445 Poetry: Parnassian and Symbolist (3) J. LEINER, VERNIER

Prerequisite, 9 credits at the 300 level, above 303

### 446 Poetry: Twentieth Century (3) VERNIER, C. WILSON

## 452 The French Enlightenment (6) ELLRICH

French thought and literature of the eighteenth century. Students may not receive credit both for this course and for French 421 or 455. Prerequisite, 9 credits at the 300 level, above 303. (Formerly 485.)

## 453 Sixteenth-Century Literary Prose (3) KELLER

Prerequisite, 9 credits at the 300 level, above 303.

## 454 Nonfiction of the Classic Period (3)

CHRISTOFIDES, KELLER, WORTLEY Prerequisite, 9 credits at the 300 level, above 303.

## 455 Eighteenth-Century Nonfiction (3)

ELLRICH Prerequisite, 9 credits at the 300 level, above 303.

#### Nineteenth-Century Nonfiction (3) 456

HERSCHENSOHN, VERNIER, C. WILSON Prerequisite, 9 credits at the 300 level, above 303.

457 Twentieth-Century Nonfiction (3) DAVID, JONES, KERN

Prerequisite, 9 credits at the 300 level, above

Prerequisite, 9 credits at the 300 level, above 303.

460 Sixteenth-Century Drama (3) KELLER

Prerequisite, 9 credits at the 300 level, above 303.

Seventeenth-Century Drama (3) 461

KERN, WORTLEY Prerequisite, 9 credits at the 300 level, above 303.

### 462 Eighteenth-Century Drama (3) ELLRICH

Prerequisite, 9 credits at the 300 level, above 303.

## 463 Romantic Drama (3)

DALE, HERSCHENSOHN Prerequisite, 9 credits at the 300 level, above 303.

### 464 Realist and Naturalist Drama (3) HERSCHENSOHN

Prerequisite, 9 credits at the 300 level, above 303.

465 Twentieth-Century Drama (3)

KERN, W. LEINER Prerequisite, 9 credits at the 300 level, above 303.

470 Cinema (3)

DALE

Major films and figures of French cinema from the beginnings to the present. Prerequisite, 9 credits at the 300 level, above 303.

Linguistics and the Teaching of French 474 (3)

HANZELI

An examination of areas of linguistics which can be particularly helpful to the French teacher. Prerequisite, 401 or permission.

#### Social and Cultural Background (3) 480 H. NOSTRAND

Common values, presuppositions, social behavior patterns and institutions of the culture area, as differentiated by social classes, regions, age groups, and time change over the past twenty years. Conducted in English, unless all registrants are sufficiently fluent in French. For French majors, some reading in French, with papers written in French.

## 490H Honors Seminar (5, max. 10) AWSp

491H The French Moralists: Montaigne to Chamfort (3)

CHRISTOFIDES, ELLRICH

Selected readings, covering the development of French culture from the late Renaissance to the early Romantic period. Meetings will consist of lecture and discussion. Each student will present an oral explication de texte. A paper will be required and there will be a final exam.

## 497 French Civilization (3)

J. LEINER, NOSTRAND

Readings on aspects of French literary tradi-tion; discussion of social and cultural values as reflected in French literature. Taught in French. (May be taken by participants in the Foreign Study Program.)

## **Courses for Graduates Only**

## 105 Elementary (5) AW

A course to prepare graduate students to pass the reading examination required for advanced degrees. Credit will be granted only to students who have received no previous credit in French. Students receiving credit in 105 may not later register for credit in 101-. Credits earned in 105 may not be applied toward an advanced degree. Prerequisite, graduate standing or permission of the Department.

106 Elementary (5) WSp Continuation of 105. Students who have received credit for -102 and/or 103 may also receive credit for 106. Credits earned in 106 may not be applied toward an advanced degree. Prerequisite, 105 or permission of the Department.

515 French Literature of the High Middle Ages (3) W FRIEDMAN

Old French literature, from the beginning to 1315. Prerequisite, permission.

516 Middle French Literature (3) W FRIEDMAN

French literature from 1315 to 1500. Prerequisite, permission.

- 520 Renaissance Prose: Rabelais (3) KELLER
- 522 Studies in Fiction: Seventeenth Century (3-5, max. 9) KERN, W. LEINER
- 523 Studies in Fiction: 1660-1800 (3, max. 9) ELLRICH
- 524 Studies in Fiction: 1800-1850 (3, max. 9) DALE
- 525 Studies in Fiction: 1850-1900 (3, max. 9) DALE, J. LEINER
- Studies in Fiction: 1900-1950 (3, max. 9) 526 JONES, KERN, J. LEINER
- 530 Studies in Renaissance Poetry (3) CREORE, KELLER
- 531 Renaissance Poetry: Ronsard (3) CREORE
- 532 Studies in Nineteenth-Century Poetry (3) HERSCHENSOHN
- Studies in Parnassian and Symbolist 533 Poetry (3, max. 9) VERNIER
- 534 Studies in Twentieth-Century Poetry (3, max. 9) **KERN, VERNIER**
- 541, 542 History of the French Language (3,3)

FIELD, KLAUSENBURGER

A survey of the phonological, morphological, and syntactical development of the French language from its origins to the present.

- 552 Renaissance Prose: Montaigne (3) KELLER
- 553 Eloquence (3) DAVID

French eloquence from the seventeenth to the twentieth centuries: G. de Balzac, Pascal, Bossuet, Fenelon, Massillon, Mirabeau, Dan-ton, de Maistre. Prerequisite, graduate standing.

554 Studies in Seventeenth-Century Nonfiction (3) CHRISTOFIDES, W. LEINER, WORTLEY

Studies in Eighteenth-Century 555 Nonfiction (3)

ELLRICH

- 556 Studies in Nineteenth-Century Nonfiction (3) DAVID
- 557 Studies in Twentieth-Century Nonfiction (3) JONES, KERN, J. LEINER
- 558 Twentieth-Century Metaphysical, Social, and Literary Polemics in France (3) DAVID

Ideological confrontations over the recon-struction of Europe in 1919. Confrontation of twentieth-century esthetics. Efforts after World War II to contain nihilism.

- Studies in Seventeenth-Century Drama (3, max. 9)
  - KERN, W. LEINER, WORTLEY
- 562 Studies in Eighteenth-Century Drama (3)

ELLRICH

- 563 Studies in Nineteenth-Century Drama (3)
- DALE, HERSCHENSOHN Studies in Twentieth-Century Drama 564 (3, max. 9) KERN, W. LEINER
- 565 Studies in French Drama (3-5) Sp LEINER

Studies in French Drama, sixteenth-twentieth centuries.

570 Seminar in Cinema (3, max. 9) DALE

Prerequisite, permission of instructor.

- 575, 576, 577 Literary Criticism (3,3,3) KERN
- Special Seminar and Conference 590 (3-9, max. 30) AWSp

Group seminars, or individual conferences, are scheduled under this number to meet special needs. Prerequisite, permission of the Graduate Program Adviser.

591 Literary Problems: Middle Ages (3, max. 9)

Prerequisite, permission.

592 Literary Problems: Renaissance (3, max. 9)

Prerequisite, permission of the Graduate Program Adviser.

593 Literary Problems: Seventeenth Century (3, max. 9)

Prerequisite, permission of the Graduate Program Adviser.

Literary Problems: Eighteenth Century (3, max. 9) 594

Prerequisite, permission of the Graduate Program Adviser.

595 Literary Problems: Nineteenth Century (3, max. 9) Prerequisite, permission of the Graduate Program Adviser.

596 Literary Problems: Twentieth Century (3, max. 9)

Prerequisite, permission of the Graduate Program Adviser.

599 Graduate Readings (\*) Supervised reading in specific fields. Prerequi-site, permission of Graduate Program Adviser.

600 Independent Study or Research (\*) AWSp

## ITALIAN

## 101-102, 103 Elementary (5-5, 5) A,W,Sp

Methods and objectives are primarily oralaural. Oral practice in the language laboratory is required. No credit is granted for 101- until -102 (or a more advanced course, as approved by the Department) has been completed satisfactorily. Prerequisite for -102: 101- or college equivalent, or placement test; for 103: -102 or college equivalent, or placement test.

### 107 Italian Language and Civilization (3)

Deals with varied aspects of Italian culture, past and present. Point of departure will be the language, considered both in its essential structure and as a reflection of the society for which it serves as a means of communication. One of the major aims of the course will be to develop a reading knowledge of Italian. The range and complexity of the readings will be coordinated with the increasing mastery of the language. Students receiving credit in 107 may not later register for credit in 101-.

## 108 Italian Language and Civilization (3) Continuation of 107. Students who have re-

Continuation of 107. Students who have received credit for -102 and/or 103 may also receive credit for 108.

## 111-112, 113 Elementary (5-5, 5)

Administered by the Division of Independent Study. Basic study of Italian grammar and idiomatic usage of the language. No credit is given for 111- until -112 has been completed. The three courses correspond to 101-102, 103, but students wishing to transfer to day-school courses must satisfactorily complete examinations, including oral proficiency test. All assignments are written, but oral practice is provided through purchase and use of tape recordings. Purchase of a tape recording, available only from the Division of Independent Study, is highly recommended.

## 201, 202, 203 Intermediate (5,5,5) A,W,Sp

Intensive practice in speaking, reading, and writing. Functional review of grammar. Prerequisite for 201: 103 or college equivalent, or placement test; for 202: 201 or college equivalent, or placement test; for 203: 202 or college equivalent, or placement test.

## 211, 212, 213 Intermediate (5,5,5)

Administered by the Division of Independent Study. Intensive practice in reading and writing. Functional review in grammar. The three courses correspond to 201, 202, 203, but students wishing to transfer to day-school courses must satisfactorily complete placement examinations, including oral proficiency test. All assignments and examinations are written, but oral practice is provided through purchase and use of tape recordings. Purchase of a tape recording, available only from the Division of Independent Study, is highly recommended. Prerequisites, 113 for 211; 211

## 301, 302 Advanced Syntax and Composition (3,3) A,W

Prerequisites, 203 or college equivalent or placement test for 301; 301 for 302.

## 303 Italian Stylistics (3) Sp

Functional grammar review; creative written and oral composition and reading, with special attention to problems of style. Prerequisite, 302.

## 304, 305, 306 Survey of Italian Literature (3,3,3) A,W,Sp

Prerequisite, 203 or college equivalent, or placement test.

## 327 Advanced Conversation (2, max. 8)

AWSp Prerequisite, 203 or college equivalent, or placement test.

390 Supervised Study (2-5, max. 20) AWSp Prerequisite, permission of the instructor and the Undergraduate Italian Adviser.

## 401 The Development of the Italian

Language (3) PACE

Historical survey of Italian phonology, morphology, and syntax. The evolution of the language will be illustrated with the study of pertinent documents from the various periods. Prerequisite, Italian 301, 302, 303, or Linguistics 400, or Romance 401, or permission.

## 410, 411, 412 Literature of the Renaissance (3,3,3)

THOMPSON

Study of the main currents and writers of the Italian Renaissance—the lyric, drama, epic, and prose as exemplified by such writers as Poliziano, Sannazzaro, Guarini, Boiardo, Ariosto, Castiglione, Machiavelli, Guicciardini, and Tasso. Prerequisites, 304, 305, 306.

### 420, 421, 422 Eighteenth-Century Italian Literature (3,3,3) PACE

420: Arcadia and the Melodrama: Metastasio. 421: Drama: Goldoni and Alfieri. 422: Po-

etry: Parini, Monti, Foscolo.

### 450 Manzoni and the Romantic Movement (3) A PACE

A study of Manzoni's works, especially the Promessi Sposi, as products of Italian roman-

ticism. Prerequisites, 304, 305, 306.

### 451 Leopardi and the Lyric (3) Sp' PACE

A reading of the *Canti* with lectures, discussions, reports. Prerequisites, 304, 305, 306.

### 460 Verismo (3) FRIEDRICH

A study of representative realistic writers such as Capuana, Verga, Serao, Fucini, and Deledda. Prerequisites, 304, 305, 306.

### 465 Contemporary Italian Narrative (3) FRIEDRICH

A critical reading of selected modern exponents of the short story and novel. Prerequisites, 304, 305, 306, or equivalent.

### 490 Proseminar in Italian Literature (3-5) FRIEDRICH

Special studies intended to help the student achieve a mature critical mastery of Italian literature. Required of Italian majors; others by permission.

## **Courses for Graduates Only**

## 512, 513, 514 Dante (3,3,3) THOMPSON

541, 542 History of the Italian Language (3,3)

PACE

Phonological, morphological, and syntactical development of the Italian language from its origin to the present.

### 551, 552, 553 Seminar in Humanist and Renaissance Prose and Poetry (3,3,3) THOMPSON

## 561, 562, 563 Italian Literature of the Nineteenth and Twentleth Centuries (3,3,3)

## 570 Seminar in Cinema (3)

DALE

Studies in various areas of Italian cinema, concentrating on major directors, critics, and movements. Prerequisite, permission.

## 590 Special Seminar and Conference

(3-9, max. 30) AWSp Group seminars, or individual conferences, are scheduled under this number to meet special needs. Prerequisite, permission of the Graduate Program Adviser.

## 591 Literary Problems: Middle Ages and

Fourteenth Century (3, max. 9) Prerequisite, permission of the Graduate Program Adviser.

### 592 Literary Problems: Renaissance (3, max.9)

Prerequisite, permission of the Graduate Program Adviser.

593 Literary Problems: Baroque (3, max.9) Prerequisite, permission of the Graduate Program Adviser.

## 594 Literary Problems: Eighteenth Century (3, max. 9)

Prerequisite, permission of the Graduate Program Adviser.

## 595 Literary Problems: Nineteenth Century (3, max. 9)

Prerequisite, permission of the Graduate Program Adviser.

## 596 Literary Problems: Twentieth Century (3, max. 9)

Prerequisite, permission of the Graduate Program Adviser.

## 599 Graduate Readings (\*)

Supervised reading in specific fields. Prerequisite, permission of the Graduate Program Adviser.

## 600 Independent Study or Research (\*) AWSp

## PORTUGUESE

## 101-102, 103 Elementary (5-5,5) A,W,Sp

Methods and objectives are primarily oralaural. Oral practice in the language laboratory is required. No credit is granted for 101- until -102 (or a more advanced course as approved by the Department) has been completed satisfactorily. Prerequisite for -102: 101- or college equivalent, or placement test; for 103: -102 or college equivalent, or placement test.

## 111-112, 113 Elementary (5-5, 5)

Administered by the Division of Independent Study. Basic study of Portuguese grammar and idiomatic usage of the language. No credit is given for 111- until -112 has been completed. The three courses correspond to 101-102, 103, but students wishing to transfer to day-school courses must satisfactorily complete placement examinations, including oral proficiency test. All assignments are written, but oral practice is provided through purchase and use of tape recordings. Purchase of a tape recording, available only from the Division of Independent Study, is highly recommended.

## 150 Accelerated (5)

For graduate students in Spanish who wish to

develop a rapid command of Portuguese primarily for reading purposes. Prerequisite, graduate standing in Spanish or instructor's permission.

## 201, 202, 203 Intermediate (5,5,5) A,W,Sp

Modern texts, composition, conversation, and functional grammar. Students with advanced standing in Spanish courses may apply to instructor for permission to enter 301, instead of 201, after 103. Prerequisites, for 201: 103 or equivalent, or permission; for 202: 201; for 203: 202.

## 301, 302 Advanced Syntax and Composition (3,3) A,W

Students with advanced standing in Spanish courses may apply to instructor for permission to enter 301 after 103. Prerequisites for 301: 203 or equivalent, or permission; for 302: 301.

## 303 Portuguese Stylistics (3) Sp

Functional grammar review; creative written and oral composition and reading with special attention to problems of style. Prerequisite, 302.

## 304 Survey of Luso-Brazilian Literature:

Middle Ages and Renaissance (3) A Prerequisite, 203 or equivalent, or permission.

305 Survey of Luso-Brazilian Literature: Seventeenth, Eighteenth, and Early Nineteenth Centuries (3) W

Prerequisite, 203 or equivalent, or permission.

306 Survey of Luso-Brazilian Literature: Late Nineteenth and Twentieth Centuries (3) Sp

Prerequisite, 203 or equivalent, or permission.

310 Introduction to Brazilian Literature (3) Sp

Prerequisite, 302 or permission.

327 Advanced Conversation (2, max. 8) Prerequisite, 203 or equivalent, or permission.

**390** Supervised Study (2-5, max. 20) AWSp Prerequisite, permission of the instructor and the Undergraduate Portuguese Adviser.

## 409 Portuguese Phonetics (3)

ALGEO Phonetic structure of the Portuguese language as spoken in Portugal and Brazil; practice in Portuguese and Brazilian pronunciation. Prerequisite, 4 credits in 327 or equivalent, or permission.

## 424, 425, 426 Fiction: 1800-1950 (3,3,3) -A,W,Sp

Romanticism, realism, symbolism, and modernism in Portugal and Brazil. Eça de Queirós, Machado de Assis, twentieth-century novelists. Prerequisites, 304, 305, and 306.

## **Courses for Graduates Only**

## 541, 542 History of the Portuguese Language (3,3)

ALGEO

Phonological, morphological, and syntactical development of the Portuguese language from its origin to the present. Prerequisite, Romance 401 or equivalent.

### 590 Special Seminar and Conference (3-9, max. 30) AWSp

Group seminars or individual conferences are scheduled under this number to meet special needs. Prerequisite, permission of Graduate Program Adviser.

## PROVENCAL

## 534 Provencal Language and Literature (3) FIELD

(Formerly 535 and 536.)

## ROMANIAN

- 401-402, 403 Elementary Romanian (5-5, 5) AWSp
  - AUGEROT

401-402: comprehensive introduction to both spoken and literary Romanian. 403: designed to increase the student's vocabulary and enhance his knowledge of grammar through the reading of short fictional material in modern Romanian. Offered jointly with the Department of Slavic Languages and Literature as Romanian 401-402, 403.

## 404, 405, 406 Advanced Romanian (5,5,5)

Continuation of 401-402, 403. Prerequisite, 403 or permission. Offered jointly with the Department of Slavic Languages and Literature as Romanian 404, 405, 406.

420, 421 Structure of Romanian (3, 3) Descriptive analysis of the phonological, morphological, syntactical, and lexical structures of modern Romanian. Prerequisite, Romance 401 or permission.

## SPANISH

101-102, 103 Elementary (5-5,5) AW,AWSp, AWSp

Methods and objectives are primarily oralaural. Oral practice in the Language Laboratory is required. Prerequisites for -102: 101or college equivalent, or placement test; for 103: -102 or college equivalent, or placement test.

## 111-112, 113 Elementary (5-5, 5)

Administered by the Division of Independent Study. Basic study of Spanish grammar and idiomatic usage of the language. No credit is given for 111- until -112 has been completed. The three courses correspond to 101-102, 103, but students wishing to transfer to day-school courses must satisfactorily complete placement examinations, including oral proficiency test. All assignments are written but oral practice is provided through purchase and use of tape recordings. Purchase of a tape recording, available only from the Division of Independent Study, is highly recommended.

### 121 Chicano History and Culture (5) YBARRA-FRAUSTO

An introduction to Chicano history and culture, including origins, customs, traditions, economics, politics, contemporary goals.

## 128 Spanish for the Elementary School (5) S FRIEDRICH

Practice in the basic language skills is combined with the demonstration and analysis of methods and techniques appropriate to FLES. Emphasis is given to the language structures and vocabulary that normally occurs in elementary school Spanish. Offered jointly with the College of Education as Education Curriculum and Instruction EDC&I 132.

## 201, 202, 203 Intermediate (5,5,5) AWSp,AWSp,AWSp

Intensive practice in speaking, reading, and writing. Systematic review of Spanish grammar. Oral practice based on selected pieces of Spanish literature. Prerequisite for 201: 103 or college equivalent, or placement test; for 202: 201 or college equivalent, or placement test; for 203: 202 or college equivalent, or placement test.

## 211, 212, 213 Intermediate (5,5,5)

Administered by the Division of Independent Stady. Intensive practice in reading and writing. Functional review in grammar. The three courses correspond to 201, 202, 203, but students wishing to transfer to day-school courses must satisfactorily complete placement examinations, including oral proficiency test. All assignments and examinations are written, but oral practice is provided through purchase and use of tape recordings. Purchase of a tape recording, available only from the Division of Independent Study, is highly recommended. Prerequisites, 113 for 211; 211 for 212; 212 for 213; or college equivalent.

## 221 Prose Readings in Spanish (5) Sp

Readings and discussion of nonfiction prose texts in Spanish. Reading material will concentrate on the social sciences, such as aspects of Hispanic cultures, recent History and contemporary social issues of Spanish speaking countries. Prerequisite, Spanish 202 or permission of instructor.

237 Conversational Spanish (2 or 4 or 6) Sp For participants in the Foreign Study Program. Prerequisites, 103 or college equivalent, and permission.

## 301, 302 Advanced Syntax and Composition (4,4) AW,WSp

Prerequisites for 301: 203 or college equivalent, or placement test; for 302: 301.

## 303 Spanish Stylistics (4) ASp

Functional grammar review; creative written and oral composition and reading with special attention to problems of style. Prerequisite, 302.

## 304 Survey of Spanish Literature: 1140-1498 (3) A

Masterpieces of Spanish literature from *Poema* de Mio Cid to 1498. Prerequisites, 203 or college equivalent, or placement test, and 350 or 351 or 352.

### 305 Survey of Spanish Literature: 1498-1681 (3) W

Prerequisites, 203 or college equivalent, or placement test, and 350 or 351 or 352.

## 306 Survey of Spanish Literature:

1681 to the Present (3) Sp Prerequisites, 203 or equivalent, or placement test, and 350 or 351 or 352.

## 311 Black Literature of the Caribbean (3) BODDEN

Survey in English of the rise of black literature from its beginnings in the Afro-Cuban current of the vanguardista movement of the 1930s to the present. Authors from the French-, English-, and Spanish-speaking territories are studied.

### 327 Advanced Conversation (2, max. 8) AWSp

Prerequisite, 203 or equivalent, or placement test.

## 331 Themes ini Mexican-American Studies (5)

YBARRA-FRAUSTO

Examination of significant historical and cultural themes of the Mexican-American experience. Creation of multimedia Chicano educational materials. Prerequisites, 121 and a colloquial speaking knowledge of Spanish.

337 Conversational Spanish (2 or 4 or 6) Sp For participants in the Foreign Study Program. Prerequisites, 203 or equivalent, and permission.

## 350 Drama (3) A

Generic study of Spanish drama. Prerequisite, 203 or college equivalent, or placement test.

351 Poetry (3) A Generic study of Spanish poetry. Prerequisite, 203 or college equivalent, or placement test.

## 352 Fiction (3) W

Generic study of Spanish fiction. Prerequisite, 203 or college equivalent, or placement test.

#### Introduction to Mexican Literature (3) 359 SOMMERS

Main outlines of literary expression in Mexico, from pre-Hispanic poetry to the con-temporary period. Reference will be made to Chicano literature in the United States. Prerequisite, Spanish 303 or permission.

390 Supervised Study (2-5, max. 20) AWSp Prerequisite, permission of the instructor and the Undergraduate Spanish Adviser.

### 400 The Structure of Modern Spanish (3) W CONTRERAS

Analysis of the spoken language from a linguistic point of view; phonological, morpho-logical, and syntactic analysis. Prerequisites, 203, and Romance 401 or Linguistics 400.

## 408 The Structure of the Spanish Language (3)

VARGAS-BARON

Advanced study of the structure of the Spanish language. Syntactical patterns will be carefully examined. Guiding principles will be derived from internal evidence. All important aspects of grammar and syntax will be studied, and drill will be concentrated on especially weak points. The approach will be that of a native studying his own language. The course will be conducted in Spanish. Prerequisites, Spanish 301, 302, 303, or permission.

#### 409 Advanced Phonetics (3) AWSp ALGEO, CONTRERAS, SALINERO,

VARGAS-BARON

Analysis of sounds: training in pronunciation, intonation, and close transcription of Spanish language in its modalities. Prerequisite, 4 credits in 327 or equivalent.

### 410 Hispanic Poetry: Late Middle Ages Through the Sixteenth Century (3) SHIPLEY

Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

### 411 Hispanic Poetry: Seventeenth Through the Nineteenth Century (3) SHIPLEY

Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

### 412, 413, 414 Hispanic Poetry (3,3,3) PREDMORE

Modern lyric poetry of the Hispanic world. The period studied extends from 1870 to 1936 and deals with thirteen major poets, from Becquer to Hernández. Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

## 417 The Epoch of Cervantes (3) W SALINERO

An introductory study of Cervantes' environment emphasizing the cultural and artistic background of this outstanding period. Preliminary to Spanish 418. Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

#### 418 Cervantes and Modern Fiction (3) SALINERO

A study of Cervantes' Don Quijote as a milestone in modern fiction. Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

## 420 Spanish Literature of the Eighteenth Century (3) PENUELAS

Study of the main literary currents and authors of the eighteenth century in Spain with emphasis on the ideological crisis of that time. Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

#### 437 **Advanced Conversational Spanish** (2 or 4 or 6) S

For participants in the Foreign Study Program. Prerequisites, 327 or equivalent, and permission.

441 Spanish Drama: 1150-1600 (3) From the beginning to Lope de Vega. Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

442 Spanish Drama: 1600-1635 (3) Lope de Vega through Ruiz de Alarcón. Prerequisites, any three of the folowing: 304, 305, 306, 350, 351, 352.

443 Spanish Drama: 1635-1681 (3) Calderón de la Barca and dramatists of his school. Prerequisites, any three of the fol-lowing: 304, 305, 306, 350, 351, 352.

#### The Modern Theatre in Spain, 1700-444 Romanticism (3) ANDERSON

A study of the directions, documents, and literature of Spain's theatre during the eighteenth and early nineteenth centuries. Special attention to the concepts and manifestations of Neoclassicism and Romanticism. Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

## 445 The Modern Theatre in Spain, 1850-1900 (3)

ANDERSON

The theories and literature of the Spanish theatre in the second half of the nineteenth century. Post-romantic drama, género chico, Naturalism. Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

#### 446 The Modern Theatre in Spain, 1900-Present (3) ANDERSON

Major currents and literature of Spain's theatre in this century. Special attention to modern reactions against Realism. Benavente, Valle-Inclán, Sastre, Lorca, and others. Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

### Spanish Drama and Play Production (2-6) ANDERSON

Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

## 451, 452, 453 Spanish Literature Since 1700 (3,3,3) A,W,Sp

ANDERSON, PENUELAS

451: 1700 through the Romantic Period. 452: 1850-1898. 453: 1898 to the present. Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

## 461, 463 Spanish Literature of the Golden Era (3,3) SHIPLEY

Poetry, historical narrative, and prose fiction of the Golden Era from 1498 to 1681. 461: Poetry. 463: Prose. Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

## 471 Individual Authors (3, max. 9)

This course is devoted to one or more representative Spanish or Spanish-American authors. Prerequisites, any three of the fol-lowing: 304, 305, 306, 350, 351, 352.

#### Application of Linguistics to the 474 Teaching of Spanish (3) A

Current theory and practical application of methods and techniques of teaching Spanish, as based on the findings of linguistics.

# 481, 482, 483 Spanish-American Literature (3,3,3) A,W,Sp

BODDEN

General survey. 481: The colonial period and early years of independence. 482: The middle years of the nineteenth century. 483: The twentieth century. Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

## 484 Twentieth-Century Spanish-American Poetry (3)

BODDEN, VARGAS-BARON

Lectures on major trends in modern Spanish-American poetry; close reading and discussion of poems by representative contemporary poets. Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

## 485 Romanticism, Realism, and Naturalism in Spanish America (3) A

VARGAS-BARON

Leading Romantic and Costumbrista authors (1810-1890). Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

#### The Modernista Movement in 486

Spanish-American Literature (3) W VARGAS-BARON

The leading poets, essayists, and novelists of Spanish America (1890-1920). Prerequisites, any three of the following: 304, 305, 306, 350, 351. 352.

#### 487 The Contemporary Spanish-American Novel (3) Sp

VARGAS-BARON

Prerequisites, any three of the following: 304, 305, 306, 350, 351, 352.

#### 488 Cultural Background of Latin-American Literature (3)

SOMMERS Survey of ideas and art forms and their re-

lationship to literature in four periods: pre-Columbian, colonial, early independence, and twentieth century. Prerequisite, 203.

#### **Problems in the Spanish-American** 489 Novel (3)

SOMMERS

Prerequisite, 352 or permission.

## **Courses for Graduates Only**

## 105 Elementary (5)

A course to prepare graduate students to pass the reading examination required for advanced degrees. Credit will be granted only to students who have received no previous credit in Spanish. Students receiving credit in 105 may

not later register for credit in 101-. Credits in 105 may not be applied toward an advanced degree. Prerequisite, graduate standing or permission of the Department.

## 106 Elementary (5)

Continuation of 105. Students who have received credit for -102 and/or 103 may also receive credit for 106. Credits in 106 may not be applied toward an advanced degree. Prerequisite, 105 or permission of the Department.

500 Seminar in Spanish Linguistics (3) Sp CONTRERAS

Problems in the phonological and grammatical analysis of modern Spanish. Prerequisite, 400.

## 501-502 Graduate Study of Hispanic Literature (3-3)

Close studies of literary texts exemplifying a variety of practical critical methods. Required of candidates for the master's degree.

511, 512, 513 Early Spanish Literature (3,3,3) A detailed survey of early Spanish literature, from its beginning through the fifteenth century. Examination of primary texts of epic and lyric poetry, brief prose fiction, drama, the ballad, didactic materials, the histories.

- 515 The Contemporary Spanish-American Short Story (3)
- 521, 522 The Renaissance in Spain (3,3) SHIPLEY
- 541, 542 History of the Spanish Language (3,3) W,Sp

SALINERO

Summary of the evolution of Spanish language from the fragmentation of Peninsular Romance to *Cantar de Mio Cid*. The main work will consist of analysis of early Castilian texts.

- 553 The Generation of '98 (3) PENUELAS
- 561 Spanish-American Novel from 1940 to the Present (3, max. 9) SOMMERS
- 562 Spanish Literature from 1940 to the Present (3) PENUELAS
- 571 The Modern Essay in Spanish America (3) VARGAS-BARON
- 572 Twentieth-Century Spanish Poetry (3) PENUELAS, PREDMORE
- 573 Twentieth-Century Spanish-American Poetry (3)
- 575 Literary Criticism (3) PENUELAS
- 590 Special Seminar and Conference (3-9, max. 30) AWSp

Group seminars, or individual conferences, are scheduled under this number to meet special needs. Prerequisite, permission of the Graduate Program Adviser.

## 591 Literary Problems: Middle Ages (3, max. 9)

Prerequisite, permission of the Graduate Program Adviser.

592 Literary Problems: Renaissance (3, max. 9)

Prerequisite, permission of the Graduate Program Adviser. 593 Literary Problems: Golden Age (3, max. 9)

Prerequisite, permission of the Graduate Pro-

gram Adviser.

594 Literary Problems: Eighteenth Century (3, max. 9)

Prerequisite, permission of the Graduate Program Adviser.

595 Literary Problems: Nineteenth Century (3, max. 9)

Prerequisite, permission of the Graduate Program Adviser.

596 Literary Problems: Twentieth Century (3, max, 9)

Prerequisite, permission of the Graduate Program Adviser.

597 Literary Problems: Spanish-American Colonial Literature (3, max. 9)

Prerequisite, permission of the Graduate Program Adviser.

598 Literary Problems: Latin America (3, max. 9)

Prerequisite, permission of the Graduate Program Adviser.

599 Graduate Readings (\*) AWSp Supervised reading in specific fields. Prerequisite, permission of the Graduate Program Adviser.

600 Independent Study or Research (\*) AWSp

ROMANCE LANGUAGES AND LITERATURE

700 Master's Thesis (\*) AWSp

800 Doctoral Dissertation (\*)

## ENGLISH TRANSLATION

These courses are recommended as appropriate minor or supporting studies for students majoring in other departments. Courses in English translation are not applicable toward undergraduate or graduate major programs in the Department of Romance Languages and Literature. Majors may take these courses for credit as one of their electives.

## **Courses for Undergraduates**

### FRENCH

481 Twentieth-Century French Novel in English (3-5)

WILSON (Formerly 413.)

- 01111011y 415.)
- 482 French Poetry from Baudelaire to the Present (5) VERNIER

Analysis in English of the major trends and movements in modern French poetry, e.g., Symbolism, Surrealism, etc. Textual studies of representative works, from Baudelaire to the poets of the 1950s. (Formerly 414.)

## 483 . Trends in Twentieth-Century Theatre in English (5)

A study of the evolution of the French theatre from the turn of the century to the present. Special emphasis will be given to the French theatrical scene since World War II. (Formerly 415.)

## 484 Rabelais and Montaigne in English (3) KELLER

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. (Formerly 416.)

485 Racine and Molière in English (3) KERN, WORTLEY

(Formerly 417.)

486 Literature of the Enlightenment in English (3) ELLRICH

(Formerly 418.)

487 Nineteenth-Century Fiction in English
(3)

DALE, HERSCHENSOHN (Formerly 419.)

Formeny 419.)

## 488 Women in French Literature (3) HERSCHENSOHN, J. LEINER

Masterpieces of French literature are read in an attempt to understand French attitudes toward women. Economic, social, sexual, and personal attitudes will form the core of the course. The works to be read will trace French attitudes from the sixteenth century, with a concentration on the twentieth century.

## ITALIAN

318 Italian Literature in English (5)

319 The Italian Short Story in English (5) FRIEDRICH

The short story from the *Novellino* and Boccaccio to modern masters of the form. The translations will be studied both as examples of narrative technique and as reflections of particular moments in Italian cultural history. Prerequisite, at least sophomore standing.

## 384 Renaissance Literature of Italy in English (3)

481 The Divine Comedy in English (5)

A study of Dante's *Divine Comedy* in English translation, with consideration of its background and influence. May be counted as an elective in an English major.

## **ROMANCE LITERATURE**

460 The Literature of the Renaissance in English (5)

## SPANISH

- 315 Latin-American Authors in English (5)
- 345 Spanish Literature of the Renaissance in English (3)

## SCANDINAVIAN LANGUAGES AND LITERATURE

## **Courses for Undergraduates**

## DANISH

101-102, 103 Elementary Danish (5-5,5) A,W,Sp

Fundamentals of oral and written Danish.

220 Introduction to Danish Literature (3) A KOFOED

Selected short stories by contemporary authors. Prerequisite, 103 or equivalent.

### 221 Introduction to Danish Literature (3) W KOFOED

Selected prose fiction. Prerequisite, 220 or equivalent.

222 Introduction to Danish Literature (3) Sp KOFOED

Kaj Munk and his dramas. Prerequisite, 221 or equivalent.

223, 224, 225 Danish Conversation and Composition (2,2,2) A,W,Sp Prerequisites, 103 for 223; 223 for 224; 224

for 225.

300, 301, 302 Modern Danish Literature (3,3,3) A,W,Sp KOFOED

### 450 History of Danish Literature (3) KOFOED

A one-volume history serves as text. Representative literary works from the earliest times to the present are read to supplement the historical account and to show the evolution of the thought and form of the various genres. Prerequisite, 222 or equivalent.

490 Supervised Reading (\*, max. 5) AWSp KOFOED

Students with an adequate reading knowledge of Danish pursue in this course a program of study in a selected area of Danish language, literature, or related fields. Conferences with the instructor; reports. Prerequisite, permission.

## FINNISH

## 401-402-403 Intensive First-Year Finnish (5,5.5) A,W,Sp,S

The study of spoken and written Finnish, with selected readings in Finnish literature.

## ICELANDIC

## 101, 102, 103 Modern Icelandic (3,3,3) A,W,Sp

Fundamentals of oral and written Modern Icelandic.

## NORWEGIAN

### 101-102, 103 Elementary Norwegian (5-5,5) AW,WSp,SpA SEHMSDORF

Fundamentals of oral and written Norwegian.

220 Introduction to Norwegian Literature (3) A

SEHMSDORF

Ibsen's A Doll's House and one other play. Prerequisite, 103 or equivalent.

221 Introduction to Norwegian Literature (3) W

ARESTAD, SEHMSDORF

Hamsun's Victoria and one other novel. Prerequisite, 220 or equivalent.

222 Introduction to Norwegian Literature (3) Sp SEHMSDORF

Hamsun's Pan and selected short stories. Prerequisite, 221 or equivalent.

223, 224, 225 Norwegian Conversation and Composition (2,2,2) A,W,Sp ARESTAD

Prerequisites, 103 for 223; 223 for 224; 224 for 225.

## 300 Modern Norwegian Literature

(3) A ARESTAD, SEHMSDORF

Reading representative works of Ibsen and Bjørnson. Prerequisite, 222 or equivalent.

Modern Norwegian Literature 301 (3) W

ARESTAD, SEHMSDORF

Reading selected novels of Kielland, Hamsun, Undset. Prerequisite, 222 or equivalent.

## 302 Modern Norwegian Literature (3) Sp

## ARESTAD, SEHMSDORF

Reading representative poetry of Wergeland, Welhaven, Vogt, Bull, and Øverland. Prerequisite, 222 or equivalent.

## 303, 304, 305 Advanced Norwegian Conversation and Composition (2,2,2) A,W,Sp SEHMSDORF

Prerequisite, 225 or equivalent.

#### 350 The Norwegian Short Story (3)

ARESTAD, SEHMSDORF Generic study of the Norwegian short story. Prerequisite, 220 or permission.

## 351 Norwegian Romanticism (3) ARESTAD, SEHMSDORF

Historical study of Norway's cultural and, specifically, literary renewal from 1814 to approximately 1865. Prerequisite, 220 or permission.

## 352 New Norwegian Writers (3)

ARESTAD, SEHMSDORF Study of fiction and poetry in Nynorsk by Duun, Vesaas, Garborg, Vinje, Nygard, Jonsson, Aukrust, Ørjasaeter, Hovden. Prerequisites, two Norwegian courses on the 300 level and permission.

## 450 History of Norwegian Literature (3) Sp ARESTAD

A one-volume history serves as text. Repre-sentative literary works from the earliest times to the present are read to supplement the literary historical account and to show the evolution of the thought and form of the various genres. Prerequisite, 222 or equivalent.

## 490 Supervised Reading (\*, max. 10) AWSp ARESTAD, SEHMSDORF

Students with an adequate reading knowledge of Norwegian pursue in this course a program of study in a selected area of Norwegian language, literature, or related fields. Conferences with the instructor; reports. Prerequisite, 302 or permission.

## SWEDISH

101-102, 103 Elementary Swedish (5-5,5) AW,WSp,SpA HALL

Fundamentals of oral and written Swedish.

220 Introduction to Swedish Literature (3) AW

JARVI, JOHNSON Fröding and his poetry. Prerequisite, 103 or equivalent.

### 221 Introduction to Swedish Literature (3) WSp JARVI

Hjalmar Söderberg and his short stories. Prerequisite, 220 or equivalent.

### 222 Introduction to Swedish Literature (3) ASp JARVI

Malmberg and his major works. Prerequisite, 221 or equivalent.

## 223, 224, 225 Swedish Conversation and Composition (2,2,2) A,W,Sp CARLSON

Prerequisites, 103 for 223; 223 for 224; 224 for 225.

300 Modern Swedish Literature (3) A

HOLKERS, JOHNSON An introduction to Lagerkvist's major works. Prerequisite, 222 or equivalent.

301 Modern Swedish Literature (3) W

HILDEMAN, HOLKERS Lyric poetry. Prerequisite, 222 or equivalent.

302 Modern Swedish Literature (3) Sp JOHNSON

Bellman and his time. Prerequisite, 222 or equivalent.

## 303, 304, 305 Advanced Conversational

Swedish (2,2,2) A,W,Sp CARLSON

Prerequisite, 225 or equivalent.

306, 307, 308 Advanced Swedish Composition (1,1,1) A,W,Sp CARLSON

Prerequisite, 225 or equivalent.

#### 350 **Contemporary Swedish Literature (3) A** JARVI, JOHNSON

An introduction to developments in Swedish literature in the 1950's and 1960's through the study of representative poetry, prose, and dramas. Prerequisite, 222 or equivalent.

## 351 Swedish Romanticism (3) W HILDEMAN, JOHNSON

The study of representative works by such romantics as Tegnér, Geijer, Atterbom, Stag-nelius, and Almqvist. Prerequisite, 222 or equivalent.

## 352 Strindberg and His Works (3) Sp

JOHNSON The study of representative short stories, dramas, autopiographical work's, poems, and one novel. Prerequisite, 222 or equivalent.

## 450 History of Swedish Literature (3) Sp HILDEMAN, JOHNSON

A one-volume history serves as text. Repre-sentative literary works from the earliest times to the present are read to supplement the literary historical account and to show the evolution of the thought and form of the various genres. Prerequisite, 222 or equivalent.

#### 490 Supervised Reading (\*, max. 12) AWSp HILDEMAN, JOHNSON

Students with an adequate reading knowledge of Swedish pursue in this course a program of study in a selected area of Swedish language, literature, or related fields. Conferences with the instructor; reports. Prerequisite, 302 or permission.

## SCANDINAVIAN COURSES IN ENGLISH

## 100 Modern Scandinavian Culture (2 or 21/2) AWSpS

JARVI

The background for Scandinavian democracy of the present day, with special emphasis on the large peoples' movements of the nineteenth century and the role of literature and the arts in this development. Reading and discussion of a play by Ibsen and one by Strindberg. Two and one-half credits available Summer Quarter only.

#### 230 Scandinavian Mythology (2 or 21/2) SpS SEHMSDORF

An introduction to the study of the mythology of the Germanic, and especially Scandinavian, peoples. Emphasis on the source material, particularly the *Poetic Edda* and *Prose Edda*,
and heroic legend, also historical and archeological material. Two and one-half credits available Summer Ouarter only.

#### 231 The Scandinavian Folktale (2) SEHMSDORF

Study of the Scandinavian folktale as of al literature and as expression of popular beliefs, and of its use by writers such as Hans Christian Andersen, Ibsen, and Strindberg.

#### 232 Hans Christian Andersen and the Fairy Tale (3) AS KOFOED

Introduction to Andersen and his tales, with particular emphasis on what they have to say about man and his world.

#### 250 Scandinavian Drama in English Translation (2 or 2½) SpS JARVI

Introduction to Scandinavian drama with major emphasis on representative plays by Holberg, Almqvist, Bjørnson, Lagerkvist, Bergman, Grieg, Abell, and Forssell, with some attention to Ibsen and Strindberg. Two and one-half credits available Summer Quarter only.

### 251 Holberg and His Comedies in English (2)

KOFOED

Holberg and his major dramas, with attention to the comic tradition in the Scandinavian theater.

309 The Scandinavian Novel in English (2 or 2½) SpS HOLKERS

Representative Old Icelandic sagas. Two and one-half credits available Summer Quarter only.

310 The Scandinavian Novel in English (2 or 2<sup>1</sup>/<sub>2</sub>) JOHNSON

The emigrant novel: Rölvaag, Bojer, Moberg. Two and one-half credits available Summer Quarter only.

311 The Scandinavian Novel in English (2 or 21/2) WS

ARESTAD, JARVI, SEHMSDORF

Representative novels and short stories of Jacobsen, Hamsun, Dinesen, Duun, and Lagerkvist. Two and one-half credits available Summer Quarter only.

### 370 The Vikings (3)

HILDEMAN, HOLKERS Study of the Vikings at home in Scandinavia and abroad with particular emphasis on life during the Viking period and on their activities as revealed in archaeological finds and in historical and literary sources. Offered jointly with the Department of History as Modern European History HSTEU 370.

#### 380 History of Scandinavia to 1814 (3) W HILDEMAN, HOLKERS

A survey of Scandinavian history from the Viking period to 1814 with primary emphasis on the development of Denmark, Finland, Iceland, Norway, and Sweden and the role of the Scandinavians in world history. Offered jointly with the Department of History as Modern European History HSTEU 380.

#### 381 History of Scandinavia Since 1814 (3) Sp HILDEMAN, HOLKERS

A survey of Scandinavian history from 1814 to the present with major emphasis on the political, social, cultural, and economic development of the Scandinavian countries. Offered jointly with the Department of History as Modern European History HSTEU 381.

#### 390 Kierkegaard and Existentialism (3) KOFOED

Consideration of Kierkegaard's major ideas and their influence on world literature.

455 Introduction to Scandinavian

Linguistics (3) Sp Descriptive analysis of the phonological, morphological, and syntactical structures of the modern Scandinavian languages. Prerequisite, equivalent of two college years of a Scandinavian language.

## 460, 461 History of the Scandinavian Languages (3,3) W,Sp

A survey of the development of the languages from primitive Scandinavian to contemporary Danish, Faroese, Icelandic, Norwegian, and Swedish. Prerequisite, two years of a Scandinavian language or permission.

80 Ibsen and His Major Plays in English (2 or 21/2) AS

ARESTAD, JOHNSON

Two and one-half credits available Summer Quarter only.

481 Strindberg and His Major Plays in English (2 or 2½) WS JOHNSON

Two and one-half credits available Summer Quarter only.

482 Lagerkvist and His Contemporaries in English (2) Sp JOHNSON

A study of representative Scandinavian plava of our time.

483 Strindberg and the Swedish Drama (5) S JOHNSON, JARVI

Study and discussion of representative Strindberg plays and of post-Strindberg plays by dramatists from Lagerkvist to Forssell in English translation.

### **Courses for Graduates Only**

500, 501, 502 Old Icelandic (3,3,3) A,W,Sp JOHNSON

503, 504 Advanced Old Icelandic (2,2) W,Sp JOHNSON

The study of the *Poetic Edda*. Prerequisite, 502 or equivalent.

506 Ibsen's Early Plays (3) A

ARESTAD (Offered alternate years; offered 1973-74.)

## 507 Ibsen's Later Plays (3) W

ARESTAD (Offered alternate years; offered 1973-74.)

- 508 Nineteenth-Century Danish-Norwegian Novel (3) A ARESTAD
- (Offered alternate years; offered 1972-73.)
- 509 Twentieth-Century Danish-Norwegian Novel (3) W

ARESTAD (Offered alternate years; offered 1972-73.)

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510, 511, 512 Strindberg (3,3,3) A,W,Sp JOHNSON (Offered alternate years; offered 1973-74.)

515 Modern Danish and Norwegian Poetry (3) Sp KOFOED

(Offered alternate years; offered 1972-73.)

#### 516 Modern Danish and Norwegian Drama (3) Sp KOFOED

(Offered alternate years; offered 1973-74.)

517 Nineteenth-Century Swedish Novel (3) W JOHNSON

Seminar in the novel from Almqvist to Strindberg. (Offered alternate years; offered 1972-73.)

518 Twentieth-Century Swedish Novel (3) Sp JOHNSON

A seminar on the novel from Strindberg to the present. (Offered alternate years; offered 1972-73.)

# 519 Recent Swedish Drama (3) A

A seminar in the drama from Lagerkvist to the present. (Offered alternate years; offered 1972-73.)

520 Modern Swedish Poetry (3) W HILDEMAN

A seminar in the poetry from Tegnér to Rydberg. (Offered alternate years; offered 1972-73.) (Formerly 517.)

#### 521 Recent Swedish Poetry (3) Sp HILDEMAN

Seminar in recent and contemporary poetry from Lagerkvist to the present. (Offered alternate years; offered 1972-73.)

530, 531 Medieval Scandinavian Literature (3,3) W,Sp

HILDEMAN, HOLKERS

The study of the main genres in the vernacular, with primary emphasis on the ballads.

600 Independent Study or Research (\*) AWSp

700 Master's Thesis (\*) AWSp

800 Doctoral Dissertation (\*)

## SLAVIC LANGUAGES AND LITERATURE

### **Courses for Undergraduates**

**BULGARIAN** 

### 401-402, 403 Elementary Bulgarian (5-5,5) A,W,Sp

401-402: Introduction to Bulgarian phonology and grammar in terms of the modern spoken language. Writing conventions of literary Bulgarian. 403: Reading in modern authors to increase student's command of grammar and vocabulary. Prerequisite, Russian 203 or 210 or 250, or permission.

#### 404, 405, 406 Advanced Bulgarian (5,5,5) A,W,Sp

Continuation of Bulgarian 401-402, 403 to provide an introduction to Bulgarian literature, history, and culture through selected readings. The courses also reinforce and extend the student's basic knowledge of Bulgarian grammar and vocabulary through daily discussions in the language. Prerequisites, 403 for 404; 404 for 405; 405 for 406.

#### CZECH

### 401-402, 403 Elementary Czech (5-5,5) A,W,Sp

KOVTUN

401-402: Introduction to the essentials of 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. Prerequisite, Russian 203 or 210 or 250, or permission.

### 404, 405, 406 Advanced Czech (5,5,5) A,W,Sp

KOVTUN

Continuation of Czech' 401-402, 403 to provide an introduction to Czech literature through selected readings from the main works of Czech authors of the nineteenth and twentieth centuries. The courses also reinforce and extend the student's basic knowledge of Czech grammar and vocabulary through daily discussions in the language. Prerequisites, 403 for 404; 404 for 405; 405 for 406.

#### HUNGARIAN

#### 401-402, 403 Elementary Hungarian (5-5.5) A.W.Sp

reading and writing in 401-402. More extensive reading and writing in 403.

#### POLISH

#### 401-402, 403 Elementary Polish (5-5,5) A,W,Sp

401-402: Acquaints the student with the principal morphological and syntactic features of the Polish language through the medium of a basic vocabulary. 403: Designed to enlarge the student's general vocabulary by the reading of short texts selected from Polish authors of the nineteenth and twentieth centuries. Prerequisite, Russian 203 or 210 or 250, or permission.

### 404, 405, 406 Advanced Polish (5,5,5) A,W,Sp

(5,5,5) A,W,

Continuation of 401-402, 403 to provide introduction to Polish literature through selected readings of the main works from nineteenth and twentieth centuries. The course also reinforces the student's basic knowledge of vocabulary, grammatical patterns, and conversation.

#### ROMANIAN

#### 401-402, 403 Elementary Romanian (5-5,5) A,W,Sp

AUGEROT

401-402: comprehensive introduction to both spoken and literary Romanian. 403: designed to increase the student's vocabulary and enhance his knowledge of grammar through the reading of short fictional material in modern Romanian. Offered jointly with the Department of Romance Languages and Literature as Romanian 401-402, 403.

### 404, 405, 406 Advanced Romanian (5,5,5)

Continuation of 401-402, 403. Prerequisite, 403 or permission. Offered jointly with the Department of Romance Languages and Literature as Romanian 404, 405, 406.

#### RUSSIAN

101-102 First-Year Russian (5-5) A,W

Introduction to Russian. Extensive oral practice to afford assimilation of basic structural features. Introduction to reading and composition. One hour weekly; lectures on pronunciation, grammar, and writing; opportunities for student questions (conducted in English). Four hours weekly: practice sessions conducted entirely in Russian. (See also 110.) For continuation, see 103.

#### 103 First-Year Russian (5) ASp

Continuation of 101-102. Prerequisite, -102 or 110, or permission.

#### 110 Accelerated Russian (10) A

Covers material of 101-102 in one quarter. Two hours weekly: lectures on pronunciation, grammar, and writing (conducted in English). Eight hours weekly: practice sessions conducted entirely in Russian. For continuation, see 115.

#### 115 Accelerated Russian (10) W

Continuation of 110. Covers material of 103, 201 in one quarter. For continuation, see 210. Prerequisite, 110 or -102, or permission.

### 150 Intensive First-Year Russian (15) S

Covers material of 101-102, 103 in one quarter. Recommended for students who want to acquire rapidly a considerable proficiency. For continuation, see 201 or 250, 202, 203.

201 Second-Year Russian (5) AW Sequel to 103. For continuation, see 202, 203. Prerequisite, 150 or 103, or permission.

202, 203 Second-Year Russian (5,5) W,Sp Continuation of 201. Prerequisite, 201 or 115, or permission.

#### 210 Accelerated Russian (10) Sp Continuation of 115 Covers material

Continuation of 115. Covers material of 202, 203 in one quarter. Prerequisite, 201 or 115, or permission.

#### 240 Accelerated Scientific Russian (10) S Introduction to written Russian as a research tool for science students only. Readings in chemistry and physics. Not counted for Russian major language credit.

250 Intensive Second-Year Russian (15) S Continuation of 150. For Summer Quarter students who wish to complete a second 15 credits of Russian. Prerequisite, 150, 103, or permission.

#### 301, 302, 303 Intermediate Russian (5,5,5) A,W,Sp

HOLDSWORTH

Oral and writing practice based on Russian prose readings. Intensive review and supplementation of structural knowledge. One hour weekly conducted in English, four hours weekly in Russian. Prerequisite, 203 or 210, or permission.

#### 306 Intermediate Russian Phonetics (3)

Systematic exploration and analysis of the Russian sound system, including phonetic transcription and the study of intonational patterns. Special attention is given to instruction in correcting individual pronunciation errors. Taught in Russian. Prerequisites, Russian 203, 210, or 250.

#### 350 Intensive Third-Year Russian (15) S HOLDSWORTH

Oral and writing practice based on Russian prose readings. Intensive review and supplementation of structural knowledge of Russian. Prerequisites, 210, 250, or 203.

# 380 Russian Language in Leningrad Program (10, max. 20)

University credits may be earned by students participating in University-sponsored Russian Language Program at Leningrad University. Prerequisite, 305 or equivalent.

### 401, 402, 403 Advanced Russian (5,5,5) A,W,Sp

GRIBANOVSKY

Class conversation and composition based on reading. Prerequisites, 303 for 401; 401 for 402; 402 for 403.

# 404 Advanced Russian Prose Composition (3) A

Russian prose translation from English to Russian, with emphasis on stylistics. Prerequisite, Russian 403, or equivalent, or permission.

#### 405 Advanced Russian Prose Composition (3) W

Russian prose translation from English to Russian, with emphasis on idiom. Continuation of Russian 404. Prerequisite, Russian 403, or equvalent, or permission.

#### 406 Advanced Russian Prose Composition (3) Sp

Russian prose composition on topics of literary or cultural interest. Continuation of Russian 405. Prerequisite, Russian 403, or equivalent, or permission.

407 Advanced Russian Conversation (2) A Russian conversation on literary and cultural topics, with emphasis on style and syntax and on contemporary intonation patterns. Prerequisite, Russian 403, or equivalent, or permission.

408 Advanced Russian Conversation (2) W Continuation of Russian 407. Prerequisite, Russian 403, or equivalent, or permission.

409 Advanced Russian Conversation (2) Sp Continuation of Russian 408. Prerequisite, Russian 403, or equivalent, or permission.

#### 450 Intensive Fourth-Year Russian (15) S GRIBANOVSKY

Intensive practice in conversation, composition, and reading at an advanced level. Equivalent to 401, 402, 403. Prerequisite, 303, 350, or permission.

### 451, 452, 453 Structure of Russian (3,3,3) A,W,Sp

AUGEROT, COATS

Descriptive analysis of the phonology and morphology of contemporary standard Russian. Prerequisites, 303 or equivalent for 451; 451 for 452; 452 for 453, or permission.

#### 461, 462, 463 Introduction to Russian Literature (3,3,3) A,W,Sp

GRIBANOVSKY, KONICK

Discussion and analysis of Russian prose, poetry, and drama in Russian. Prerequisite, 303 or permission.

#### 470 Special Topics in Russian for Teachers (5) S

Discussion of journalistic and literary texts. Practical review of morphology and syntax. Essay writing. All intended for the improvement of Russian teaching through presentation of current linguistic and literary developments in the Soviet Union and at home. Conducted in Russian.

### 490 Studies in Russian Literature

(5, max. 15) Sp Studies on various aspects of Russian literature, either in Russian or English, varying from quarter to quarter. Prospective students should consult the department office for information.

#### 499 Undergraduate Research (3-5, max. 15) AWSp

For Slavic majors only. Prerequisite, permission.

### SERBO-CROATIAN

401-402, 403 Elementary Serbo-Croatian (5-5,5) A,W,Sp 401-402: A comprehensive introduction to both spoken and written literary Serbo-Croatian. 403: Designed to increase the student's vocabulary and enhance his knowledge of grammar through the reading of short stories in the modern literary idiom. Prerequisite, Russian 203 or 210 or 250, or permission.

### 404, 405, 406 Advanced Serbo-Croatian (5,5,5) A,W,Sp

Continuation of Serbo-Croatian 401-402, 403 to provide instruction and practice designed to reinforce the basic grasp of the language, and to enlarge both vocabulary and command of grammatical patterns. Prerequisite, 403.

#### SLAVIC

351 History of the Slavic Languages (5) Sp 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. Prerequisite, reading knowledge of one Slavic language.

#### 499 Undergraduate Research (3-5, max. 15) AWSp

For Slavic majors only. Prerequisite, permission.

#### **UKRAINIAN**

401-402, 403 Elementary Ukrainian (5,5,5) Introduction to spoken and written Ukrainian.

### LITERATURE COURSES IN ENGLISH

Czech 320 Czech Literature in English (5) W A survey of Czech literature, with emphasis on major trends and achievements.

Polish 320 Polish Literature in English (5) A A survey of Polish literature, with emphasis on major trends and achievements.

#### Russian 320 Russian Literature in English (5) A

Introduction, from 1782 to the present. Representative prose and poetical works of the foremost Russian and Soviet writers are discussed and analyzed.

## Russian 420 Early Twentieth-Century Russian Literature in English (5) A

A survey of Russian literature from 1900 to 1935.

### Russian 421 Contemporary Russian Literature in English (5) W

A survey of Russian literature from 1917 to the present.

Russian 422 Russian Plays in English (5) Sp From 1782 to 1948.

Russian 426 The Russian Novel in

English (5) A Gogol, Goncharov, Turgenev, Leskov, Saltykov-Shchedrin.

#### Russian 427 The Russian Novel in English (5) W

Tolstoy

Russian 428 The Russian Novel in English (5) Sp Dostoevsky

Serbo-Croatian 320 Serbo-Croatian Literature in English (3) Sp KOVTUN

A survey of Serbian and Croatian literatures, with emphasis on major trends and achievements.

### Courses for Graduates Only RUSSIAN

### KUSSIAN

512 Nineteenth-Century Russian Literary Criticism (4) A HAGGLUND

An analysis of the critical approach, methods, and literary values of major Russian literary critics of the nineteenth century.

513 Contemporary Russian Literary Criticism (4) Sp

Recent trends in the Russian study of literature. (Formerly 468.)

## 515 Russian Versification (4) Sp

Russian versification and poetic language, with a brief survey of bibliography pertaining to Russian literary studies. Prerequisite, 526 or permission. (Formerly 470.)

#### 516 Stylistics of Modern Russian Poetry (4) A

An examination of the linguistic aspects of poetic style in selected works of modern Russian poetry. Prerequisites, 451, 452, and 6 credits in Russian literature courses, or permission. (Formerly 571.)

### 520 Seminar in Russian Poetry (4) Sp Topics in Russian poetry to be selected by the

instructor. (Formerly 572.)

#### 522 Pushkin (4) A Analysis of the works of

Analysis of the works of Alexander Pushkin. (Formerly 566.)

### 524 Nineteenth-Century Russian Poetry Since Pushkin (4) Sp

Discussion of the masters of nineteenthcentury Russian lyric poetry since Pushkin. (Formerly 568.)

#### 525 The Russian Symbolist Movement (4) Sp

A study of Russian poetry and prose of the "Symbolist" period (1894-1910). (Formerly 464.)

# 526 Modern Russian Poetry (Acmeism and Futurism) (4) A

A study of Russian poetry in its renaissance, from 1890 to 1925. Prerequisite, Russian 403 or equivalent. (Formerly 465.)

530 Seminar in Russian Prose (4) A Examination and discussion of Russian masterpieces. (Formerly 570.)

#### 532 Gogol (4) W

Close analysis of Gogol's novels, plays, and stories in Russian. (Formerly 561.)

533 Chekhov (4) Sp A detailed analysis of the plays and short stories of Anton Chekhov in Russian.

#### 534 Dostoevsky (4) W Analysis of the works of Feodor Dostoevsky.

(Formerly 567.)

### 535 Tolstoy (4) W

Analysis of the works of Leo Tolstoy. (Formerly 562.)

### 538 Pasternak (4) Sp

A detailed analysis of the poetry and prose of Boris Pasternak in Russian.

#### 540 Seminar in Contemporary Russian Literature (4) Sp

Examination of selected works of poetry, prose, and criticism representative of Russian literature from 1917 to the present. Prerequisite, permission.

### 550 Advanced Russian Morphophonology (3) A

### MICKLESEN

Includes a detailed discussion and evaluation of attempts to incorporate both Russian phonology and Russian morphology in modern scientific grammars. Prerequisite, 453.

#### 551 Advanced Russian Syntax (3) W MICKLESEN

Detailed structural analysis of sentence types in the Russian literary language, with emphasis on grammatical categories and word classes.

# 555 History of the Russian Language (4) W COATS

An outline of grammatical and lexical developments of the Russian literary language from the earliest documents to the present. Prerequisite, Slavic 550.

### 556 Readings in the History of the Russian Language (3) Sp

COATS

Readings and grammatical interpretation of selected texts from various periods of development of the Russian language. Prerequisite, Russian 555.

### 565 Russian Eighteenth-Century Literature (4) W

Discussion of representative works of poetry, prose, fiction, and criticism in the eighteenth century. Prerequisite, 320 or permission.

### 575 Kievan Literature (4) A

HANEY Analysis of representative works of prose and poetry of Kievan Rus' from the beginning to the end of the thirteenth century. Prerequisite, graduate standing. (Offered alternate years; not offered 1972-73.)

# 576 Muscovite Literature (4) W

Analysis of representative works of prose and poetry of the Muscovite period from the end of the thirteenth century to the reign of Peter I. Prerequisite, graduate standing. (Offered alternate years; not offered 1972-73.)

# 577 Russian Folk Literature (4) Sp

Analysis of representative works of the various genres of folk literature including the *byliny, skazki*, historical and lyrical songs and the spiritual *stikh*. Prerequisite, graduate standing. (Offered alternate years; not offered ` 1972-73.)

#### 578 Studies in Kievan Literature (4) A HANEY

A field course for students with a specialization in Kievan literature. Work with primary sources, textual tradition, and bibliography.

# 579 Studies in Muscovite Literature (4) W

A field course for students with a specialization in Muscovite literature. Work with primary sources, textual tradition, and bibliography.

#### 588-589-590 Russian Literature, 1750 to the Present (5-5-5) A,W,Sp

Survey of Russian Literature for first-year graduate students. Prerequisite, graduate standing.

600 Independent Study or Research (\*) AWSp

# ARTS AND SCIENCES

#### SLAVIC

### 550 Historical Survey of Common Slavic (5) A

MICKLESEN 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. Prerequisite, Russian 453 or permission.

#### 552 History of the East Slavic Languages (3) A

MICKLESEN

Designed to acquaint majors in Slavic Linguistics with the details of the historical development of the phonological and morphological structure of the East Slavic languages. Prerequisite, 550.

#### 553 History of the West Slavic Languages (3) W

MICKLESEN

Designed to acquaint majors in Slavic Linquistics with the details of the historical development of the phonological and morphological structure of the West Slavic languages. Prerequisites, 550, 552.

#### 554 The History of the South Slavic Languages (3) Sp MICKLESEN

This course is 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. Prerequisites, 550, 552, 553.

#### 555 Old Church Slavonic (3) W AUGEROT

Rise and development of earliest Slavic literary language and a descriptive study of its orthography, phonology, morphology, and syntax.

#### 556 Readings in Old Church Slavonic (3) Sp AUGEROT

Reading and grammatical interpretation of a selected group of texts.

#### 557 Seminar in Slavic Linguistics (3) Sp MICKLESEN

Seminar designed to permit the investigation and discussion of special topics in Slavic linguistics. (May be repeated for credit.) Prerequisites, 554 and Russian 551.

600 Independent Study or Research (\*) AWSpS

### SLAVIC LANGUAGES AND LITERATURE

#### 700 Master's Thesis (\*)

800 Doctoral Dissertation (\*)

### SOCIAL SCIENCE

**150** Afro-American History (5) An examination of the Negro and his role in history both in Africa and the Americas.

### SOCIETY AND JUSTICE

310 Non-Field Research in Society and Justice (1-5, max. 15) AWSpS

Individual library research, under supervision, on some aspects of society and justice. Prerequisite, majors only.

#### 311 Field Research in Society and Justice (5) AWSpS

Individual field research, under supervision, on some aspect of society and justice. Prerequisite, majors only.

### 320 Field Experience in the System of Justice (5) AWSpS

STOTLAND

Participant-observation in some public or private agency relevant to the system of justice. Prerequisite, majors only.

#### 321 Case Study in the System of Justice (1, max. 4) AWSpS STOTLAND

Personally follow a felony case from arrest to ultimate discharge through the agencies of the system of justice. Prerequisite, majors only.

#### 400 Seminar in Society and Justice (3, max. 6) AWSpS

Seminar in various aspects of the administration of justice. Prerequisite, majors only.

### SOCIOLOGY

105 Sociology of Black Americans (5) Evaluates the sociocultural context of the black man's environment and consequences of his interaction with that environment.

#### 110 Survey of Sociology (5) AWSp

Human interaction patterns shaped by ecology, social structure, and culture. Communication, family processes, social differentiation, and formal organization as integrative mechanisms. Deviance, adaptation, social change.

#### 223 Social Statistics (5) AWSp

Methods and sources for quantitative investigation. Prerequisite, 110.

#### 240 Introduction to Social Psychology (5) AWSp

BLUMSTEIN, BURGESS, EMERSON Socialization of the individual; social processes; and interactions of persons in groups. Prerequisites, 110 and Psychology 100.

#### 270 Social Problems (5) AWSp SCHMITT

Analysis of the processes of social and personal disorganization and reorganization in relation to poverty, crime, suicide, family disorganization, mental disorders, and similar social problems. Prerequisite, 110.

#### 271 Introduction to the Sociology of Deviance (5) AKERS

Kinds of deviant behavior and the issues covered will be of interest in themselves, but the course is especially recommended for sociology majors and those who plan to take courses in criminology, delinquency, or corrections. Will focus on drug use (opiate addiction, hallucinogenic and other drug use), sexual deviance, alcoholism, suicide, mental illness, crime, and delinquency. Description, theory, research, and policy issues of law and control relevant to understanding deviance are presented and discussed. Prerequisite, 110.

#### 330 Human Ecology (5) A

CAMPBELL, MC CANN Factors and forces which determine the distribution of people and institutions. Prerequisite, 110.

331 Population Analysis (5) CAMPBELL, MC CANN 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. Prerequisite, 110.

#### 347 Socialization (5)

BURGESS

How social systems control the behavior of their constituent groups, and persons, through the socialization process, sanctions, power, allocation of status and rewards. Prerequisite, 110.

### 352 The Family (5) AWSp \*

The family as a social institution; personality development within the family; marriage adjustment; changing family patterns; disorganization and reorganization. Prerequisite, 110.

### 361 Age and Sex Differentiation (3)

VAN DEN BERGHE 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. Prerequisite, 110.

### 362 Race Relations (5) AWSp

BARTH, MIYAMOTO Interracial contacts and conflicts. Prerequisite, 110.

#### 365 Urban Community (5)

KORNBLUM

Comparative and analytic study of organization and activities of urban groups. Prerequisite, 110.

#### 371 Criminology (5) AWSp AKERS, SCHRAG

Factors associated with crime and delinquency. Criminological theories. Survey of correctional facilities and programs. Visits to agencies and institutions. Prerequisite, 110.

#### 389 Reading in Selected Fields (2-5, max. 15) AWSp

Open only to qualified undergraduate students by permission.

#### 410 History of Sociological Thought (5)

ROTH Contributions of individual theorists (from Comte to the present) to a coherent body of testable hypotheses; emphasis on cumulative development of concepts and principles, emergence of sociology as a science, probable future developments. Prerequisite, 110.

### 414 Sociological Theory (5) A

COSTNER, SCHRAG Modern scientific theory applied to social be-

havior; sociology as a natural science. Prerequisite, 20 credits in social science.

#### 415 Theory of Social Organization (5) W WAGER

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. Prerequisite, 110.

#### 420 Methods of Sociological Research (5) A FARIS

A general survey of the principal methods of research used in sociology, and of special

issues and problems in methodology. Prerequisite, 223 or equivalent.

#### Methodology: Case Studies and . Interviewing 421 KORNBLUM

Prerequisites, 223 and 420.

#### 422 General Methodological Strategies (3) Sp WAGER

An introduction to the varied strategies of research in sociology. These strategies include laboratory and field experimentation, statistical studies, surveys, field observations, his-torical and comparative studies, mathematical modeling, and computer simulation. Prerequisite, 223.

#### 423 Advanced Social Statistics (5) A BLALOCK

Application of statistical methods to the analysis of sociological data. Prerequisite, 223.

#### 425 Graphic Techniques in the Social Sciences (5) SCHMD

Theory and practice of presenting statistical data in graphic form. Construction of bar, line, pictorial, and other types of charts and graphs, and areal distribution maps, etc., used for research and publicity purposes in sociology, geography, economics, education, and community planning. Prerequisite, 223 or approved equivalent.

### 426 Methodology: Quantitative Techniques in Sociology (3)

COSTNER

Measures of relationships among variables and among attributes; calculation techniques; application to typical sociological problems; interpretation. Prerequisites, 223 and 423, or equivalents.

#### Statistical Classification and 427 Measurement (3)

COSTNER

Application of statistical principles and methods to problems of classification and measurement in social research. Prerequisite, 423 or equivalent.

### 428-429 Principles of Study Design (3-3) W,Sp

COSTNER

#### Application of statistical principles and methods to problems of sampling and experimentation in social research. Prerequisite, 423 or equivalent.

### 430 Human Ecology (5)

CAMPBELL Factors and forces which determine the distribution of people and institutions. Not open to students who have taken 330. Senior majors and graduate students only. Prerequisite, 110.

#### 431 Population Analysis (5) MC CANN

Population growth and distribution, population composition, population theory, urbanization. Determinants and consequences of fertility and mortality trends and migration in ecologically developed and underdeveloped areas. Not open to students who have taken 331. Senior majors and graduate students only. Prerequisite, 110.

#### 440 **Primary Interaction and Personal** Behavior (5) W

Social sources of cooperative motives; social basis of the self; nature of primary groups; institutional roles; exceptional and unconventional roles; methodology. Prerequisite, 240 or equivalent.

### 442 Public Opinion (3)

The nature of public opinion; formation and measurement of public opinion; the operation of public opinion polls. Prerequisite, 240 or equivalent.

#### 443 Mass Communication (5)

LARSEN Control, structure, and functioning of mass media of communications as a force in social life; methods of research. Prerequisite, 240 or equivalent.

### 445 Social Movements (3)

ΜΙΥΑΜΟΤΟ

Social movements as collective enterprises to establish new social orders; types, formation, and organization of movements. Prerequisite, 240 or equivalent.

### 448 Sociometric Analysis and Group Structure (5)

LEIK Analysis of the theory and techniques used in the description and experimental investigation of group structure and process. Study of formation, organization, cohesion, and disorganization of social groups through sociometric techniques. Prerequisites, 223, 240, and senior standing.

#### 450 Contemporary American Institutions (5) HECHTER, WAGER

Origins and developments of major social institutions. Sociology of economic structure, political organization, religion, education, recreation, and other institutionalized patterns. Prerequisite, 110.

#### 451 Social Change and Trends (5) HECHTER, WAGER

Basic trends in American life; frames of reference for analysis of social change; forces causing social change. Prerequisite, 15 credits in social science.

#### 452 Health and Social Behavior (5)

SHARP Theoretical and methodological aspects of health, disease, and illness as deviant behavior in relation to social (organizational and occu-pational), ecological, demographic, and cultural determinants of health and health care. Prerequisite, 110.

#### 453 Social Factors in the Family (3) LEIK

Review and analysis of empirical research in courtship and marriage, marital adjustment, and specific areas of marriage and family life. Prerequisites, 223 and 352

455 Housing in the American Community (3) Sociological considerations in housing design; housing trends in relation to major components of the population; housing and resi-dential areas in the community context.

#### 456 Political Sociology (3)

ROTH Bases of political legitimacy; modern and traditional structures of domination: theories of democracy, authoritarianism, and totalitarianism; relationship to social classes, status groups, and economic organization. Prerequisite. 110.

#### 457 Sociology of Religion (5) ROTH

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 quasireligions.

#### 458 Institutional Forms and Processes (5) Sp FARIS

The process of institutionalization and the general nature of institutions; relationship of institutions to persons; institutions and social control; social change and institutional disorganization. Prerequisites, 110 and upperdivision standing.

#### 459 Comparative Social Systems: Africa (3) VAN DEN BERGHE

A comparative approach to the social structure of literate and nonliterate societies with special emphasis on problems of social evolution, integration, and conflict. Africa south of the Sahara will be stressed. Prerequisite, senior standing in the social sciences.

#### 460 Social Differentiation (5)

BARTH, HARGENS, VAN DEN BERGHE

Analysis of societal organization based on sex, age, residence, occupation, community, class, caste, and race. Prerequisite, 110.

#### 463 American Negro Community (3) BARTH

Internal structure of class and caste patterns; resultant personality and institutional development. Prerequisite, 110.

### 465 Complex Organizations (3) A

GROSS An examination of the structure of complex organizations. Particular attention will be given to developing generalizations applicable to industrial organizations, businesses, hos-pitals, prisons, labor unions, governments, uni-versities, armies, and similar formally insti-tuted organizations. The major focus will be on empirical research, with some attention to methodological problems in studying such organizations. Prerequisites, 15 credits in sociology.

466 Industrial Sociology (5) Changing focus of field; contrasting types of industrial organizations; industrial organizations as social systems; problems of social systems; the individual in the organization; union-management relations and tional dynamics. Prerequisite, 110. organiza-

#### Industry and the Community (3) 467

KORNBLUM

Nature of the economy. Theories of industry-community relations. Varieties and types of relations between industry and community. Process of power. Impact of technological change. Levels of worker participation in the community. Integration of industry and other communal institutions. Prerequisite, 110.

### 468 Sociology of Occupations and **Professions (5)**

### BLUMSTEIN

Frameworks for study of occupations and professions; occupational structure and mobility in American society and relation to adult socialization and career development; occupational and professional associations and society. Prerequisites, 240 and 15 credits in social sciences.

#### 472 Juvenile Delinquency (5) AKERS, COSTNER

Factors in delinquency, juvenile courts, detention, probation. Programs of treatment and prevention. Volunteer services. Prerequisite. 371 or equivalent.

#### 473 Corrections (5)

SCHRAG

Social control of crime. Police, courts, institutions, and correctional agencies for adult offenders. Individual and group therapies. Captive communities. Prerequisite, 371 or equivalent.

#### 474 Probation and Parole (3)

Probation and parole systems. Roles of judges, parole board members, and professional personnel. Criteria for parole selection. Attitudes toward probationers and parolees. Prerequisite, 473 or equivalent.

#### 475 Problems in the Administration of Correctional Programs (3)

Correctional objectives, and relative effectiveness of alternative procedures aimed at their attainment. Participation in research designed to evaluate correctional policies. Observation of administrative methods. Prerequisites, 371 and 473, or equivalents.

### 481, 482, 483 Issues in Analytic Sociology (3, max. 9; 3, max. 9; 3, max. 9)

Examination of current issues in sociological analysis. The specific content of the course will vary according to recent developments in sociology and according to the interests of the instructor. Any of the sequence may be repeated with permission of the instructor. Prerequisite, permission.

### 496H, 497H, 498H Senior Seminar (3,3,3) A,W,Sp

Exploration of fields of sociological specialization; professional organization of sociologists; relation to other disciplines. For sociology majors only, primarily for honors students. Prerequisites, senior standing and permission.

#### 499 Undergraduate Research (2-5, max. 15) AWSp

Open only to qualified undergraduate students by permission of the instructor.

#### 501, 502, 503 Research Frontiers in Sociology (3,3,3) A,W,Sp LARSEN

Review and analysis of research strategic requirements and opportunities in and between major fields of sociology. Required of all entering graduate students and restricted to this group. Must be taken in sequence.

#### 510 Seminar in Sociological Theory (3) ROTH

Macrosociological theories; functionalism and neoevolutionism; conflict and consensus approach; comparative strategies; models and long-range theories; ideology and sociology. From Marx and Tocqueville to contemporary literature.

#### 521, 522, 523 Seminar in Methods of Sociological Research (3,3,3) STATLK

Prerequisites, 223 and 420, or equivalents.

528 Seminar in Selected Statistical Problems in Social Research (3) COSTNER

Prerequisite, 426.

530 Advanced Human Ecology (3)

Prerequisites, 330 or 430, and 15 credits in social sciences.

#### 531 Demography (3)

Research problems in population and vital statistics. Prerequisites, 331 or 431 and 15 credits in social sciences, or permission.

#### 532 Research Methods in Human Ecology (3)

Analysis of community structure, segregation, and other spatial phenomena. Measures of migration, intercity relations, and diversity. General problems of measuring ecological associations. Prerequisite, 330 or 430.

### 533 Research Methods in Demography (3)

Measures of population composition, fertility, and mortality. Life table analysis, standardization procedures, population projects and estimates. Prerequisites, 331 or 431.

### 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. Prerequisite, permission of instructor.

#### 540, 541 Seminar in Social Interaction (3,3) BURGESS, SCHMITT

Evaluation of studies in social interaction. Analyzes types of interaction, interaction models, and such major variables as roles, self-conception, and the influence of norms. Prerequisite, 440.

#### 542 Seminar on Small Group Research (3) EMERSON, LEIK, SCHMITT

Theories, methodology, and studies in the area of small group research. Covers such topics as interaction channels, group cohesion, group locomotion, and consensus in groups. Prerequisite, permission for nonmajors.

### 543 Communications Seminar (3) LARSEN

Sociological research in mass communication. Emphasis on the role of groups in providing norms and networks in the flow of information and influence from the mass media. Prerequisite, 443 or equivalent.

#### 544 Seminar on Social Power (3) EMERSON

An examination of basic principles concerning power, influence, and authority in small groups, organizations, and communities. Prerequisites, 240, 415, and 460.

550, 551, 552 Marriage and the Family (3,3,3) Analysis of marriage and family patterns and problems, with initial emphasis on research findings and methods. Individual research on selected projects. Prerequisites, 352 and 453, or equivalents.

#### 562 Seminar in Comparative Race Relations (3)

VAN DEN BERGHE

A cross-cultural approach to race and ethnic relations, including case studies from Africa and Latin America. Prerequisite, graduate standing in social sciences.

566, 567 Seminar in Complex Organizations (3,3) W,Sp GROSS

Research training in industrial sociology, Readings and field projects. Prerequisite, 465 or equivalent.

### 569 Social and Cultural Change: Africa (3, max. 9)

OTTENBERG, VAN DEN BERGHE, WINANS Urbanization, stratification, technology, education, social and religious movements, and cultural pluralism in contemporary Africa. Offered jointly with the Department of Anthropology as Anthropology 569. Prerequisite, graduate standing in a social science department.

# 571 Correctional Communities (3)

SCHRAG

Prisons and juvenile reformatories as communities. Prerequisites, 371 and 473.

#### 572 Analysis of Criminal Careers (3)

Personal and social factors in criminal maturation and reformation. Prerequisites, 371 and 473, or equivalents.

#### 573 Crime Prevention (3)

Critical consideration of programs for delinquency prevention. Prerequisites, 371 and 472.

## 574 Seminar in Methods of Criminological Research (3) W

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.

### 581, 582, 583 Special Topics in Sociology (3,3,3) A,W,Sp

Examination of current substantive topics in sociology. The specific content of the seminar will vary according to recent developments in sociology and according to the interests of the instructor. May be repeated for credit with the permission of the instructor.

#### 599 Reading in Selected Fields (1-6, max. 24) AWSp

Open only to qualified graduate students by permission.

- 600 Independent Study or Research (\*) AWSp
- 700 Master's Thesis (\*) AWSp

800 Doctoral Dissertation (\*)

### **SPEECH**

GENERAL

### **Courses for Undergraduates**

#### 100 Voice and Articulation Improvement (3) AWSp

The nature of the process of voice production and of the sound system of standard American speech. Questions of speech standards, regional and social dialects, and voice quality will be considered. Special laboratory work available to students with significant voice or pronunciation problems.

#### 101 Applied Phonetics (2) AWSp

Continuation of Speech 100 for students with special concerns in the area of pronunciation and articulation. Not open to those who have had Speech 300 or 302. Prerequisite, 100 or permission.

### 102 Speech, Man, and Society (5) AWSp

An introduction to the study of speech communication, the semantic and physical bases of speech, speech in the life of the individual and society, the impeding and facilitating of communication.

#### 103 Basic Principles of Oral Communication (5) AWSp

Training in interpersonal communication. Emphasizes analyzing and experiencing communication variables affecting human relationships, such as person perception, feedback, idea development, nonverbal cues, etc. Emphasis is on informal communication settings.

#### 111 Standard and Nonstandard American Speech: Theory and Applications (2) AWSp

A wide variety of American speech patterns or dialects will be studied in terms of their phonetic, phonological, sociolinguistic, and psycholinguistic characteristics. Study of standard and nonstandard American speech patterns will be supplemented by readings in phonetics, phonology, sociolinguistics. Students will analyze their own speech patterns and will develop appropriate phonetic skills if desired. Especially useful for foreign students and minority students from nonstandard speech communities. Prerequisite, permission.

#### 203 Principles of Oral Communication (3) AWSp

A course in the fundamentals of interpersonal communication designed to develop the elementary and secondary teacher's ability to communicate sensitively and effectively in an educational setting. Required for the Provisional Teaching Certificate. Speech 103 may be substituted, but credit may not be received for both Speech 103 and 203.

# 400 Theoretical Backgrounds in Speech (3) W

Speech as a form of individual and social behavior, with an emphasis on the function of symbols in human interaction.

#### 499 Undergraduate Research (1-5, max. 15) AWSp

Prerequisite, permission.

### **Courses for Graduates Only**

500 Departmental Seminar (0) AWSp Reports of research by graduate students and staff members.

- 501 Introduction to Graduate Research in Speech (3) A CROWELL
- 590 Seminar in Theory of Speech (2, max. 6) A

600 Independent Study or Research (\*) AWSp

- 700 Master's Thesis (\*) AWSp
- 800 Doctoral Dissertation (\*)

## RHETORIC AND PUBLIC ADDRESS

# **Courses for Undergraduates**

#### 220 Introduction to Public Speaking (5) AWSp BOSMAJIAN

A beginning course in persuasive speaking, emphasizing choice and organization of material, sound reasoning, audience analysis, oral style, and delivery. Frequent speeches before the class, followed by conferences with instructor. Not open to students who earned credit for Speech 120 prior to Autumn Quarter, 1961. Special section for honors students offered Autumn Quarter only.

#### 222 Speech in a Free Society (3) W BOSMAJIAN

Examination of 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.

#### 230 Essentials of Argument (5) AWSp DOUGLAS, STEPHENSON

Argument as a technique in the investigation of social problems; evidence, proof, refutation, persuasion; training in argumentative speaking.

#### 235 Parliamentary Procedure (3) A BOSMAJIAN

Principles and practice: a study of the historical bases and contemporary uses of parliamentary procedure; methods and practice in organizing and conducting public meetings.

#### 260 Radio-TV Speech (3) AWSp BIRD, HOGAN

The development and practice of speech techniques in radio and television broadcasting. Three lecture and discussion periods and two one-hour laboratory periods each week.

#### 305 Perspectives on Language in Speech Communication (5) W STEWART

Introduction to the study of language and meaning, and survey of three influential modern approaches: the semantic-general semantic, behavioral, and analytic philosophical. Relates theories of language and meaning to the study of speech-communication.

### 320 Public Speaking (5) A

MEADOR 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. Prerequisite, Speech 103 or 220, or permission.

### 327 Extempore Speaking (3) Sp

Not open to speech majors or students who have taken Speech 220 or 320.

#### 329 Rhetoric of Social and Political Movements (5) Sp BOSMAJIAN

Inquiry into the rhetoric of social and political movements; emphasis on investigation of persuasive discourse; also an examination of the nonverbal symbols of persuasion.

#### 335 Methods of Debate (3) W DOUGLAS

Introduction to debate as a method of advocacy with study and practice of its more important forms. Concurrent registration in Speech 339 not permitted. Prerequisite, Speech 220 or 230, or permission.

#### 339 Forensic Studies (1-3, max. 9) AWSp DOUGLAS

Discussion of selected public questions before audiences on and off campus. No more than 3 credits may be earned in one year, and these should normally be distributed through at least two consecutive quarters. The student should confer with the director before completing registration. Prerequisite, permission.

#### 361 Advanced Radio-TV Speech (3) W BIRD, HOGAN

Analysis of audience situations, group discus-

sions, and audience participation programs. Prerequisite, Speech 260 or permission.

#### 373 Principles of Group Discussion (5) AWSp

### CROWELL

Discussion as an everyday community activity, with emphasis on the informal cooperative decision-making methods of committee, conference, and round-table groups. Prerequisite, Speech 103 or 230, or permission.

## 421 Advanced Speech Composition (5) W

BASKERVILLE, MEADOR Preparation and delivery of longer public speeches. Emphasis on style, thought organization, and proof. Analysis of model speeches. Prerequisite, Speech 220 or permission.

#### 424 Rhetorical Perspective in Revolutionary Documents (5) A

CAMPBELL

Rhetorical investigation of selected major writings. Examines the rhetorical dimension in the progress of ideas through analysis of revolutionary documents as persuasive works. Relates principal revolutions in Western thought to contemporary controversy. Examines Rights of Man, Communist Manifesto, The Origin of Species, etc.

## 425, 426 American Public Address

# (5,5) A,Sp BASKERVILLE

Historical and critical study of principal speakers and speeches and of their relationship to American political, social, and intellectual life. A lecture, discussion, and reading course. 425: Revolutionary period to late nineteenth century; 426: late nineteenth century to the present.

### 428 British Public Address (5) W

CROWELL

Historical and critical study of principal speakers and speeches and of their relationship to British political and social life. Rhetorical analysis of speeches.

#### 473 Problems of Discussion Leadership (3) Sp

CROWELL

A critical analysis of leadership in committee and conference, with emphasis on the development of speech effectiveness in the cooperative achievement of goals. Prerequisite, Speech 373.

## **Courses for Graduates Only**

521 Studies in Greek and Roman Rhetoric (5) A

MEADOR

Critical analysis of writings on rhetoric by Plato, Aristotle, Cicero, Quintilian, and others.

### 522 Studies in Medieval and Renaissance Rhetoric (5) W

MEADOR

A critical analysis of selected persons, works, and topics related to the development of rhetorical theory during the Middle Ages and the Renaissance. Prerequisite, Speech 521. (Offered alternate years; not offered 1972-73.)

#### 523 Studies in Modern Rhetoric (5) W CAMPBELL

Critical analysis of writings on rhetoric by Cox, Wilson, Bacon, Campbell, Blair, Whately, and others.

524 Studies in Contemporary Rhetoric (5) Sp NILSEN ARTS AND SCIENCES

Critical analysis of recent developments in and contributions to rhetorical thought.

#### 525 Rhetorical Criticism (3 or 5) W BASKERVILLE

The history and method of rhetorical criticism. Application of critical standards to notable British and American speeches. Prerequisites, Speech 425, 426, or 428.

- 592 Seminar in Rhetoric and Public Address (2, max. 6) W
- 593 Seminar in Argument and Discussion (2, max. 6) Sp

### ORAL INTERPRETATION OF LITERATURE

### **Courses for Undergraduates**

140 Oral Interpretation of Literature (5) AWSp WEYBRIGHT

Introduction to the study of imaginative literature through the medium of oral performance. Analysis and interpretation of verse, prose, and drama.

#### 240 Critical Approaches to Oral Interpretation (3) W

A course relating oral interpretation performance and literary criticism. Critical study and performance of contemporary verse, prose, and drama. Prerequisite, Speech 140 or permission.

345 Ensemble Oral Interpretation (3) Sp The focus of this course is upon the study of the potentials for ensemble oral interpretation in the three major genres of imaginative works of literature. It includes study in the theory and techniques of Chamber Theatre and Readers Theatre. Prerequisite, Speech 140 or permission. (Offered alternate years; not offered 1972-73.)

#### 347 Oral Interpretation of Nonfiction Prose (3) Sp

A study of stylistic, literary, and rhetorical strategies in nonfiction prose texts from the point of view of the oral interpreter. Materials will be selected from histories, biographies, autobiographies, speeches, essays, travel literature, letters, journals, and diaries. Prerequisite, Speech 140 or permission. (Offered alternate years; not offered 1973-74.)

#### 349 Readers Theatre (2, max. 10) AWSp POST

Presentation of literature before audiences on and off campus. Prerequisites, Speech 140 and permission.

#### 440 Oral Interpretation of Poetry (3) W

Study of forms of verse through analysis and oral presentation. Prerequisite, Speech 140.

442 Oral Interpretation of Fiction (3) A Emphasis is placed on the analysis and the oral interpretation of narrative perspectives in the novel and the short story. Prerequisite, Speech 140.

#### 444 Oral Interpretation of Modern Dramatic Literature (3) Sp

Study of dramatic literature from Ibsen to the present, for purposes of developing understanding, appreciation, and ability to communicate its meaning. Prerequisite, Speech 140.

#### 446 Oral Interpretation of Elizabethan Drama (3) A POST

POST

Development of understanding of the content and the form of selected Elizabethan plays by relating literary analysis and performance. Plays by Shakespeare, Marlowe, Kyd, Jonson, and Webster will be included. Prerequisite, Speech 140.

#### **Courses for Graduates Only**

540 History of Oral Interpretation (3) A Critical analysis of writings by Sheridan, Walker, Rush, Delsarte, Bell, Curry, Emerson, and others. Prerequisite, Speech 440. (Offered alternate years; not offered 1972-73.)

#### 543 Studies in Theories of Performance and Criticism (3) W

Analysis of performance theories as expressed in the writings of oral interpreters and literary critics.

594 Seminar in Oral Interpretation (2, max. 6) Sp

# SPEECH-COMMUNICATION SCIENCE

### Courses for Undergraduates

270 Introduction to Speecli-Communication Sciénce (5) A

D'ANGELO, STEPHENSON

Basic research principles in Speech-Communication Science; survey of substantive research findings. Prerequisite, Speech 103.

### 471 Persuasion (3) Sp

ARUNDALE, D'ANGELO Analysis of the ways in which beliefs, values, attitudes, and behavior are deliberately influenced through communication. (Formerly Speech 421.)

#### 472 Speech-Communication and Interpersonal Influence (5) W ARUNDALE, D'ANGELO

Source, message, channel, and receiver variables as determinants of communication effects. Examination of major theoretic positions underlying current speech-communication literature in interpersonal influence.

#### 476 Speech-Communication: Behavioral Models and Theories (3) A ARUNDALE, STEPHENSON

Examination of selected theories and communication models from the behavioral sciences. Emphasis on application of theory to problems of hypothesis testing in empirical research in speech behavior.

#### **Courses for Graduates Only**

#### 576 Experimental Methods in Speech-Communication (3) Sp

D'ANGELO, STEPHENSON Application of behavioral research principles to problems in quantification, design, and analysis of data in speech-communication research. Prerequisite, introductory statistics or equivalent, or permission. (Formerly Speech 474.)

### 577-578 Research Problems in Speech Communication (3, max. 6)-(3, max. 6)

W,Sp Application of methodology and design prin-

#### ciples to research problems in speech communication. Prerequisite, 577- for -578. (Formerly Speech 570.)

### 597 Seminar in Interpersonal

Communications (2, max. 6) Sp Examination of experimental literature on selected topics. Subjects to change from year to year, including conflict resolution, information processing, communication networks, feedback systems, audience composition research, communication effects.

### SPEECH EDUCATION

### **Courses for Undergraduates**

### 355 Speech in the Elementary Classroom (3) Sp

FEEZEL

Designed for prospective or current public school teachers in the primary or elementary grades. Recognizes oral communication as both a means of teaching and learning and as an essential object of instruction in any discipline. Special attention to instructional communication theory, language development, studentcentered curriculum, speech activities. Prerequisites, junior standing and Education EDUC 288.

#### 356 Speech in the Secondary Classroom (3) W

FREZEL

Designed for prospective or current teachers in the secondary schools. Recognizes oral communication as both a means of teaching and learning and as an essential object of instruction in any discipline. Special attention to instructional communication theory, studentcentered curriculum, speech activities, oral questioning process. Not open to speech majors. Prerequisites, junior standing and Education EDUC 288.

#### 457 Debate and Discussion Problems in High School and College (2½) S DOUGLAS

Evaluation of debate and discussion in high school and college and consideration of methods of directing; specific consideration of debate questions in current use; bibliographies, analyses, and briefs.

### **Courses for Graduates Only**

550 Studies in Speech Education (3) A Philosophical, curricular, and methodological problems of speech instruction. (Offered alternate years; not offered 1973-74.)

595 Seminar in the Teaching of Speech (2, max. 6) A

### SPEECH AND HEARING SCIENCES

### **Courses for Undergraduates**

#### 300 Speech Science (5) AWSp

Study of the basic physiological and acoustical attributes of speech production and reception.

### 301 Anatomy of the Speech Mechanism (5) AWSp

PALMER

Structure and function of the organs concerned with phonation and articulation. Class size limited.

### 302 General Phonetics (4) AWSp

' TIFFANY

Phonetic and phonemic analysis of the sound system of the English language with special application to the problems of speech improvement. Three lectures and two laboratories per week. Prerequisite, Speech 301 or permission.

#### 303 Speech and Language Development (3) ASp HEDRICK

Study of the normal acquisition of speech and language in children. Prerequisite, Speech 302 or permission.

304 Physical Dimensions of Speech (2) AWSp Basic introduction to physical characteristics of the speech signal. Emphasis is given to properties of vibratory systems, analysis and measurement of speech waveforms, and physical correlates of the perceptual attributes of speech sounds. Not open to those who have had Speech 300, except by permission. Lectures complemented by laboratory demonstrations and projects.

### 414 Speech Physiology (3) A

ABBS, BENNETT

Study of the physiological parameters of speech production. Prerequisites, Speech 300, 302, or permission.

#### 415 Speech Acoustics (3) W

MINIFIE, TIFFANY

Study of the acoustical correlates of the distinctive parameters of speech. Special emphasis on speech analysis methods, including sound spectrography. Prerequisite, a course in speech science or phonetics, or permission.

#### 416 Speech Perception (3) Sp

BENNETT

Study of the perceptual and linguistic parameters of speech reception. Prerequisites, Speech 300, 302, or permission.

#### 420 Instrumentation for Speech and Hearing Science (3) A

General problems in design and application of electronic equipment used in the speech and hearing sciences. Laboratory problems and demonstrations; two hours of laboratory required each week.

### **Courses for Graduates Only**

502 Advanced Anatomy of Speech and Hearing Structures (2) AWSp PALMER

Directed individual dissection and study of selected anatomic structures of the speech or hearing mechanisms.

#### 503 Experimental Phonetics (3, max. 9) Sp TIFFANY

Application of experimental methods to research in voice and phonetics; critical review of research literature.

### 504, 505 Research Methods in Speech and Hearing Science (3,3) W,Sp

PRATHER, THOMPSON

504: Introduction to empirical methods in the speech and hearing sciences. 505: Applications of basic statistical procedures to investigation of specific problems in the communication sciences. Prerequisite for 505, Psychology 302 or equivalent.

### 519 Seminar in Speech Science (2, max. 6) AWSp

#### 520 Advanced Instrumentation for Speech and Hearing Science (3) Sp WALTON

Design and use of electronic and electroacoustic devices in the speech and hearing sciences. Laboratory construction and calibration of equipment. Two hours of laboratory required each week. Prerequisite, Speech 420. (Offered alternate years; not offered 1973-74.)

### SPEECH AND LANGUAGE DISORDERS

### **Courses for Undergraduates**

250 Introduction to Communication Disorders (3) ASp

Orients the student to the field of communication disorders and to a basic classification system. Required of all students majoring in speech pathology.

330 Disorders of Articulation (3) ASp Nature, etiology, and treatment. Prerequisites, Speech 250, 302, and 303.

331 Language Disorders of Children (3) W Consideration of descriptions and theories, both historical and contemporary, of disordered language in children and related problems. Prerequisites, Speech 250 and 303.

332 Diagnosis of Speech Disorders (3) ASp Prerequisites, Speech 330 and 331.

#### 348 Survey of Communication Disorders (3) Sp

For students not intending to major in speech pathology or audiology.

#### 350 Methods of Clinical Management (3) AWSp MINER

Techniques and procedures for planning effective management of speech disorders. Prerequisites, 330 or 331 and 332; Speech 332 may be taken concurrently.

#### 351 Practicum in Speech Pathology (1-2, max. 15) AWSp MINER

Total undergraduate credits in 351 and 391 together cannot exceed 20 credits. Minimum of 3 credits recommended; course may be repeated for credit. Prerequisites, Speech 332, 350, and permission.

### 430 Nature of Stuttering (3) ASp

PRINS Major theories of stuttering are studied in light of research concerning the characteristics of stutterers and their symptoms. Prerequisite, Speech 250 or permission.

#### 432 Interview Techniques for Communication Disorders (2) ASp

Interview techniques for the management of communication disorders. Prerequisites, Speech 250 and junior standing.

#### 449 Special Studies in Speech Pathology and Audiology (1-5, max. 15)

Intensive study of selected special problems in speech pathology and audiology. Prerequisite, permission.

### 450 Treatment of Stuttering (3) W

PRINS Description and evaluation of therapy systems for children and adults who stutter. Two hours per week of therapy observation are integrated with class material. Prerequisites, Speech 350 and 430, or permission.

### 451 Speech Pathology-Audiology Practicum in the Schools (1-2) AWSp

MINER, WILSON

Special projects in clinical practicum, offered only in the school setting. Provides an opportunity for students to extend practicum experiences in this special environment; does not fulfill requirements for teaching practicum in the College of Education. Prerequisites, Speech 350 and permission.

#### 452 Rehabilitation Medicine Information in Speech Pathology (3) A

Orientation information for speech pathology and audiology students on rehabilitation principles and techniques. Offered jointly with the Department of Rehabilitation Medicine as Rehabilitation Medicine 479. Lecture and clinical observation in all areas of rehabilitation, emphasizing cooperation and coordination of various professions in rehabilitation.

### 454 Voice Disorders (3) W

Etiology, evaluation, and treatment. Prerequisite, Speech 250.

### **Courses for Graduates Only**

### 530, 531, 532 Organic Disorders of Speech (3,3,3) A,W,Sp

Etiology, evaluation, and treatment. 530: Morphogenic disorders, especially cleft palate and dental malocclusions. 531: Dysarthria, especially cerebral palsy. 532: Dysphasia. Prerequisite for each course, 330 or permission.

#### 535 Psychological Factors in Communication Disorders (2) W

Prerequisite, Psychology 305 or permission.

#### 536 Advanced Diagnostic Procedures in Speech Pathology (4) AWSp

A study of approaches to differential diagnosis in speech and language disorders, as well as experience in the integration of information gained from various diagnostic procedures. Two hours of laboratory required per week. Class size limited. Prerequisite, Speech 332, or permission.

#### 551 Advanced Practicum in Speech Pathology (1-3, max. 10) AWSp MINER

Prerequisites, 351 or equivalent, and permission.

#### 552 Clinical Management of Stuttering (3) W PRINS

Study and application of clinical procedures for the diagnosis and the treatment of persons who stutter. Theoretical problems will be dealt with as a part of actual case management. Two hours of laboratory required each week. Prerequisites, Speech 430 and 450, or permission.

#### 560 Research Methods in Clinical Management of Childhood Language Disorders (3) AWSp

Rationale and methods for systematic sampling, data collection, and data analysis will be applied to the evaluation and the modification of language behaviors. Each student will design, conduct, and report on a laboratory project applying research methods to the evaluation of some aspect of a child's language behavior. Class size limited. Prerequisites, Speech 303 and permission.

#### 561 Language of Normal Children (3) AWSp CARPENTER

Advanced study of language acquisition and use by normal children, with emphasis on behavioral, semantic, grammatical, and syntactic aspects. Tools employed in study of early language development will be presented. Two hours of laboratory required each week. Class size limited. Prerequisites, Speech 303 and 560 or equivalent, and permission.

#### 562 Evaluation of Language Disorders of Children (4) AWSp KUNZE

Procedures and tools used in evaluating the language skills of children are presented along with parent interviewing techniques and professional reporting methods. Three hours of practicum each week in an interdisciplinary clinic is required. Class size limited. Prerequisites, Speech 331 and 561, and permission.

#### Management of Language Disorders of 563 Children (3) AWSp

Methodology appropriate to individual and small-group management with children having language disorders, with emphasis on a be-havioral approach. Two hours of practicum required each week. Class size limited. Prerequisites, Speech 331 and 561, and permission.

#### **Classroom Management of Language** 564 **Behaviors (2-5) AWSp** RIEKE

Methodology and supervised experience in management of language behaviors in a preschool class setting. Class size limited. Pre-requisites, Speech 563 and permission.

565 Practicum in Language Disorders of Children (1-3, max. 15) AWSp HEDRICK

Prerequisites, Speech 563 or equivalent, and permission.

- Seminar in Language Development and 566 Disorders (2, max. 6) S
- Prerequisites, Speech 331 and 477.
- 569 Seminar in Speech Pathology (2, max. 6) Sn

#### AUDIOLOGY

#### **Courses for Undergraduates**

306 Introduction to Audiology (5) ASp Description of normal audition; elementary structure and function of the hearing mechanism; types of deficient hearing and their effects on speech. (Formerly Speech 370.)

371 Basic Audiometry (5) AWSp Introduction to the theory and practice of the assessment of hearing function. Two hours of laboratory required each week. Class size limited. Prerequisites, Speech 306 and permission.

#### 390 Introduction to Aural Rehabilitation (5) w

WILSON

Psychological and educational implications of hearing loss; principles and methods of speech reading, auditory training, and speech conservation. Prerequisite, Speech 306.

#### 391 Practicum in Audiology (1-2, max. 15) AWSD WILSON

Total undergraduate credits in 351 and 391 together cannot exceed 20 credits. Minimum of 2 credits recommended; course may be repeated for credit. Prerequisites, Speech 371 or 390, and permission.

477 Pediatric Audiology (3) W Assessment of auditory disorders in infants and young children. Emphasis on behavioral and electrophysiologic techniques and on the role of the audiologist in the clinical management of the young hearing-impaired child. Prerequisites, Speech 306 and 371, or equivalent.

#### 493 Acoustic Amplification (3) W

Study of acoustic amplification and pertinent audiologic techniques. Prerequisites, Speech 371 and 390, or permission.

#### 494 Hearing Conservation for Children (2) Sp WII SON

Planning and execution of identification and educational programs relative to hearingimpaired infants and children of preschool and school ages. Prerequisites, Speech 371 and

390, which may be taken concurrently.

### **Courses for Graduates Only**

#### 526 Physiological Acoustics (3) W VANTIS

Study of pertinent literature and experimental techniques incident to the scientific study of the normal and abnormal auditory system.

#### 527 Psychoacoustics (3) Sp

YANTIS Review of instrumentation, research techniques, and significant literature pertinent to normal auditory sensitivity, pitch, loudness, and other attributes of auditory sensation. (Offered alternate years; not offered 1972-73.)

# 570 Advanced Audiology (5) A

Methods, techniques, and instruments used in the measurement of auditory function. Review of research literature. Prerequisite, 371 or permission.

#### 571, 572, 573 Advanced Audiometry (3,3,3) A,W,Sp

Special diagnostic and predictive techniques for assessment of auditory function. 571: Techniques of objective audiometry and evaluation of nonorganic hearing problems. 572: Functional evaluation of the cochlear end organ. 573: Functional evaluation of the retrocochlear and central auditory systems. Prerequisite for each course, 570.

#### Industrial and Community Hearing Conservation (3) W YANTIS

The 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, Speech 570 or permission. (Offered alternate years; not offered 1973-74.)

#### 575 Medical Background for Audiology (2) w

SNYDER

Diseases and injuries of the ear resulting in reduced audition. Prerequisite, Speech 306 or permission. (Offered alternate years; not of-fered 1972-73.) (Formerly Speech 470.)

#### **Advanced Practicum in Audiology** 501 (1-3, max. 10) AWSp WILSON

Prerequisites, 391 or equivalent, 570, and permission.

#### 596 Advanced Aural Rehabilitation (5) Sp WILSON

Survey and study of the pertinent research literature in speech reading, auditory training, and speech conservation for the auditorially handicapped. Prerequisite, Speech 390 or permission. (Formerly Speech 492.)

599 Seminar in Audiology (2, max. 6) W

# ZOOLOGY

### **Courses for Undergraduates**

114 Evolution (2) S General survey of evolution of animals, includ-ing man. For nonmajors.

#### 118 Survey of Physiology (5) A

MARTIN

Elementary human physiology. For nonma-jors. Credit will not be given for 118 if credit previously has been given for Zoology 208.

#### 119 Elementary Physiology Laboratory (1) A MARTIN

Specifically for physical education majors. May be taken by others only with permission. Prerequisite, 118 concurrently.

#### 208 Elementary Human Physiology (5) Sp GRIFFITHS

Each organ system is described and its function illustrated in the laboratory. Prerequisites, two quarters of college chemistry, two quarters college biological sciences completed or in progress, or permission. Credit will not be given for 208 if credit has previously been given for Zoology 118.

### 301 Introductory Physiology (3) A

EDWARDS, OLSEN, WHITELEY

Fundamentals of physiology: biochemistry of cell constituents, environment of the cell, bioenergetics, intermediary metabolism, membranes, control mechanisms. Prerequisites, chemistry through organic, one year of college physics, 10 credits in biological sciences.

#### 330 Natural History of Marine Invertebrates (5) Sp

KOHN, PAINE

A field and laboratory course emphasizing the habits, habitats, adaptations, and interrelationships of marine animals. Students may be required to share a portion of the costs of field trips.

#### 331 Natural History of Freshwater Invertebrates (5) SpS

A laboratory and field course dealing with the occurrence, distribution, and ecological rela-tionships of common freshwater invertebrates. Prerequisite, 15 credits in biological sciences or permission.

#### 362 Natural History of Vertebrates (5) Sp PAULSON

A field and laboratory course on the classifi-cation, ecology, and behavior of fishes, amphibians, reptiles, birds, and mammals. Prerequisite, permission. Students may be required to share a portion of the costs of field trips.

### 402 History of Zoology (3) A

Prerequisite, 20 credits in zoology or permission.

#### 403 Comparative Vertebrate Histology (5) A CLONEY

Microscopic anatomy of the tissues and organs of vertebrates. Prerequisite, Biology 212.

#### Ethology (3) W 409

ALCOCK, ORIANS Perception, nervous integration, movement, motivation, instinct, learning, and social behavior in animals, with emphasis upon their evolution and selective significance. Offered jointly with the Department of Psychology as Psychology 409. Prerequisite, Psychology 200 or Zoology 212, or equivalent.

### 410 Ethology and Ecology Laboratory (1-4) Sp

ORIANS, PAINE

Field projects on foraging and social be-havior, species interactions and structure of terrestrial and marine communities, including special student research problems. Prerequisite, permission. Students may be required to share a portion of the costs of field trips.

#### 423 Protozoology (5) A OSTERUD

Introduction to protozoa exclusive of parasites, with emphasis on morphology (including fine structure and function), ecology, tax-onomy, and life histories. Prerequisite, 20 credits in biological sciences or permission; Biology 401 recommended.

#### 428 General Physiology of Excitable Tissues (3) W

WILLOWS

Simple and complex ionic equilibria, electrical properties of membranes; active and passive membrane responses. Impulse generation and conduction; electrical and chemical synapses; structure of muscle, and mechanical, thermal, chemical, and electrical aspects of contraction. Prerequisite, 301.

#### 429 **General Physiology of Excitable Tissues** Laboratory (2) W

WILLOWS

Laboratory work to demonstrate the basic properties of nerve and the electrical and mechanical characteristics of muscle. This will be followed by experiments with diverse species that emphasize less-well-known nerve, muscle, and synaptic phenomena. Training will be given in the use of intracellular and extracellular stimulating and recording methods and other basic electrophysiological techniques. Prerequisites, 428 concurrently and permission.

### 432 Marine Invertebrate Zoology (8) S

Morphology and phylogeny of marine invertebrates. (Offered at Friday Harbor Labora-tories.) Not open to students who have had 433, 434. Prerequisite, Biology 212.

#### 433, 434 Invertebrate Zoology (5,5) A,W KOHN, ILLG, KOZLOFF

Morphology and phylogeny of invertebrates exclusive of terrestrial arthropods. Not open to students who have had 432. Prerequisite, Biology 212.

#### 435 Parasitology (5) W OSTERUD

A general course covering the principles of parasitism and the major groups of animal parasites. Prerequisite, 20 credits in biological sciences or permission.

#### 438 Comparative Endocrinology (3) W GORBMAN

Hormonal integration of living processes at all levels in animals: cells, organs, organisms, populations. Prerequisites, one year of zoology and permission; histology and organic chemistry recommended.

#### 439 **Comparative Endocrinology** Laboratory (2) W GORBMAN

Appropriate experiments to accompany and enlarge on material presented in 438. Prerequisites, 438 and permission.

444 Entomology (5) Sp 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. Students may be required to share a portion of the costs of field trips.

#### 448 **Concepts of Nervous System Function** (3) Sp

PALKA

A 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. Zoology 428 recommended but not required.

#### 449 **Concepts of Nervous System Function** Laboratory (2) Sp PALKA

Experiments to accompany material presented in 448. Prerequisites, 448 and permission.

#### 453-454 Comparative Anatomy of Chordates (5-5) A,W

SNYDER Phylogeny of the chordates; structure, function, and evolution of vertebrate organ systems. Prerequisite, Biology 212.

#### 456 Developmental Biology of Animals (5) ASp

BALL, CAHN, FERNALD

Introduction to properties and experimental analysis of developing systems, and a descriptive and comparative study of development with emphasis on chordates. The Autumn Quarter course emphasizes descriptive and comparative analysis. The Spring Quarter course emphasizes experimental aspects and the use of live material in the laboratory. Prerequisite, Biology 212. Prior completion of Zoology 301 recommended for the Spring Quarter course.

#### 457 Methods and Problems in Development (3) Sp

BALL, CAHN

Lecture course in experimental embryology focusing on modern approaches to developmental problems and emphasizing their analysis at a biochemical level. Selected topics will be covered in two lectures each week. Readings from primary sources will be assigned in conjunction with lecture material, to be discussed in a discussion section once weekly. Prerequisites, 456 and permission.

## 458 Vertebrate Physiology (5) W

MARTIN Emphasis on the physiology of nonmammalian vertebrates' major functions and organ systems viewed extensively from ecologic and evolutionary aspects. Special attention will be given to respiration, circulation, excretion, locomotion, energy metabolism, seasonal adaptation. Prerequisite, 301.

#### 459 Laboratory in Development (2) Sp. BALL, CAHN

An analysis of developmental problems using several experimental approaches. Exercises will include tissue culture and transplantation experiments, and use of biochemical approaches to characterize embryonic development. Prerequisites, concurrent registration in 457 and permission.

### 464 Natural History of Birds (5) Sp RICHARDSON

A lecture, laboratory, and field course. (Al-ternates with 465.) Prerequisites, Biology 212 and permission. Students may be required to share a portion of the costs of field trips.

#### 465 Natural History of Mammals (5) Sp RICHARDSON

A lecture, laboratory, and field course. (Offered alternate years.) Prerequisites, Biology 212 and permission. Students may be required to share a portion of the costs of field trips.

### 468 Comparative Physiology (5) Sp

EDWARDS, MARTIN, OLSEN Osmotic and ionic regulation, respiration, circulation, and excretion, with special emphasis on the variety of means with which animals solve common problems. Prerequisite, 301.

#### 470 Concepts and Issues (5) A

RAY

Zoological concepts, their current and potential applications to cultural dilemmas and frontiers. Prerequisite, advanced standing.

#### 475 Zoogeography (3) W RICHARDSON

Studies of the present distribution of terrestrial vertebrates and how it has come about, especially in relation to environment, evolution, and dispersal. Prerequisites, Biology 212 or equivalent, and one additional course involving some study of vertebrate classification, or permission.

### 490 Undergraduate Seminar (3, max. 6)

Supervised reading and group discussion on selected concepts of zoology. Prerequisites, 20 credits in zoology and permission.

#### **Topics in Zoological Research** 491 (1, max. 3) A

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. Prerequisites, upper-division standing and permission.

#### Special Problems in Zoology 498

(1-5, max. 15) AWSp Prerequisites, 30 credits in zoology and permission.

### **Courses for Graduates Only**

#### 506 Topics in Experimental Embryology (2, max. 6) A

Seminars and discussions of aspects of growth of special current interest. Prerequisite, permission.

### 517 Comparative Developmental Physiology (6)

WHITELEY

The topics of oögenesis, fertilization, and differentiation of invertebrates will be con-sidered from the point of view of biosyntheses, permeability, and metabolic changes, acquisition of specific biochemical properties and physical mechanisms of developmental processes. The laboratory will deal comparatively with a variety of marine invertebrates. (Offered at Friday Harbor Laboratories.) Prerequisite, permission.

### 520, 521, 522 Seminar (1,1,1) A,W,Sp FARNER

Advanced Topics in Physiology 528 (1-3, max. 15) Sp EDWARDS, PALKA, WILLOWS

Advanced considerations in physiology with emphasis on recent developments. Prerequisite, at least one 400-level course in physiology.

533 Advanced Invertebrate Zoology (6) S The rich and varied invertebrate fauna of the San Jaun Archipelago is studied, emphasizing systematics and ecology, with opportunity for developing individual research problems. (Offered at Friday Harbor Laboratories.) Prerequisite, 10 credits in invertebrate zoology or equivalent.

### 534 Topics in Advanced Invertebrate Zoology (3 or 6, max. 15)

ILLG, KOHN, KOZLOFF Advanced considerations in morphology, ecology, phylogeny of invertebrates; emphasizing current developments. (Six credits available at Friday Harbor Laboratories only.) Prerequisite, permission.

#### 536 Comparative Invertebrate Embryology (6) S

Morphological and experimental studies of development of selected types of marine invertebrates. (Offered at Friday Harbor Laboratories.) Prerequisites, 433, 434, and 456.

538 Advanced Invertebrate Physiology (6) S Physiological bases of ecology, evolution, and tolerance to stress, as illustrated by many diverse forms. (Offered at Friday Harbor Laboratories.) Prerequisites, chemistry through organic and 10 credits in invertebrate zoology, or equivalent.

#### 554 Advanced Vertebrate Morphology (3) A SNYDER

Current problems and trends in vertebrate anatomy emphasizing functional relationships. Prerequisites, 454, 456, and permission.

#### 568 Chemical Integration (2, max. 6) AWSp GORBMAN

Graduate seminar dealing with current problems in endocrinology and neuroendocrinology. Prerequisite, permission.

### 572 Topics in Ecology (2 or 3) W

EDMONDSON, PAINE, KOHN, ORIANS Graduate seminar on modern problems in ecology. Prerequisites, Biology 472 or equivalent, and permission.

#### 574 Ecology of Marine Communities (3) A PAINE

A lecture course emphasizing the ecological structure and functioning of marine communities. Topics include population interactions and dynamics, distributional patterns, bioenergetics, stability, and species diversity. **Prerequisites**, Biology 472 or equivalent, and permission.

#### 576 Environmental Marine Physiology (6) Sp JOHANSEN

A course emphasizing the relationship of vertebrate and invertebrate physiology to physical factors in the marine environment. Instruction will be given in principles and applications of modern instrumentation for quantitative study of animal-environment interactions. (Offered at Friday Harbor Laboratories.) Prerequisites, invertebrate and/or vertebrate zoology, one year of college physics, organic chemistry. Physiology desirable.

#### 578 Advanced Ecology (5) W ORIANS

Strategies of reproduction, habitat selection, foraging and spacing; theory of competition

and predator-prey interactions; niche theory and community structure. Prerequisites, Biology 472 or equivalent, and permission.

# 581 Systematic Zoology (5) W

History, principles, and procedures of zoological taxonomy; review of biological bases of phylogeny; history and principles of zoological nomenclature. Prerequisite, permission.

### 583 Advanced Techniques in Microscopy (5) W

CLONEY

Theory and use of light microscope, modern techniques of specimen preparation for morphological studies, photomicrography. Prerequisite, permission.

- 600 Independent Study or Research (\*) AWSpS
- 700 Master's Thesis (\*) AWSpS
- 800 Doctoral Dissertation (\*)

# SCHOOL AND GRADUATE SCHOOL OF BUSINESS ADMINISTRATION

### ACCOUNTING

### **Courses for Undergraduates**

210 Fundamentals of Accounting (3) Nature and social setting of accounting; uses of accounting information; introduction to basic accounting concepts, and some accounting techniques. Prerequisite, sophomore standing.

#### 220 Fundamentals of Accounting (3)

Basic concepts used in financial reporting, interpretation of financial statements. Prerequisite, 210.

#### 230 Basic Accounting Analysis (3)

Analysis and evaluation of accounting information as part of the managerial processes of control, planning, and decision making. Concentrates on the use of information by those managing the enterprise and making decisions. Prerequisite, 220.

#### 301 Intermediate Accounting I (3)

Concepts and principles of financial accounting. Analysis of controversies and problems related to the measurement of enterprise income. Prerequisite, 230.

#### 302 Intermediate Accounting II (3) Continuation of 301. Prerequisite, 301.

### 303 Advanced Accounting (3)

Theory and problems in accounting for ownership equities in corporations and partnerships. Financial statement analysis and internal measurement of business performance. Prerequisite, 302.

#### 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.

### 371 Auditing or Industrial Internship (2)

One quarter's internship with a certified pub-

lic accounting firm, industrial organization, or government agency. Prerequisite, prior departmental approval.

### 375 Topics in Financial Reporting (4)

A critical examination of the uses and limitations of general purpose financial statements which have been prepared in accordance with generally accepted accounting principles. Prerequisite, 230; not open to accounting majors.

### 411 Auditing Standards and Principles (3)

Establishes a framework in which the student will be operating as a professional man to examine the problems and the opportunities, the approaches and the methodology in performing the attest function and in expanding the attest function in the future. Prerequisites, 303, 311.

### 421 Federal Income Tax (5)

Comprehensive development of individual and corporation income tax. Prerequisite, 303 or permission.

430 Introduction to Information Systems (3) Study of the concepts of information systems in administrative organizations and the processes of analyzing and designing systems, with an emphasis on those using computer facilities. Includes sufficient study of computer systems to understand their present and future impact on information systems and to evaluate proposals for computerization of existing systems. Prerequisites, 230 and Quantitative Methods 200.

### 440 Accounting Systems (3)

Focuses on the integration of accounting and other information systems. The concepts and methodology of computerized information systems analysis and design, and a study of the management of the information function. As a part of systems design, the student will be introduced to COBOL as a programming language used in business information systems. Advanced study of computer equipment and its impact on systems. Prerequisite, 430.

### 450 Special Tax Problems (3)

Special problems in income tax, including partnerships, estates and trusts, corporate reorganization, gift and estate taxes, basic tax research. Prerequisite, 421.

### 460 Advanced Cost Accounting (3)

Advance 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.

# 470 Case Studies in Auditing (4)

Application of standards and principles to case studies in auditing, including practice case. Prerequisite, 411.

### 475 Administrative Controls (3)

The use of the budgetary, statistical, and accounting information in planning operations and achieving planned objectives through control. Prerequisites, 230 and Quantitative Methods 201. Not open to accounting majors.

### 480 Fund Accounting (3)

Fund and budgetary accounting as applied to governments and to institutions, such as hospitals and colleges. Prerequisites, 302.

# 485 Consolidated Financial Statements (3)

Accounting for parent-subsidiary and branch relationships; mergers; foreign exchange. Pre-requisite, 303.

#### 490 Advanced Problems (3)

Intensive study of accounting principles, procedures, and presentations, principally through consideration of C.P.A. problems. Prerequisites, 311, 411, 421, 480.

### 495 Advanced Accounting Theory (3)

Theory of accounting related to income measurement, assets, and equities. Prerequisites, 303 and senior standing.

#### 499 Undergraduate Research (3, max. 9) Arranged and supervised by individual mem-

bers of the faculty. Prerequisite, permission.

### **Courses for Graduates Only**

#### 500 Managerial Accounting (3)

Covers concepts and procedures for determination and presentation of information for managerial and financial decisions. Income determination, cost analysis, and analytic reports. Interpretation, use, and limitations of accounting statements. Prerequisite, permission.

#### 501 Managerial Accounting (3)

Study of the generation and the use of accounting information within the firm for purposes of planning and controlling operations. Topics covered include cost concepts, responsibility accounting systems, cost control, and the use of accounting information in shortand long-term management decision problems. Prerequisites, 500 and permission

#### 510 Concepts in Accounting Measurements (3)

An intensive study of accounting principles underlying financial statements, the measurement of income, the valuation of assets, and accounting for corporate stock equities. Emphasis is placed on the uses and limitations of accounting data, including analysis and interpretation of financial statements, and the manager's responsibilities and opportunities in financial reporting. Prerequisites, 500 and permission.

# 511 Concepts in Accounting Measurements (3)

Identifying and measuring attributes of resources of the firm relevant to management decisions. Flows as they relate to time, volume of activity, units of product, segments of the firm, and functional responsibility. Problems of cost and revenue forecasting for planning and control. Prerequisites, 500, 501, and permission.

### 520 Seminar in Financial Accounting (3)

A critical examination of alternative approaches to the study and the development of accounting theory. Evaluation of selected classic contributions to accounting theory. Extensive readings and discussion of recent attempts in English-speaking countries to formulate meaningful and useful conceptual bases for accounting. Prerequisite, permission.

### 521 Seminar in Financial Accounting (3)

Application of accounting theories to unresolved problems in financial accounting. Topics covered vary with the changing importance of current accounting concepts and problems. Stress is placed on developing research and writing skills along with analytic abilities. Prerequisites, 520 and permission.

### 522 Seminar in Cost Accounting (3)

Critical examination of theories of cost and managerial accounting. Differentiation of objectives of managerial and financial accounting; economic and accounting views of costs; current developments in cost accounting theory and practice. Prerequisite, permission.

540 Seminar in International Accounting (3) Emergence of the international accounting problem and organizations associated with the study of the issues involved; national differences in accounting thought and practice; international standards of accounting and auditing and financial reporting. Prerequisite, permission.

### 570 Seminar in Auditing (3)

Examination of the changing business environment of the auditor and the impact of these changes on auditing philosophy, objectives and methodology. The seminar focuses on the auditing of integrated information systems, the use of computers as an audit tool, and the expansion of the reporting function. Management aspects of public accounting practice are examined. Prerequisite, permission.

#### 571-572 Research Reports (3-3)

Independent study in business administration; critical evaluation of business analysis and research methods. Effective communication of ideas is emphasized. Methods and content of independent research studies being completed by the students are subjected to critical evaluation. Prerequisites, instructor's approval of preliminary research topic outline for 571-; 571- for -572; 571-572 open only to M.B.A. nonthesis students.

### 599 Doctoral Seminar in Accounting (3)

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 visiting professors and departmental faculty. For doctoral students only. May be repeated for credit. Prerequisite, permission.

600 Independent Study or Research (\*)

## ADMINISTRATIVE THEORY AND ORGANIZATIONAL BEHAVIOR

### **Courses for Undergraduates**

# 301 Behavioral Science and Administration (4)

An introduction to some of the fundamental research and theories of behavioral science that are particularly relevant to the study of management. Materials are presented to aid the student of management and administration in understanding the behavior of individuals and work groups. Prerequisite, junior standing.

### 440 Organization Theory (3)

Studies of concepts of power, authority, and influence; communications, delegation and decentralization, decision and planning theory; formal organization structures, group decision making, philosophy and values in business organizations, and considerations of organization as a social issue. Prerequisite, 90 credits.

#### 441 Advanced Organization Theory (3)

Deals with current research, measuring organizational effectiveness, planning, leadership patterns, current problems, developments in related disciplines. Prerequisite, 440.

#### 460 Human Relations in Organizations (4) Develops understanding of organizational be-

havior, with a clinical focus on basic processes and methods involved in diagnosing human situations and in taking action; includes specific personal, social, and organizational aspects; case discussion and analysis of concepts and conceptual schemes. Prerequisite, 90 credits. Offered on satisfactory/nonsatisfactory basis only.

#### 461 Two-Person Behavior in Organizational Contexts (4)

Clinically examines those behavioral skills and processes that are most basic in the development of effective individual behavior in business and other organizational contexts. Emphasis on clinical practice in developing: (1) self-awareness; (2) skills and processes in face-to-face communication and interaction; and, (3) structuring effective interpersonal relationships in organizational contexts. Prerequisites, 460 or permission, and senior standing. Offered on satisfactory/nonsatisfactory basis only.

#### 463 Administrative Behavior (4)

Studies practice and theory in formal organizations through selected readings and actual cases. Emphasizes the superior-subordinate relationship at all levels. Considers the administrator's frame of reference, communication in organizations, motivation, informal organization, situational and environmental aspects, and administrative controls. Prorequisite, either Administrative Theory and Organizational Behavior 460 or Personnel 301

#### 464 Racial, Ethnic, and Cultural Factors in Administration (4)

Understanding racial, ethnic, and cultural factors and their impact on the administration of organizations. Emphasis is on the comprehension of behavioral dynamics of discrimination through case analysis, role playing, and other exercises. Prerequisite, permission. Offered on satisfactory/nonsatisfactory basis only.

499 Undergraduate Research (3, max. 9) Prerequisite, permission.

### **Courses for Graduates Only**

500 Human Relations in Organizations (3) Analytically examines basic clinical processes related to diagnosing organizational behavior and taking action, and such aspects as individual and group behavior, basic human relations skills, behavioral processes, and the effects of organizational systems and processes on human organization. Prerequisite, permission.

#### 550 Organization and Management (3)

Studies concepts of power, authority and influence, objectives and goals, decision making and planning, communication, delegation and decentralization, leadership and motivation, and considerations of values, social issues, and future trends in organization. Research and theories in other fields, such as behavioral science and economics, will be related to business organization and management theory. Prerequisite, permission.

#### 565 Seminar in Comparative Administrative Theory (3)

Identifies and evaluates the variations that occur among significant factors within organizations, across organizations, institutional groups (business, education, health services, government...), national cultures (U.S., Russia, France, Brazil...) and supranational cultures (SEATO, EEC...), and their effect upon unit effectiveness. Prerequisite, permission.

### 571-572 Research Reports (3-3) See Accounting 571-572 for description.

575 Human Aspects of Administration (3) Examines administration process with a primary focus on organizational behavior. Develops the basic contributions of social science and other sources in the formulation of administrative-organizational conceptual schemes. Critically evaluates administrative theory in relation to administrative practice. Prerequisite, permission.

#### 576 Human Aspects of Administration (3)

Develops in depth some of the basic contributions to administrative theory and practice made by past and current research, thought, and experience. Typically examines several major research studies, drawing on findings from psychology, sociology, social and cultural anthropology, business administration, government, and other sources. Prerequisite, permission.

### 577 Practicum in Human Relations (3)

Utilizes the concepts, structures, methods, and techniques, commonly called the laboratory training method, for learning about personal and interpersonal phenomena. The course presents the opportunity for an in-depth examination of one's own and others' behavior and of the consequences of that behavior, using the vehicle of the T- (for training) group—an unstructured, agenda-less small group that focuses on the "here and now" actions, reactions, and interactions of the group members. The T-group provides the environment for inquiry, examination, and experimentation; the data are created and analyzed by the group members working together. Prerequisite, permission. Offered on satisfactory/nonsatisfactory basis only.

### 580 Planning and Decision Theory (3)

Usually focuses on the development of a theory of decision making, with emphasis on behavioral aspects. Consideration of information-decision systems and the role of model building. Occasionally emphasizes the development of a theory of planning, including foundation for theory, process of planning, role of participants in planning, the auxiliary functions, and integration into general theory. Prerequisite, permission.

#### 584 Theory and Practice in Organization Development (3)

Provides a conceptual understanding of organization development and some practice in developing applicable skills. Inquires into such matters as the history of organization development, conditions for successful application, organization diagnosis, client-consultant relationships, the action research model, team building, intergroup conflict resolution, and implications for the total organization. Prerequisite, permission.

#### 587 Seminar in Advanced Organization Theory (3)

Investigates the development of a theory of organization with subtheories on structures, processes, goal determination, problem solving, innovation, and change. Appraises various approaches to the study of organizations such as the sociological, normative, descriptive, analytical, and systems approach. Studies in detail the most important conceptual and analytical models of organization such as bureaucratic, information-communication, coalition, economic, and behavioral. Appraises the research methodologies in field studies, laboratory investigations, model building, and simulation. Discusses the future trends in organization theory. Prerequisite, permission.

#### 599 Doctoral Seminar in Administrative

Theory and Organizational Behavior (3) Study and research in advanced topics of administrative theory and organizational behavior. The seminar is generally concerned with unpublished areas of research and is conducted by visiting professors and departmental faculty. May be repeated for credit. For doctoral students only. Prerequisite, permission.

600 Independent Study or Research (\*)

### **BUSINESS ADMINISTRATION**

### 513 Introduction to Information Processing Systems (2)

Introduction to the use and the programming of computers for business applications. Programming problems in BASIC. Impact of computers on management. No credit if Quantitative Methods 200 has been taken. Prerequisite, permission.

#### 515 Introduction to Computer Information Systems (4)

Provides further study of computer technology and its impact on administrative organizations, the design and implementation of computerized information systems, and some exposure to computer languages. The purpose of the course is to provide the knowledge required by an operating or staff manager to work effectively with specialists developing computerized information systems. Prerequisites, 513 and permission.

700 Master's Thesis (\*) AWSp

800 Doctoral Dissertation (\*)

### BUSINESS ADMINISTRATION RESEARCH METHODS

### 500 Statistical Methods I (4)

Treatment of statistical methods useful in doing research in the various areas of business administration. Emphasis will be placed on using the statistical tools for testing hypotheses. Includes probability theory, sampling, estimation, hypothesis testing. Prerequisites, Quantitative Methods 201 or equivalent, doctoral standing and permission.

#### 501 Statistical Methods II (4)

Continuation of 500. A treatment of statistical methods useful in doing research in the various areas of business administration. Includes multiple regression, analysis of covariance, nonparametric statistics. Prerequisites, 500 and permission.

#### 510 Applied Econometrics I (3)

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, 500 and 501, and permission.

### 511 Applied Econometrics II (3)

Continuation of 510. Hypothesis testing, distributed lags, serial correlation models, simultaneous equation models. Prerequisite, 510.

#### 520 Behavioral Research Methods—Theory and Design (3)

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, 500 and 501, and permission.

#### 521 Behavioral Research Methods-Approaches and Applications (3)

Approaches 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, 500 and 501, and permission.

### **BUSINESS COMMUNICATIONS**

### **Courses for Undergraduates**

# 301 Basic Written Business Communications (4)

A 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, 75 credits.

#### 410 Business Reports and Other Specialized Communications (5)

Covers both internal and external communications that businessmen and businesswomen write on the job. Emphasis is 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, 75 credits.

### **BUSINESS ECONOMICS**

### 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. Prerequisite, Economics 201.

301 Money, National Income, and Prices (4) Measurement and analysis of business activity in the commodity and money markets; static and dynamic models of income and interest rate determination; problems and policies in the stabilization of business conditions. Prerequisites, Economics 200 and 201.

#### 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 and Quantitative Methods 201,

### 499 Undergraduate Research (3, max. 6)

Research in selected areas of business economics. Prerequisites, 300 and 301, and permission.

#### **Courses for Graduates Only**

#### 500 Business Economics I (3)

Factors underlying the determination of cost and prices for the industry and the firm; demand analysis. Prerequisite, permission.

### 501 Business Economics II (3)

Analysis of real and monetary factors affecting the national and international economic environment, supply and demand for money, interest rates, stabilization problems and policies. Prerequisites, 500 and permission.

#### 512 Advanced Managerial Economics (3)

Focus is on application of basic firm theory as developed in 500. Principles of optimum resource allocation, empirical estimation of cost and demand schedules. Prerequisite, 500 and Quantitative Methods 500, and permission.

#### 513 Macro-Analysis For Business (3)

National income and output analysis; examination of dynamic income-expenditure models; economic growth and industry change. Prerequisites, 501 and permission.

520 Seminar in Monetary and Fiscal Policy (3) Exploration of the recent and current literature in the area of monetary and income theory and an examination of monetary and fiscal policy problems in the area of domestic finance. Prerequisites, 500, 501, and Finance 420, and permission.

### 524 Seminar in Forecasting (3)

Econometrics; input-output analysis and NBER forecasting techniques; empirical testing and applications. Prerequisites, 513 and Quantitative Methods 500, and permission.

526 Industry Structure and Performance (3) A course in market structure, conduct, and performance; mergers and diversification; price and nonprice patterns of firm behavior. Prerequisite, 512 and permission.

#### 571-572 Research Reports (3-3)

See Accounting 571-572 for description.

#### 588 Seminar in Applied Microeconomic Analysis (3)

A seminar in applied microeconomic analysis: emphasis on individual selected topics and presentation of papers with application to economic problems of industries and firms, such as the estimation of aggregate production functions for industries, consumer preference patterns, firm forecasting and intrafirm pricing policies. Prerequisites, 512 and permission.

#### 599 Doctoral Seminar in Business Economics (3)

Study and research in advanced topics of business economics. The seminar is generally concerned with unpublished areas of research, and is conducted by visiting professors and departmental faculty. May be repeated for credit. For doctoral students only. Prerequisite, permission.

600 Independent Study or Research (\*)

## **BUSINESS, GOVERNMENT, AND SOCIETY**

#### **Courses for Undergraduates**

101 Business: An Introductory Analysis (5) The nature and role of American business in modern society; its growth, structure, organization, and relationship to environment. Business firms: their objectives, functions, and management. Problems of organization, decision making, controls, investment in business, and related aspects. Career opportunities in business.

#### 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.

#### 310 Legal Aspects of Business and Public Policy (5)

Legal questions involved in government and economic institutions including government regulation of competition and business-labor relations, government ownership, government assistance to business as well as business influences on government, regulation and the alternative of public control in selected case studies in such areas as pollution control and public utilities. Prerequisite, 200 or permission.

#### 361 Business History (3)

Exploration and analysis of the development of the American business system, business enterprise and its management within the context of environmental forces shaping the growth of the nation.

#### 403 Commercial Law (5)

Principles of the law of property, sales, negotiable instruments, and security transactions. Prerequisite, 200.

#### 444 Business and Society (4)

Major concepts in the behavioral sciences with respect to the influence of cultural norms and goals upon business activity, and the interdependence of business and other elements of the social order. Lectures and discussion.

#### 445 Comparative Enterprise Systems (5)

Investigation of functions, modes of operation, and methods of coordinating business enterprises in various economic systems, ranging from the competitive to the highly centralized.

### 490 Special Topics and Issues in Business, Government, and Society (3, max. 9)

Emphasis is upon contemporary topics and issues of business in their governmental and societal contexts. The content of the course will reflect contemporary developments and the current interests of the instructors and students. Prerequisite, permission.

499 Undergraduate Research (3, max. 9) Selected problems in social, legal, and economic institutions. Prerequisite, permission.

#### **Courses for Graduates Only**

#### 510 Business and Public Policy (3)

Legal institutions and processes in the business environment; contract, property, and the corporation; business, labor, and governmental participation in development of public policies affecting business. Prerequisite, permission.

511 The Context of the Business System (3) Specific problems that arise between the business system and the environmental context within which it operates. The role and contribution of the business system to American society and the symbiotic relationship that exists between the two. Prerequisite, permission. 552 Legal Aspects of Business Regulation (3) Examination, from the point of view of the business manager and the society, of advanced problems bearing upon top management's operating policy, with particular reference to selected legal and economic issues in public policies relating to competition. Prerequisite, permission.

#### 553 Advanced Problems in Business and Public Policy (3)

Advanced contemporary problems in business and public policy; wage and price controls; collective bargaining and strikes in essential industries; racial integration; "undesirable" and "excessive" advertising; industrial impact on the physical environment. Prerequisite, permission.

562 Responsibilities of Business Leadership (3) Relationships among business and consumers, government, labor, and agriculture as affected by changing social forces. Problems of business ethics. Prerequisite, permission.

#### 565 Industrialization and Social Structure (3)

Continuity and change in the structure of societies undergoing industrialization, with special attention to theories of the American experience and to the status and power of business. Prerequisite, permission.

#### 571-572 Research Reports (3-3)

See Accounting 571-572 for description.

#### 575 Theories of Capitalism (3)

Focuses upon the various theories of capitalism developed over the past several centuries and their relevance for our contemporary society. Prerequisite, permission.

### 590 Business History (3)

Development of the American business system, with special emphasis upon the dynamic forces, both internal and external, that shape the form and character of macro- and microbusiness. Prerequisite, permission.

#### 597 Behavioral Science of the Business System (3)

Analysis of the business system in the light of the concepts and methods of the behavioral disciplines. Attention centers on the business scholar's need to develop an integrative approach to social science. Prerequisite, permission.

#### 598 Analysis of Business Behavior (3)

Analysis of the behavior of the modern firm and its environment in the light of traditional and contemporary theory. Emphasis is placed upon empirical investigation of firm behavior. Prerequisite, permission.

#### 599 Doctoral Seminar in Business, Government, and Society (3)

Study and research in advanced topics of business, government, and society. Generally concerned with unpublished areas of research and conducted by visiting professors and departmental faculty. May be repeated for credit. Prerequisite, permission.

#### 600 Independent Study or Research (\*, max. 10)

Prerequisite, permission.

#### **BUSINESS POLICY**

### **Courses for Undergraduates**

470 Business Policy (4) Case study of policy making and administra-

tion from a general management point of view. Emphasis is on problem analysis, the decision-making process, administration and control, and continuous reappraisal of poli-cies and objectives. This course integrates and builds upon the work of the core curriculum. Prerequisites, senior standing or above and Finance 350, Marketing 301, Operations and Systems Analysis 301, and Personnel and Industrial Relations 301 or Ad-ministrative Theory and Organizational Be-havior 460, or permission.

#### 471 Problems of the Independent Businessman (4)

The role of small business in the economy. Case studies of problems faced by owner-managers of small business enterprises. The managerial role in establishing and operating new businesses. Case studies of problems involved in translating new product or service ideas into economic enterprises. Emphasis on the decision-making process in choosing a strategy and implementing it. Prerequisites, senior standing or above and Finance 350, Marketing 301, Operations and Systems Analysis 301 and Personnel 301 or Administrative Theory and Organizational Behavior 460, or permission.

#### 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, senior stand-ing or above and Finance 350, Marketing 301, Operations and Systems Analysis 301 and Personnel 301 or Administrative Theory and Organizational Behavior 460, or permission.

499 Undergraduate Research (3, max. 9) Prerequisite, permission.

### **Courses for Graduates Only**

571-572 Research Reports (3-3) See Accounting 571-572 for description.

### 593, 594 Policy Determination and Administration (3,3)

Analysis of policy problems faced by chief administrative officers of business firms. Determining of objectives; development of policies to achieve objectives; organization of executive personnel to implement policies; coordination of the organization; appraisal and adjustments to changes in environment. The course is intended to give a clearer in-sight not only into how business decisions are reached, but into the motivation of business-men in deciding what to do under varying circumstances. Case study seminars with simulation (business gaming) included in 594. (It is recommended that these courses be scheduled toward the end of the student's course work.) Prerequisites, second-year standing in M.B.A. program and permission for 593; 593 and permission for 594.

#### 595 Entrepreneurship (3)

Course focuses on entrepreneurship, both in pendent businesses on entriprintiating, both in pendent 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. Prerequisite, permission.

### FINANCE

### **Courses for Undergraduates**

### 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. Prerequisite, Business Economics 300.

#### 420 Financial Markets (4)

Analysis of the structure and functions of the money and capital markets; the saving-invest-ment process and financial intermediaries; supply and demand for loanable funds and the level and structure of interest rates, role of Federal Reserve and Treasury in money market developments. Prerequisite, Business Economics 301.

#### 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, 420.

#### 427 International Finance (4)

Asset choice and institutional operations in international finance; foreign exchange prob-lems; the impact 'of international financial problems and operations on business; shortterm and long-term international financing. Prerequisite, Business Economics 301.

### 450 Problems in Corporation 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 divi-dend policy. The management point of view is stressed. Prerequisites, 350 and Accounting 375.

#### 453 Financial Theory and Analysis (4)

Determination of liquidity needs subject to firm constraints and longer term capital budgeting problems involving cost of capital and capital rationing considerations; analytical approach, Prerequisites, 350 and Quantitative Methods 201.

#### 460 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, 350.

## 461 Investment Analysis (4)

A sequence course to 460 in which traditional investment analysis of securities is explored in more detail, and special emphasis is directed to more recent developments, especially portfolio analysis. Prerequisite, 460.

499 Undergraduate Research (3, max. 6) Research in selected areas of business finance, money and banking, or investments. Pre-requisites, 350 and permission.

#### **Courses for Graduates Only**

### 502 Business Finance (3)

A course in the financial management of the firm including capital budgets; working capital analysis, and dividend policy. Prerequisites. Business Economics 500 and 501, and permission.

#### 515 Capital Investment in Urban Development (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, permission. Offered jointly with the Department of Business, Government, and Society, as Urban Development 515.

### 520 Money Markets (3)

Analysis of the functions and the 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. Prerequisites, Business Economics 501 and permission.

### 521 Seminar in Financial Markets (3)

Analysis of managerial and environmental financial problems of banks and nonbank financial institutions; theory of flow of funds and financial intermediation. Prerequisites, 420, and Business Economics 500, 501, and permission.

#### 527 Seminar in International Finance and Investments (3)

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, 502 and permission.

#### 550 Advanced Business Finance (3)

Systematic coverage of the theory of financial management. Application of quantitative anal-ysis to the financial problems of the firm. Examination of empirical studies on the financing of the modern corporation. Prerequisites, 502 and permission.

### 551 Problems in Business Finance (3)

The application of financial principles and techniques to problems in financial management. Topics include cash management, credit management, problems in short-term and longterm financing, and capital budgeting. Pre-requisites, 502 and permission.

#### 552 Seminar in Business Finance (3)

A study of the financing of the corporation, including recent theoretical and institutional developments. Extensive reading and discussion in designated areas covering problems re-lating to financial management and to the social and economic implications of the financial process. Prerequisites, admission to Ph.D. program and permission.

#### 560 Investments (3)

Introduction to the nature, the problems, and the 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. Pre-requisites, 502 and permission.

#### 561 Seminar in Investments (3)

Discussion and analysis of concepts, processes, and problems of investment media valuation, portfolio valuation, and portfolio construction and administration for individuals and institutions. Prerequisites, 460, 502 and permission.

### 571-572 Research Reports (3-3) See Accounting 571-572 for description.

599 Doctoral Seminar in Finance (3) Study and research in advanced topics of finance. The seminar is generally concerned with unpublished areas of research and is conducted by visiting professors and departmental faculty. May be repeated for credit. For doctoral students only. Prerequisite, permission.

600 Independent Study or Research (\*)

### **INTERNATIONAL BUSINESS\***

### **Courses for Undergraduates**

310 Principles of International Business (5) Broad study of the major forms of international business: export and import trade, overseas investment, production and marketing operations; licensing, financing, and other services. Theoretical principles, government policies, business practices. Prerequisite, junior standing or permission.

#### 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. Prerequisite, 310 or equivalent.

#### 340 Business Environment in Industrial Countries (4)

Study of factors and conditions affecting business operations and behavior in developed countries; international integration; business relations among nation states and integrated supranational systems; direct investments and multinational industrial activities; analysis of sources and causes of international change. Prerequisite, 310 or equivalent.

#### 440 National Policy in International Business (4)

Concepts and characteristics of contemporary international economic relations; analysis of tariffs and nontariff trade controls; international economic policies of the U.S. and other major countries; bilateral and multilateral trade; GATT, UN Trade and Development Conference; Kennedy Round and aftermath; pending issues; analysis and evaluation of current trade legislation. Prerequisite, 310 or equivalent.

### 450 East-West Economic Relations (4)

Impact of foreign economic policies of communist countries on world business; communist trading organization and representation abroad; trade patterns; integration of international trade and industrial activity; export and import policies and tactics; pricing and costing practices; joint ventures between communist and capitalist enterprises; U.S. policies toward communist countries; changing patterns of East-West economic relations. Prerequisite, 310 or equivalent.

**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. Prerequisite, 310 or permission.

499 Undergraduate Research (3, max. 9) Prerequisite, permission.

### **Courses for Graduates Only**

### 515 Concepts and Policies (3)

Theoretical and managerial concepts, institutions, and environment of international business; organization and administration of foreign operations; conflicts between domestic and international policies and practices. Prerequisite, permission.

#### 520 Business Enterprise in Developing Areas (3)

The conditions, requirements, and problems which confront business enterprise in the developing countries of Africa, Asia, Latin America, and Oceania form the theme and the structure for this seminar. Prerequisite, permission.

#### 521 Business Enterprise in Integrated Markets (3)

A study in depth of the European Economic Community and other internationally integrated areas; their impact upon business operations and world trade is emphasized. Prerequisite, permission.

### 544 Multinational Corporate Systems (3)

Theoretical concepts; structural and sociological systems; intra-company international trade; transfer of corporate skills; transfer pricing; managerial communication; integrations of the different national subsystems; normative deductions. Prerequisites, 515 and permission.

# 571-572 Research Reports (3-3)

See Accounting 571-572 for description.

#### 595 Business Studies Abroad (\*, max. 9) 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 a major adviser who has agreed to direct their work in accordance with a definite program of studies. Prerequisite, permission.

#### 599 Doctoral Seminar in International Business (3)

Study and research in advanced topics of international business. The seminar is generally concerned with unpublished areas of research and is conducted by visiting professors and departmental faculty. May be repeated for credit. For doctoral students only. Prerequisite, permission.

600 Independent Study or Research (\*)

### MARKETING

#### **Courses for Undergraduates**

### 300 Marketing Concepts (4)

Analysis of tools, factors, and concepts used by management in planning, establishing policies, and solving marketing problems. Topics cover marketing concepts, consumer demand and behavior, location analysis, marketing functions, institutions, channels, prices, and public policy. (Not open to Business Administration students for credit, nor to those who have taken Marketing 301.)

#### 301 Marketing Concepts (4)

Analysis of tools, factors, and concepts used by management in planning, establishing policies, and solving marketing problems. Topics cover marketing concepts, consumer demand and behavior, location analysis, marketing, functions, institutions, channels, prices, and public policy. Prerequisite, Economics 201.

### 341 Product and Price Policies (4)

Examines 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 and Business Economics 300.

#### 350 Marketing Management (4)

Analysis of marketing management areas. Major areas covered are: market evaluation, product planning, promotion, channels and dealer relations, pricing and government controls, physical distribution, organization and planning and control of marketing activities. Prerequisite, 301.

361 Marketing Channels and Institutions (4) Analysis of marketing institutions and their functions, marketing channel structure, and channel alternatives available to management. Special attention is given to the role and perspective of the channel manager in directing marketing channel systems. Prerequisite, 301 or equivalent. (Not open to students who have taken 381.)

### 381 Retailing (4)

Profit planning and business control; buying, stock control, pricing, promotion; store location, layout, organization, policies, systems; coordination of store activities. Prerequisite, 301. (Not open to students who have taken 361.)

### 401 Sales Management (4)

Sales and distribution planning; sales organization and training; management of the sales force; methods of sales, cost, and performance analysis. Prerequisite, 301.

### 411 Advertising (4)

The management of the advertising function and its integration with other forms of promotion. Topics covered are planning the program; determining the most effective approach; evaluation of media and budget; advertising research; advertising institutions; economic and social aspects. Prerequisite, 301.

### 415 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. Prerequisite, 301; Quantitative Methods 201 recommended.

<sup>\*</sup>Related courses in other areas include: Accounting 540; Business, Government, and Society 445; Finance 427 and 527.

#### 421 Marketing Research (4)

The 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. Prerequisite, 301.

#### 430 Quantitative Methods in Marketing (4)

Application of quantitative methods to marketing decision problems, such as product testing, advertising effectiveness, routing of salesmen, distribution systems, pricing, and marketing models. Methods include analysis of variance, multiple regression, Bayesian statistics, linear programming, and others as appropriate. Prerequisites, 301 and Quantitative Methods 201 or equivalent.

### 481 Retail Field Work (2, max. 8)

Open to scholarship students only. Prerequisite, permission.

### 491 Marketing Problems (4)

Analysis of managerial marketing problems of the manufacturer, wholesaler, and retailer. Prerequisites, 301 and senior standing.

499 Undergraduate Research (3, max. 9) Prerequisite, permission.

### **Courses for Graduates Only**

500 Marketing Management (3) Analysis of markets and institutions, and the role of marketing in the economy. Considerations necessary for sound marketing management decisions in pricing, demand creation, physical distribution, channel selection, and product development; marketing structures and policies under various competitive relationships; public policy and legislative restraints. Prerequisite, permission.

# 510 Market Structure and Channel Strategy (3)

Principles, structure, and channel implications of both wholesale and retail distribution; factors affecting channels; selected product channels; physical distribution factors; marketing cost analysis and control. Prerequisites, 500 and permission.

#### 515 Price Practices and Policies (3)

The nature of pricing decisions; price theory and practice; primary and secondary factors affecting price policy; pricing methods and strategies; pricing practices in selected industries. Prerequisites, 500 and permission.

520 Seminar on Promotion in Marketing (3) Examiniation of topics of importance in the promotion of the firm's goods and services in its markets. Prerequisites, 500 and permission.

#### 521 Seminar on Measurement in Marketing (3)

The theory and application of experimental designs in marketing. Emphasis is placed on the underlying logic of experimentation and the analysis and interpretation of experimental data dealing with a variety of marketing problems. Prerequisites, 500 and Quantitative Methods 500 and permission.

#### 522 Advanced Marketing Concepts (3)

The interdisciplinary exchange of ideas related to marketing is studied. The marketing theories and evolving concepts of marketing and management are critically appraised. Prerequisites, 520 or 521, and permission. 525 Seminar in Consumer Behavior (3)

Analysis of current research in consumer behavior. Topics will include consumer decisionmaking processes, models of buyer behavior, and contributions from the behavioral sciences. Prerequisites, 500 and permission.

#### 571-572 Research Reports (3-3) See Accounting 571-572 for description.

599 Doctoral Seminar in Marketing (3) Study and research in advanced topics of marketing. The seminar is generally concerned with unpublished areas of research and is conducted by visiting professors and departmental faculty. May be repeated for credit. For doctoral students only. Prerequisite, permission.

600 Independent Study or Research (\*)

## OPERATIONS AND SYSTEMS ANALYSIS

### **Courses for Undergraduates**

#### 301 Principles of Operations Analysis (3)

Fundamentals of systems management and the techniques used in the analysis and control of operating systems. Background of management decision making and systems analysis, concepts of alternate systems of operations, selection of resources, scheduling and control of the flow of transactions in systems, maintenance of efficiency, statistical analysis of systems behavior, use of computers and quantitative models in analysis and control of operations. Prerequisites, Quantitative Methods 200, 201, or permission.

## 441 Systems Theory (3)

Analysis of planning and control of operations, including the use of those tools and those techniques that are best suited to the design stage. Micro systems are emphasized. Prerequisite, 301 or permission.

#### 442 Operations Planning and Control (3)

Analysis of planning and control of operations, including capital equipment selection and replacement, design of control systems using statistical control models, and applications of improvement curve theory to systems planning and control. Prerequisite, 301 or permission.

#### 443 Scheduling and Inventory (3)

Analysis of alternative scheduling and inventory systems, with emphasis on the use of mathematical models and simulation. Prerequisite, 301 or permission.

### 460 Administration of Operations (4) Administration and analysis of operations in a

variety of institutional settings. Particular attention is given to analysis and decision making through the use of cases. Prerequisites, 301 and senior standing, or permission.

499 Undergraduate Research (3, max. 9) Prerequisite, permission.

### **Courses for Graduates Only**

### 500 Operations and Systems Analysis (3)

A study of the management of operations in business and public enterprises. Basic concepts, philosophy, and techniques of analysis for management decision/making; analysis of structure and dynamic behavior of management systems; use of computers and quantitative models in planning and control of operations; selection of resources; choosing among alternative systems of operations. Prerequisites, Quantitative Methods 500 and permission.

520 Systems Analysis and Current Issues (3) Evaluation and redesign of organizations using the systems approach. Both macro and micro systems are studied; however, the emphasis is on the larger units, for example, corporate conglomerates or metropolitan centers. Each member of the class selects some segment of an issue to research, but all use the same model for analysis. Prerequisites, 500 and permission.

### 521 Studies in Operations Analysis (3)

Policy formulation and administration of operating sectors of organizations, emphasizing applications of quantitative models to operating problems; systems analysis, and integration of functions of operations management with the major goals of the organization. Case studies and models are used. Prerequisites, 500 and permission.

#### 571-572 Research Reports (3-3)

See Accounting 571-572 for description.

### 582 Analytical Models (3, max. 6)

Application of quantitative methods to operations problems. Content to vary. Topics to include inventory, theory, location, scheduling, maintenance scheduling, quality control, with one or two areas covered in depth each quarter. Prerequisites, 500 and Quantitative Methods 510, and permission.

### 585 Systems Analysis Models (3, max. 6)

Analysis of the structure and dynamic behavior of systems. Study in different quarters, of such topics as industrial dynamics (theory and analysis of the feedback structure of or ganizations and computer systems and system analysis and model building in the public sector. Prerequisites, 500 and permission.

#### 599 Doctoral Seminar in Operation and Systems Analysis (3)

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. May be repeated for credit. Prerequisite, permission.

600 Independent Study or Research (\*)

## PERSONNEL AND INDUSTRIAL RELATIONS

### **Courses for Undergraduates**

#### 301 Industrial Relations (3)

The recruitment, selection, utilization, and development of human resources, with special emphasis on union management relations and relevant behavioral science research.

445 Personnel Methods and Theory I (3) Job analysis, job evaluation, and wage surveys, wage and salary administration; performance standards, performance evaluation; employee services and fringe benefits.

446 Personnel Methods and Theory II (3) Recruitment, selection, interviewing, testing, placement, training, research, and statistics.

450 Industrial Relations Administration (5) Cases, lectures, and collective bargaining simulation are used to develop administrative skill in dealing with unions. Subjects covered are: **499 Undergraduate Research (3, max. 9)** Prerequisite, permission.

### **Courses for Graduates Only**

#### 520 Seminar in Personnel and Industrial Relations (3)

Problems and policies in personnel and industrial relations are analyzed in the following areas: personnel philosophy, ethics, role of personnel department, breadth of personnel department's responsibilities, implementation of personnel program, collective bargaining, and contribution of personnel department to the organization. Prerequisite, permission.

#### 530 Personnel Systems and the Behavioral Sciences (3)

Depth analysis of the utility, reliability, and validity of current and proposed personnel devices and systems in staffing, directing, appraisal, compensation, training and development, and collective bargaining. Prerequisite, permission.

#### 541 Management-Employee Relations Systems in the White Collar and Professional Sectors (3)

Focuses on current and emerging forms of management and employee relations systems. Primary emphasis is given to new forms of white-collar unionization, bargaining and quasi-bargaining situations between professionals and management, and emerging forms of third party participation in these relationships. Prerequisite, permission.

#### 571-572 Research Reports (3-3) See Accounting 571-572 for description.

### 599 Doctoral Seminar in Personnel and Industrial Relations (3)

Study and research in advanced topics of personnel and industrial relations. The seminar is generally concerned with unpublished areas of research, and is conducted by visiting professors and departmental faculty. For doctoral students only. May be repeated for credit. Prerequisite, permission.

600 Independent Study or Research (\*)

# **QUANTITATIVE METHODS**

### **Courses for Undergraduates**

### 200 Computer Programming (2)

Introduction to computer programming using the BASIC language and "canned" programs. Applications to business problems. (Not recommended for students with credit for Engineering 141 or Mathematics 114.) Offered on satisfactory/nonsatisfactory basis only.

### 201 Statistical Analysis (4)

Survey of statistical techniques useful in guiding business decisions: introduction to probability, decision making, correlation, and regression. Prerequisites, 200 and Mathematics 157.

350 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, 200 and Mathematics 157. Offered on satisfactory/nonsatisfactory basis only. 360 Probability Concepts for Business (4) Introduction to calculation concepts of probability, random variables, moments, and probability models. Includes applications of probability in management decision making. Prerequisite, 350 or equivalent.

### 401 Statistical Inference (4)

Sampling distributions, estimation, tests of hypotheses, simple nonparametric methods, elements of statistical decision theory. Prerequisite, 201.

404 Computer Programming for Business (4) Programming techniques and languages for solution of quantitative business problems. Assembly language, FORTRAN, COBOL. Basic data-processing techniques. Programming assignments. Prerequisite, 200; 350 recommended.

### 424 Simulation Techniques (4)

Construction and operation of simulation models, including study and use of specialized simulation languages on digital computers. Prerequisites, 200, 201; 350 recommended.

#### 450 Operations Research—Deterministic Models (4)

Formulation and solution of business problems of (primarily) deterministic nature through use of operations research tools. Emphasis on techniques of mathematical programming, dynamic programming, network algorithms. Prerequisite, 350 or equivalent.

#### 490 Special Problems in Quantitative Methods (4)

Specialized quantitative techniques useful for solving business problems. Topics from operations research, statistics, computer methods. Emphasis on application. Prerequisites, 401, 404, 450, depending on topic.

### 499 Undergraduate Research (3, max. 9)

Research in selected problems in business statistics, operations research, decision theory, and computer applications. Prerequisite, permission.

### **Courses for Graduates Only**

### 500 Business Statistics (3)

Treatment of statistical methods useful in the decision-making process. Includes descriptive statistics, probability and inference, correlation, and regression. Emphasis on basic concepts and application. Prerequisites, Mathematics 157 or equivalent and permission.

### 510 Quantitative Methods (3)

Survey of operations research techniques for business problem solving. Emphasis on linear programming and general mathematical programming techniques. Prerequisites, 500 and permission.

#### 516 Statistical Decision Processes for Business (3)

Application of utility theory, probability theory, and game theory to decision making under conditions of risk and uncertainty. Bayesian approach to decision making. Prerequisites, 500 or equivalent and permission.

## 520 Seminar in Business Statistics (3)

Seminar in the application of statistical techniques: topics are selected from nonparametric statistics, advanced application of statistical techniques in administrative control, advanced multivariate analysis, theories and techniques of time series analysis, and index

#### 544 Seminar in Business Use of Computers (3)

Investigation into the applications of digital computers in the business environment. Possible topics include economic feasibility of using computers in business, computational algorithms for business data analysis problems, computational approaches to problems of operations research, and application of artificial intelligence techniques to business problems. Prerequisites, 404, 500, and 510 (or equivalent) and permission.

### 550 Seminar in Operations Research Techniques (3, max. 6)

Intensive study into operations research techniques relevant to business analysis. Selected topics include: extensions of linear programming, solution of large systems, stochastic processes, dynamic programming, discrete programming, and network models. Prerequisites, 450 and permission.

### 571-572 Research Reports (3-3)

See Accounting 571-572 for description.

#### 599 Doctoral Seminar in Quantitative Methods (3)

Study and research in advanced topics of quantitative methods. The seminar is generally concerned with unpublished areas of research and is conducted by visiting professors and departmental faculty. May be repeated for credit. For doctoral students only. Prerequisite, permission.

600 Independent Study or Research (\*) Prerequisite, permission.

## **RISK AND INSURANCE**

# **Courses for Undergraduates**

310 Fundamentals of Risk and Insurance (5) Introduction to principles of insurance. Economic and social contributions of insurance. Evaluation of loss exposures faced in business and personal situations. Planning to use insurance intelligently in dealing with loss exposures. Analysis of alternative methods. Prerequisite, junior standing.

### 420 Analysis of Insurer Operations (4)

Study of basic operations common to all types of insurance companies. Emphasis on analysis and decision making as applied to different insurance company operating problems. Prerequisite, junior standing.

### 480 Risk Control (4)

Control of non-market risks as a managerial function. Evaluation of alternative courses of action. Influence of competitive pressures and regulation of the insurance industry. Prerequisite, junior standing.

### 499 Undergraduate Research (3, max. 6)

Individual investigation of risk and insurance problems. Open only to qualified students. Prerequisite, permission.

## TRANSPORTATION

## **Courses for Undergraduates**

#### 310 Principles of Transportation (5) Survey of the economic organization and functioning of the transportation industries. Impact on industrial location, prices, and markets. The nature of public policy in transportation.

372 Physical Distribution Management (3) Management's responsibility for the movement of raw materials and finished products, including traffic management, plant location, materials handling, distribution warehousing, inventory control, and production scheduling.

#### 440 Transportation Pricing (3)

Conceptual framework and theoretical aspects of pricing services. Exercise of managerial discretion in price determination. Comparative evaluation of pricing among different modes. Problems in pricing. Prerequisite, 310.

### 471 Public Policy in Transportation (3)

Appraisal from the public point of view. Content and effect on decision making by carrier and shipper firms. Procedures of administrative agencies regulating transportation firms.

#### 481 Cases in Transportation Carrier Management (3)

Carrier problems including financing, equipment purchase and utilization, labor relations, policy determination, purchasing controls, public relations, and rate negotiations. Prerequisite, 310.

### 491 Cases in Physical Distribution Management (3)

Transportation problems and decisions from the buyer's viewpoint. Cases deal with analysis and selection of mode, both public and private. Costs and service considerations in assembly and distribution. Plant and warehouse location. Evaluation of market potential in view of transportation problems.

499 Undergraduate Research (3, max. 9) Prerequisite, permission.

### **Courses for Graduates Only**

### 505 Transportation Systems and

Institutions (3)

Economic, social, and political aspects of the transportation industry from the standpoint of the transportation firm, the user, and the regulatory agencies. Modern physical distribution systems. The economic impact of location on transportation industries. Theoretical and pragmatic considerations in pricing transportation services. Environmental aspects of domestic and international transportation and physical distribution systems. The socio-economic impact of advancing technology in transportation.

#### 520, 521 Trends and Contemporary Problems in Transportation Management, National Policy, and Regulation (3,3)

The impact of changing patterns and programs in transportation on the economy and individual firms. Primary and secondary source data and the interpretation of this information in researching transportation problems and arriving at solutions. Each quarter different aspects are emphasized. Prerequisites, 505 and permission.

### 571-572 Research Reports (3-3)

See Accounting 571-572 for description.

600 Independent Study or Research

### **URBAN DEVELOPMENT**

### **Courses for Undergraduates**

### 310 Urban Development Economics (4)

Urban land use analysis and determination, location and interdependence of cities, the urban economy, land tenure, and other institutional factors. 320 Law of Urban Development (3) Legal aspects of modern land utilization including the urban plan, zoning, and private and public ownership—with preliminary discussion of the nature of property and a brief survey of real property law.

#### 395 Urban Development and Private Investment (4)

Emphasizes the role of the private sector in urban development; valuation and investment theory; techniques of investment analysis, and capital allocation.

#### 405 Urban Development and Location of Firms (4)

Spatial equilibrium and the optimum location of business firms and households; decision criteria for location of commercial and industrial firms, and for residences; rent and location theory.

496 Research in Urban Development (3) Research methodologies and techniques are stressed. A supervised research paper is required. Prerequisites, 310, 395, and permission.

### **Courses for Graduates Only**

#### 515 Capital Investment in Urban Development (3)

Develops principles for evaluating opportunities to invest in urban real estate, discusses the queston 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, permission. Offered jointly with the Department of Finance, Business Economics, and Quantitative Methods as Finance 515.

### 520 Urban Development Economics (3)

Economics of spatial systems, urban land value, rent and location theory, the urban market for land use—residential, commercial, industrial, public; problems of urban development and investment. Prerequisite, permission.

# 525 Urban Development and the Location of Firms (3)

Spatial equilibrium of the firm and households; decision criteria for optimum location with constraints; public policy and allocation of urban land uses. Prerequisites, 515, 520, and permission.

#### 571-572 Research Reports (3-3) See Accounting 571-572 for description.

## 595 Urban Development Problems (3)

For advanced graduate students concerned with contemporary problems of urban development, including problem identification and measurement, research methodology, and techniques; historical and cultural aspects, social indicators. Prerequisites, 515, 520, and permission.

600 Independent Study or Research (\*) Prerequisite, permission.

# SCHOOL OF DENTISTRY

### **COMMUNITY DENTISTRY**

100 Orientation (1) Sp GUILD Introduction to the social, political, and economic aspects of the health-care-delivery system.

### 200 Community Dentistry (1) W

MIDDAUGH Social, economic, political, and psychological aspects of dental practice.

# 300 Community Health (2) Sp

Social aspects of dental health care delivery systems in the United States and elsewhere.

#### 301 Dental Psychiatry (0) Sp HEILBRUNN

Psychological aspects of dental practice.

### 401 Current Events (2) W

GUILD Recent social, economic, and political devel-

opments relevant to the dental profession.

### 403 Jurisprudence (1) A

WILSON Legal problems and obligations incident to the practice of dentistry: state dental laws, contracts, malpractice, and dentists as expert witnesses.

### 497 Directed Studies in Community Dentistry (\*) AWSp

Permits students and faculty who have common academic interests to pursue them together within the curriculum by means of independent study and a tutorial student-faculty relationship. Prerequisites, permission of class adviser and instructor.

### DENTAL HYGIENE

#### 345 Oral Prophylaxis (2) W

Objectives, techniques, and procedures for oral prophylaxis; application of these procedures to patient treatment and education for patient preventive control program.

### 347, 348, 349 Dental Hygiene Procedures A,W,S (4,6,6)

BENNETT, LANGSLET

Core courses coordinating oral anatomy, dental materials, occlusion, radiology, and introduction to dental hygiene services.

350 Dental Hygiene Procedures (6) S Continuation of 349. Prerequisite, 349.

#### 401 Office Procedure and Ethics (2) Sp HOWARD

Dental office and clinic procedure; dental and dental hygiene ethics, professional interrelationships.

#### 402 Community Dental Health (3) A FALES, MAR

Application of educational principles to dental health teaching; instruction in planning for community dental health programs including actual dental survey experience; evaluation of dental health teaching materials.

#### 403, 404 Principles of Dental Hygiene Practice (1,1) Sp BENNETT

Presentation and analysis of dental health problems, with emphasis on advanced dental health instruction; experience in presentation of dental health material to groups.

# 445 Advanced Clinical Techniques

(2 or 4, max. 8) AWSpS

Advanced instrumentation and clinical procedures for certificate dental hygienists. Seminars and clinical experience. Prerequisites, certificate in dental hygiene from an accredited program and permission.

#### 446 Field Practice (2) WSp

Advanced dental hygiene practice, including work in the University Child Health Center, in a public health department, hospitals, clinics, and schools.

#### 447 Dental Hygiene Practice (4) A WELLS

Clinical procedures in all phases of dental hygiene; varied clinical experiences under close supervision.

#### 448 Dental Hygiene Practice (4) W

WELLS

Continued clinical procedure with expansion to include dental hygiene services to patients requiring special considerations.

#### 449 Dental Hygiene Practice (4) Sp WELLS

Supervised opportunity to attain experience, knowledge, and skill so that each student may develop operative dental hygiene techniques commensurate with her ability.

450 Dental Hygiene Practice (6) S Continuation of 449. Prerequisite, 449.

#### 491 Seminar in Dental Hygiene (2) AWSp LANGSLET

Study of professional education, accreditation, legislation, organization, and literature. Responsibilities of the dental hygienist to the community.

# 492 Readings in Current Literature in Dental Hygiene and Preventive Dentistry (2) AWSp

FALES

Discussion of reported readings and survey of background material, with emphasis on dental research and its application to dental health education.

#### 493 Problems in Dental Hygiene (2-4) AWSp FALES

Problems for study directed toward increased understanding in the selected field of practice. Presentation of background, objectives, program, and evaluation.

#### 494 Principles of Teaching in Dental Hygiene (2) AWSp FALES

Application of principles of learning to teaching methods and techniques effective in dental hygiene, with opportunity for course planning, demonstration, and practice teaching. Prerequisite, certificate in dental hygiene.

#### 497 Directed Studies in Dental Hygiene (\*) AWSp

Elective course based on student interest in special areas of preventive dentistry or dental hygiene education. The course allows independent study and a tutorial student-faculty relationship. May be repeated. Prerequisites, permission of class adviser and instructor.

### **ENDODONTICS**

#### 201 Introduction to Endodontics (2) Sp NATKIN

Lecture course dealing with the differential diagnosis and the treatment of pulp pathosis and associated periapical pathosis.

#### 232 Endodontic Technic (2) Sp HARRINGTON

A lecture-laboratory course in root canal therapy in terms of present-day concepts, with emphasis on a definite, simplified technic. Treatment of extracted teeth as practice for clinical cases.

#### 304 Endodontics (1) A HARRINGTON

Lecture course dealing with diagnosis and treatment of impact injuries to teeth; treatment of endodontic emergencies; surgical management of endodontic problems.

#### 305 Clinical Management of Endodontic Treatment Problems (1) W HARRINGTON

Management of a variety of technical problems frequently encountered in the treatment of endodontic cases. Required for third-year dental students.

#### 349 Clinical Endodontics (0-1-1) AWSp

The student is required to complete endodontic treatment of an anterior, bicuspid, and molar tooth.

350 Clinical Endodontics (6) S Continuation of 349. Prerequisite, 349.

#### 449 Advanced Clinical Endodontics (0-0-2) AWSp

In addition to conservative treatment of several endodontic cases, the student performs periapical surgery and at least one minor operation such as bleaching.

#### 450 Advanced Clinical Endodontics (6) S. Continuation of 449. Prerequisite, 449.

#### 497 Directed Studies in Endodontics (\*) AWSp

Course will permit students and faculty who have common academic interests to pursue them together within the curriculum by means of independent study and a tutorial studentfaculty relationship. Prerequisites, permission of class adviser and instructor.

#### 525 Physiologic Bases of Dental Science (3) S VAN HASSEL

Current concepts in areas of physiology related to dentistry, including pain, taste, speech, microcirculation, occlusion, and calcification. Review of basic physiologic mechanisms, survey of recent literature, and design of applied dental research in each area. Offered jointly with Physiology and Biophysics P BIO 506. Prerequisite, permission.

#### 535 Microbiological Aspects of Endodontic Therapy (2) Sp ZELDOW

Seminar discussion of areas of microbiology of particular significance to the field of endodontics. Required for endodontics graduate students. Prerequisite, permission for nonendodontics dental graduate students.

### **Courses for Graduates Only**

546, 547, 548 Clinical Endodontics (3,4,4) HABRINGTON

The clinical diagnosis and treatment of the pulpless tooth.

#### 549, 550, 551 Clinical Endodontics (3,4,4) NATKIN

The clinical diagnosis and treatment of the pulpless tooth. Prerequisites, 546, 547, 548.

576, 577, 578 Endodontic Seminar (2,2,2) NATKIN

A continuous weekly seminar devoted to re-

view of endodontic and related literature and to discussion of research methods.

#### 579, 580, 581 Endodontic Seminar (2,2,2) HARRINGTON

A continuous weekly seminar devoted to review of endodontic and related literature and to discussion of research methods. Prerequisites, 576, 577, 578.

#### 582, 583, 584 Treatment Planning Seminar (2,2,2)

HARRINGTON

A weekly seminar to discuss controversial treatment problems and difficult diagnostic cases.

#### 585, 586, 587 Treatment Planning Seminar (2,2,2)

HARRINGTON

A continuation of the weekly seminar to discuss controversial treatment problems and difficult diagnostic cases. Prerequisites, 582, 583, 584.

#### 591, 592, 593 Clinical Practice Teaching (1,1,1)

#### NATKIN

A closely supervised experience in teaching clinical endodontics to the undergraduate dental student. Prerequisites, 546, 547, 548, 576, 577, 578.

#### 597, 598 Endodontics Teaching Seminar (2,2) W,W

HARRINGTON Weekly seminars devoted to an examination of general problems of teaching and learning and specific problems of endodontics teach-

ing. Prerequisite, 597 for 598.

#### 600 Independent Study or Research (\*) VAN HASSEL

An investigative program in one of the basic sciences under the direction of the departmental faculty. Prerequisite, permission.

## DENTISTRY

### Courses for Undergraduates

100 Principles of Preventive Dentistry (2) A Nature of dental plaque and its role in dental disease. Methods of detecting, quantifying, and controlling dental plaque. Epidemiology of dental caries and the role of fluorides in prevention. Patient-education procedures.

101 Human Growth and Development (2) W Growth and development of the human being from birth through maturity. Special emphasis upon growth of the head and dentition.

#### 361 Clinical Orientation (0) A

A course for third-year students prior to the beginning of Autumn Quarter. It is designed to familiarize the student with clinical equipment and procedures and initiates the transition of thought from technical and laboratory methods to clinical application of them. It includes student exercises on each other in prophylaxis, rubber dam applications, and local anesthetic injections in preparation for treatment of patients.

### 400 Hospital Orientation (0-0-1) AWSp

ANDERSON

A demonstration course for fourth-year dental students emphasizing hospital procedures and the dentist's use of the patient's medical record. 401 Treatment Planning Seminar (1-1) AWSp A seminar devoted to the discussion of treatment plans for patients of fourth-year students. The specific plans for treatment along with a case "work-up" are presented by the students, discussed by the class members present, and reviewed by the attending faculty.

#### 402 Special Studies in Dentistry (2, max. 4) AWSp

A 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, and may be applied toward the major requirement for the degree of Master of Science in Dentistry.

#### 404 Dental Auxiliary Utilization (0-0-2) AWSp

Combined seminar, lecture, and clinical course designed to provide instruction in the training and the utilization of auxiliary personnel in the practice of dentistry.

## **Courses for Graduate and Certificate Dental Students Only**

These courses include subject material applicable to all phases of dentistry, and they may be applied toward the major requirement for the degree of Master of Science in Dentistry.

#### 510 Applied Osteology and Myology of the Head and Neck (2) A

Detailed study as a background for the study of the growth and development of the head and for cephalometric roentgenogram interpretation. (Department of Orthodontics)

#### 511 Roentgenographic Cephalometry (2) A MOORE

Basic principles, history, and techniques of roentgenographic cephalometry. (Department of Orthodontics)

# 512, 513 Growth and Development (2,2) W JOONDEPH, KELLER, MC NEILL

Review of the various methods of studying human growth, and special ephasis upon growth of the head, and study of the development of the dentition from birth through maturity; analysis of the factors that produce normal occlusion and malocclusion. Prerequisite, 512 for 513. (Department of Orthodontics)

#### 514 Genetics and Its Applications to Dental Problems (2) W COHEN, MOFFETT

Review of methodology in twin studies, population genetics, and karyotypic analysis, using examples in dental research. Survey of literature on inherited dental traits.

#### 515 Morphogenesis of Skeletal Tissue (3) SpS

Review of development of connective tissue, cartilage, bone and joints, including the differentiation, growth, remodeling, aging, and degenerative changes.

# 518 Scientific Methodology in Dental Research (2) Sp (1) Review of the scientific method. (2) Eval-

Review of the scientific method. (2) Evaluation of dental literature. (3) Discussion of proposed master's degree research projects.
 Procedure in scientific writing. (5) Formulation and discussion of hypothetical research projects related to orthodontics.

A seminar-lecture discussion course dealing with the structure, physiology, chemistry, and microbiology of the dental and periodontal tissues. Correlations with the needs of the clinical specialties are made wherever possible.

### 581 Comprehensive Treatment Planning (4) Sp

YUODELIS

A seminar devoted to the coordinated application of knowledge gained from both graduate and undergraduate courses to the diagnosis and treatment of comprehensive dental cases with special emphasis given to the relationship of periodontics to restorative dentistry. Prerequisite, graduate dental student or permission.

#### 587 Masticatory Functional Analysis and Occlusal Adjustment (2) A YUODELIS

The course is designed to enable the orthodontic graduate student to mount dental casts on an adjustable articulator, allowing for the reproduction of various mandibular border movements related to the functional occlusion of the teeth. For orthodontic graduate students only.

#### 588 Masticatory Functional Analysis and Occlusal Adjustment (2) A YUODELIS

Nine weekly three-hour lecture/seminar and clinical sessions in the study of the physiology of occlusion. Pertinent literature is reviewed and discussed from the multidisciplinary viewpoint. The clinical sessions include training in masticatory functional analysis and the treatment of occlusally related diseases. Open to graduate dental students only.

# 589 Masticatory Functional Analysis and Occlusal Adjustment (2) W

Continuation of 588. Prerequisite, 587 or 588.

700 Master's Thesis (\*)

For other graduate course offerings see individual departmental listings.

### ORAL BIOLOGY

### 200 Dental Caries (1) W

A series of lectures outlining the morphological, biochemical, and microbiological aspects of dental caries. (Required for dental and dental hygiene students.) Prerequisites, course in general biology and permission.

#### 331 Oral Pathology (5) Sp

Presents a survey of the diseases of the oralfacial regions. Clinical findings, differential diagnosis, and mechanisms of abnormal processes are stressed. (For dental students only.) Prerequisite, 431 or equivalent.

### 334 Oral Histology (3) A

Development and microscopic anatomy of structures of the oral cavity. (Required for dental hygiene students.) Prerequisite for other students, permission.

#### 405 Oral Pathology for Dental Hygienists (2) W

Study of diseases and abnormalities of the hard and soft tissues of the oral cavity. Pre-requisite, Pathology 310.

431 Oral Histology and Embryology (3) W Histology of enamel, dentin, dental pulp, cementum, periodontal membrane, alveolar bone, oral mucous membrane, maxillary sinus and temporomandibular articulation. Required for dental students. Prerequisites, course in general mammalian histology or equivalent and permission.

#### 497 Directed Studies in Oral Biology (\*) AWSpS

Selected readings and seminars on a topic chosen by individual arrangement in collaboration with a faculty member. Open to undergraduates, as well as to dental and dental hygiene students. Prerequisites, permission of class adviser and instructor.

#### 498 Directed Studies in Oral Biology (\*) AWSpS

Individual research on topics selected in collaboration with a faculty member. Open to undergraduates, as well as to dental and dental hygiene students. Prerequisites, permission of class adviser and instructor.

### **Courses for Graduates Only**

### 500 Dental Caries (2-3) W

A series of lectures outlining the morphological, biochemical, and microbiological aspects of dental caries with the additional requirement of participation in a seminar for purposes of review of the current literature and discussion of research in this field. Prerequisites, course in general mammalian histology or its equivalent and permission.

#### 502 Supervised Teaching in Oral Biology (1-5, max. 10) AWSpS

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 will be required to participate in lecture and laboratory teaching under the supervision of the course director. Prerequisite, permission.

#### 510 Clinical Oral Pathology (1-3, max. 10) Sp

Presentation of interesting oral lesions from the Dental School and the University Hospital 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 will be stressed. (Primarily designed for students with D.D.S., M.D., or D.V.M. degrees.) Prerequisite, permission.

# 515 Surgical Oral Pathology (2-4, max. 16)

The objectives of this course are to train students to interpret microscopic slides of lesions from the oral cavity and related areas, and to correlate these with the clinical findings. Each student will be responsible for the grossing of specimens and the preparation of histology reports. (Primarily designed for students with D.D.S., M.D., or D.V.M. degrees.) Prerequisite, permission.

#### 520 Seminar in Oral Pathology (1-3, max. 9) Sp

Consists of in-depth studies of specific oral diseases and will make use of seminar and discussion methods. Students will be required to present literature reviews and to act as discussion leaders. (Primarily designed for students with D.D.S., M.D., or D.V.M. degrees.) Prerequisite, permission.

#### 531 Oral Pathology (5) W

Presents to the student the major disease processes of oral tissues and adjacent structures. It demonstrates a rationale for interpretation and diagnosis of clinical findings, based upon an understanding of the mechanisms of disease. Students will be required to participate in seminars of present literature reviews of specific disease states. (Primarily designed for students with D.D.S., M.D., or D.V.M. degrees.) Prerequisite, permission.

### 540 Oral Biology Seminar (1-3, max. 10) AWSp

Presentation of and discussion of current research problems by members of the staff, investigators from other departments in the University, visiting scientists, and trainees. Prerequisite, permission.

#### 550 Research Techniques in Oral Biology (2-4) Sp

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. Biochemical techniques might include cell-fractionation, paper and column chromatography, zone-electrophoresis, and appropriate chemical and enzymatic determinations. Morphological techniques might include light microscopy, electron microscopy, radioautography, histochemistry, and cytochemistry. The analytical techniques show how, even with quite limited training, a biologist can use simple mathematical methods to describe living systems and to advance biological theory. Prerequisite, permission.

### 560 Biomineralization (2) A

A series of lectures outlining the current state of knowledge concerning the formation and metabolism of mineralized tissues of the human body, with particular emphasis on the hard tissues of the tooth and alveolus. Prerequisite, permission. (Offered alternate years; offered 1973-74.)

#### 565 Histological Comparative Odontology (2) A

Presents a broad view of the evolution of dental tissues as demonstrated by the microscopic organization of teeth and their supporting structures in various vertebrate species. (Offered alternate years; offered 1973-74.)

### 570 Oral Facial Development (2-3) Sp

The course will trace the embryological development of the tissues and organs of the human face and oral regions. Contributions of embryonic primordia to adult structures will be studied. Mechanisms resulting in abnormal development will receive special emphasis. Prerequisite, course in basic embryology recommended, permission. (Offered alternate years; offered 1972-73.)

#### 581 Biological Structure and Function of Exocrine Glands (1-3) A

Initiation, differentiation, and development of exocrine glands in a number of mammalian species. Exocrine tissues, such as pancreas and salivary glands, will be emphasized, but examples of other exocrine systems will be presented. Stress will be placed on the relation of the structural and ultrastructural characteristics of exocrine glands to their varied functions. Prerequisites, permission, basic course in introductory biology (e.g., Biology 212) or human biology (e.g., Biological Structure 330 or Human Biology 411) recommended. (Offered alternate years; offered 1972-73.)

#### 582 Physiology of Exocrine Glands (3) W The autonomic innervation of salivary glands, the action of drugs, changes in blood flow and metabolism during activity as well as the processes involved in the transport of water and electrolytes through the glands will be explored in depth. Prerequisite, permission; basic knowledge in general physiology recommended. (Offered alternate years; offered 1972-73.)

583 Biochemical Aspects of Secretion (2-3) Sp The course will be concerned with biochemical aspects of the secretory process, including biosynthesis, intracellular transport and expulsion of proteins and glycoproteins from the cell. Exocrine tissues such as pancreatic and salivary glands will be emphasized, but course material will include examples of nonexocrine secretion, e.g., of collagen, plasma proteins, thyroglobulins, insulin, etc. Oral Biology 581 desirable. Prerequisites, Biochemistry 406 or its equivalent and permission. (Offered alternate years; offered 1972-73.)

#### 600 Independent Study or Research (\*) AWSpS

Laboratory projects and/or conferences with individual faculty members designed to acquaint the student with research projects currently in progress within the department. Prerequisite, permission.

700 Master's Thesis (\*)

## ORAL DIAGNOSIS AND TREATMENT PLANNING

100 Introduction to Clinical Procedures (2) A Orientation to dental examination procedures, with appropriate clinical participation by the student.

# 216, 217 Oral Roentgenology (1,1) W,Sp JACOBSON

Biophysical, clinical, and interpretative aspects of dental X-ray procedures, with practical application in the completion of acceptable full-mouth surveys on patients.

#### 300, 301 Oral Diagnosis and Treatment Planning (1,1) A,W

Fundamental procedures in oral diagnosis; preparation for advanced instruction.

#### 346 Clinical Oral Diagnosis and Treatment Planning (0-1) WSp

Opportunity for examining, performing X-ray survey, and planning treatment for less involved patients. Students also participate in rendering diagnosis and emergency treatment.

### 347 Clinical Oral Diagnosis and Treatment Planning (6) S

Continuation of 346.

#### 400, 401, 402 Advanced Oral Diagnosis and Treatment Planning (1,1,1) A,W,Sp JACOBSON

Instruction in advanced X-ray interpretation. Diagnosis and treatment of typical cases to be encountered in general practice. Recognition and treatment of the more common manifestations of oral disease.

#### 446 Advanced Clinical Oral Diagnosis and Treatment Planning (0-1) AW

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.

### **Course for Graduates Only**

# 500 Extraoral Radiology (1)

The purpose of this course is to familiarize the student with the various techniques necessary to produce diagnostic radiographic films of the jaws and their contiguous parts. This is done by means of seminar and clinical performance on patients. Offered when demand is sufficient.

### **ORAL SURGERY**

#### 100 Cardiopulmonary Resuscitation and Techniques of Local Anesthesia (1) Sp HOOLEY

Basics of cardiopulmonary resuscitation are presented from the point of view of first aid rather than of sophisticated medical management of cardiopulmonary arrest. Method of teaching is that advocated by the World Federation of Anesthesiologists and emphasizes the techniques of closed-chest cardiac massage and mouth-to-mouth resuscitation. Students have an opportunity to use these techniques on a mannequin so that they may evaluate the techniques' performance. Lectures and movies reinforce information that is being' concurrently presented in the surgical anatomy course. Techniques of local anesthesia are described in lectures, and movies demonstrating these techniques are shown. Armamentarium required for local anesthetic injections is discussed. Following the presentation, the students are required to perform on each other the inferior alveolar nerve block and the posterior alveolar nerve block.

#### 200 Regional Anesthesia (1) Sp EVERETT

A review of the head and neck anatomy, the pharmacology of the anesthetic agents and their vasoconstrictors, and the physiology involved in local anesthetic administration are presented. Patient evaluation is stressed, with indications and contraindications for the use of local anesthesia and sedative premedication. The armamentarium, sterilization of equipment, and sterile technique are included. Methods of anesthetizing the branches of the trigeminal nerve for dental manipulations are described in detail. The complications and emergencies attending local anesthetic administrations are emphasized. Limited group demonstrations and practical experience are included during the course.

#### 300, 301, 302 Exodontia (1,1,1) A,W,Sp BOLIN

The definition, history, and scope of Oral Surgery are presented. Surgical principles, history taking, and patient evaluation including the performance of an adequate, thorough oral examination are emphasized. The principles of asepsis, adequate armamenta-rium, and surgical technique for the extraction of all normally erupted teeth with the recovery of fractured roots resulting from such extractions are presented. Surgical techniques for the extraction of teeth associated with the low antrum; the extraction of complicated teeth; classification, diagnosis, and removal of impacted teeth; soft and hard tissue surgery; pre- and postoperative management of the patient; types, prevention, and control of hemorrhage; surgical complica-tions; fundamentals of diagnosis, treatment and prevention of shock are included. The fundamentals of office emergency treatment are introduced.

# DENTISTRY

303 Emergencies in the Dental Office (1) W Office emergencies are discussed in detail. A scheme for evaluation and stepwise treatment of any office emergency is outlined. Specific initial therapy prior to the arrival of the physician for each office emergency (angina pectoris, myocardial infarction, cardiac arrhythma, epileptic attack, cerebrovas-cular accident, allergic reaction, anaphylactic shock, and others) is discussed. The taking of an adequate medical history and premedication for prevention of the emergency are strongly emphasized.

#### 305 Oral Surgery (5) Sp HOOLEY, STAFF

Presented by lectures and demonstrations are acute chronic infections of the oral cavity, treatment of dental infections, special infections and their surgical relationships, cysts of the bone and soft tissues of the oral cavity and contiguous structures, diseases of the maxillary sinus of dental origin, tissue transplantation, wounds and injuries of the soft tissues, traumatic injuries of the teeth and alveolar processes, fractures of the jaws, the temporomandibular joint, cleft lip and palate, acquired defects of the hard and soft tissues of the face, developmental deformities of the jaws, surgical aspects of oral tumors, salivary glands and ducts, neurological aspects of dental pain, abnormalities of the mouth, premedication techniques, introduction to the use of general anesthesia for oral surgery and analgesia techniques.

#### 310 Dental Medicine (1) Sp

Systemic conditions and diseases, with special reference to their oral manifestations or implications. Considerations of some aspects of dermatology and syphilology, diabetes, the blood dyscrasias, endocrine gland and nutritional disturbances, and other conditions.

# 346 Clinical Exodontia (0-1-1) AWSp

Extractions and other minor oral surgery under local anesthesia are accomplished in the Oral Surgery Clinic. The junior student is responsible for the patient's medical history, the oral examination, radiographic and clinical diagnosis, treatment planning, administration of the local anesthetic agent, assisting the senior student in the treatment and postoperative care of the patient under the supervision of the staff. Opportunities are provided for practical application for the principles of sterilization of instruments and supplies, as well as the demonstration of in-travenous and intramuscular injections and prescription writing. Demonstrations of emergency oxygen equipment and the treatment of emergencies in the dental office are practiced.

### 347 Clinical Exodontia (6) S

Continuation of 346. Prerequisite, 346.

446 Clinical Oral Surgery (0-0-2) AWSp The senior student is responsible for mastering the medical evaluation, the oral examination, the x-ray and clinical diagnosis, treatment plan, administration of premedication, operation, and postoperative management of clinic patients. The student learns to manage

problems of multiple dental extractions with flap design and alveolectomy, surgical extractions, hyperplastic tissue removal, exos-toses, small cysts, uncomplicated biopsies, buried roots, intraoral incision and drainage of abscesses with their complete management, and the removal of some unerupted or impacted teeth. Clinical experience with intravenous and intramuscular drug administration is provided.

447 Clinical Oral Surgery (6) S Continuation of 446. Prerequisite, 446.

### **Courses for Graduates Only**

### 500, 501, 502 Oral Surgery Seminar (2,2,2) A,W,Sp

HOOLEY

A weekly seminar is devoted to the discussion of oral surgery and related problems from basic science, medical, diagnostic, therapeutic, operative, and postoperative aspects. Subjects such as hemorrhagic diathesis, antibiotic therapy, facial trauma, neurologic disorders, developmental deformities, soft tissue surgery, maxillary sinus pathology, pharmacology of general anesthetics, bone physiology, and tracheotomy are discussed. Prepared presentations are given by the graduate students. Guest lecturers are invited to discuss their specialties in the fields such as ophthalmology, otolaryngology, neurosurgery, and general surgery, as they are related to oral surgery. Several seminars are held jointly with other departments (Prosthodontics and Orthodon-tics). Each graduate student attends ninety seminars over the three-year period.

#### 520, 521, 522 Literature Review (2,2,2) A,W,Sp

HOOLEY, STAFF

Surveys all of the pertinent literature in the field of oral surgery. Current literature will be reviewed at the beginning of each session and following this a participant will present a seminar on topics in oral surgery based on a review of the literature.

#### 540, 541, 542 Advanced Oral Surgery Clinic (3,3,3) A,W,Sp WEST

The patient evaluation, clinical diagnosis, treatment plan, operation and management of oral surgery cases that can be operated under premedication and local anesthesia on an outpatient basis are accomplished. Problems such as biopsy, benign tumor, cyst, vermillionectomy, peripheral neurectomy, vestibular extension, removal of hyperplastic tissue, exo-stosis, torus, foreign body, supernumerary impacted teeth, and other procedures are included.

#### Anatomical Approaches to Head and Neck Surgery (2) W 550 GEHRIG

A study and laboratory dissection of the anatomical structures as they are found in major oral surgery procedures. Prerequisite, permission.

#### 600 Independent Study or Research (\*) AWSp

An investigative program in one of the basic or clinical sciences under the direction of the departmental faculty. Prerequisite, permission.

### ORTHODONTICS

#### 201 Preventive Dentistry (1) W

MOORE Study of the growth and the development of the oral mechanism and of the human head is begun in the second quarter; the forces of occlusion are analyzed, and a comparison is made betwen the various animal dentitions. The Broadbent-Bolton cephalometer is discussed, with particular emphasis on its research implications.

#### 300 Orthodontics (2) A

Brief historical review of the etiology of malocclusion; classification and analysis of cases; growth anomalies, as well as deformities and their evaluation; the temporomandibular joint; the mandibular position, as related to orthodontic case analysis; treatment planning; types of appliances and their uses; retention; the ultimate outcome of orthodontic treatment.

### **301-302** Orthodontics (0-1)

This course is designed to provide a clinical background in orthodontics diagnosis and treatment planning. The student will be required to participate in graduate-level seminars from 7:30 to 8:30 a.m. and clinical examination and treatment planning from 8:30 to 11:30 a.m. Prerequisites, 300 for 301; 301 for 302.

#### 497 Directed Studies in Orthodontics (\*) AWSp

Permits students and faculty who have common academic interests to pursue them to-gether within the curriculum by means of independent study and a tutorial student-faculty relationship. Prerequisites, permission of class adviser and instructor.

### **Courses for Graduates Only**

500, 501, 502, 503, 504, 505, 506 Orthodontics

Seminar (\*,\*,\*,\*,\*,\*) 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 he is supervising. Each course is prerequisite to the following course.

# 546, 547, 548, 549, 550, 551, 552 Clinical Orthodontics (\*,\*,\*,\*,\*,\*,\*)

Technics of construction and manipulation of the edgewise arch mechanism; application of the technics in the treatment of malocclusion. Treatment of patients begins in the second quarter. Each course is prerequisite to the following course.

600 Independent Study or Research (\*) Prerequisite, permission.

### PEDODONTICS

#### 200 Preventive Dentistry (1, max. 2) A LAW, MOORE

Etiology and control of dental caries. Physiology and composition of saliva, ecology of the mouth, chemical composition of teeth, degradation of carbohydrates, systemic factors in the carles process, enzyme inhibitors, fluorides, and caries susceptibility tests. Study of the growth and development of the oral mechanism and of the human head is begun in the second quarter; the forces of occlusion are analyzed and a comparison made between the various animal dentitions. The Broadbent-Bolton cephalometer is discussed, with particular emphasis on its research implications.

#### 216 Pedodontics (2) Sp PETERSON

Operative technics applicable to primary and mixed dentitions; cavity preparations in primary teeth, construction of a functional space maintainer, and restoration of a fractured incisor.

### 300, 301 Pedodontics (1,1) A,W

PETERSON Emotional development of the child and its implications in pedodontic procedures. Space maintenance, the interception of incipient malocclusion, and clinical management of oral babits

346 Clinical Pedodontics (1-1-1) AWSp Diagnosis and examination of the child patient. Restorative procedures in primary and mixed dentitions, with special emphasis on application of the rubber dam.

347 Clinical Pedodontics (6) S Continuation of 346. Prerequisite, 346.

#### 400 Pedodontics and Public Health Dentistry (1) Sp PETERSON

The child in the dental health program. Organization of dental health programs on local, state, and national levels. The role of the dentist in community public health planning. Public health legislation and its implications to the dental profession.

#### 446 Advanced Clinical Pedodontics (1-1-1) AWSp

Diagnosis and treatment planning, with emphasis upon preventive dentistry. Complete operative procedures, including vital pulp therapy, construction of space maintainers, bite planes, and restoration of fractured anterior teeth.

447 Advanced Clinical Pedodontics (6) S Continuation of 446. Prerequisite, 446.

#### **Courses for Graduates Only**

500, 501, 502, 503, 504, 505 Pedodontics Seminar (2,2,2,2,2,2,2)

Pedodontics Seminar (2,2,2,2,2,2) LAW

Seminar on problems of tooth formation, development, calcification, and eruption in the child. Management of clinical problems of tooth development; operative procedures, pulp therapy, treatment planning, and the consideration of emotional factors in pedodontic practice.

### 546, 547, 548, 549, 550

Clinical Pedodontics (\*,\*,\*,\*,\*) A,W,Sp,S,A

DAVIS, PETERSON, ROGERS

Advanced clinical practice. Assignment of selected cases, with student responsibility for complete examination, diagnosis, and treatment planning including completion of the case. The use of appliances to effect limited tooth movement in cases of space closure and the application of the Broadbent-Bolton cephalometer in diagnosis and treatment.

### 580-581, 582, 583 Dental Care for the Handicapped Child (\*-\*,\*,\*) W,Sp,S,A

ROLLA Seminar clinic concentrating on the diagnosis and the management of dental care for the handicapped child. Emphasis will be on the interaction of physical, intellectual, emotional, and social developmental patterns and processes.

600 Independent Study or Research (\*) Prerequisite, permission.

### PERIODONTICS

100 Introduction to Periodontics (1) W HALL Introduction to periodontology. Designed to provide the student with understanding of the clinical, histopathologic, and radiographic features of the various periodontal diseases.

#### 101 Basic Periodontal Therapy (1) Sp

HALL Introduction to periodontal therapy: examination, treatment planning, initial therapy.

146 Basic Periodontal Instrumentation (1) Sp Techniques of periodontal examination and instrumentation by simulation on models and treatment of patients.

### 300 Periodontics (2) A

HALL, STAFF

Introduction to periodontal therapy as it is currently practiced. The indications for, and applications of the various treatment procedures. Lecture-demonstration course.

### 301 Periodontics (1) W

HALL, STAFF Continuation of 300. Additional aspects of therapy are discussed. Emphasis is placed upon the prevention of disease, the integration of periodontics within the dental practice, the use of auxiliary personnel to the full in periodontal treatment, and the longterm maintenance of treatment results. Lecture-discussion course.

346 Clinical Periodontics (0-0-3) AWSp Treatment of periodontal disease. Emphasis upon diagnosis, treatment planning, and nonsurgical treatment procedures.

347 Clinical Periodontics (6) S Continuation of 346. Prerequisite, 346.

#### 407, 408 Principles of Periodontology (1, 1) W,Sp

Principles of treatment of periodontal diseases and the relationship of these to dental hygiene practice. Prerequisite, 407 for 408. (Formerly Dental Hygiene 407, 408.)

#### 446 Advanced Clinical Periodontics (0-0-3) AWSp

Treatment of patients with more complex periodontal involvement. The development of skill in treatment planning and execution by the individual student. Concrete experiences in surgical periodontics.

447 Advanced Clinical Periodontics (6) S Continuation of 446. Prerequisite, 446.

#### 450 Honors Course in Periodontics (0-0-3) AWSp

HEINS

Intensive clinic-seminar experience in periodontics for selected fourth-year students. Taken instead of 446.

### 497 Directed Studies in Periodontics (\*)

AWSp

Permits students and faculty who have common academic interests to pursue them together within the curriculum by means of independent study and a tutorial studentfaculty relationship. Prerequisites, permission of class adviser and instructor.

### **Courses for Graduates Only**

546, 547, 548 Clinical Periodontics (3,4,4) SCHLUGER

Clinical experience in diagnosis and treatment of periodontal disease.

549, 550, 551 Clinical Periodontics (3,4,4) SCHLUGER Clinical experience in diagnosis and treatment of periodontal disease. Prerequisites, 546, 547, 548.

#### 560 Morphology of the Periodontium (1)

Study of the structure of the periodontium. This course is designed to correlate closely with 599. Prerequisite, permission.

#### 561, 562, 563 Periodontal Case Management (1,1,1)

A didactic presentation of clinical periodontics to provide a comprehensive view of the field and a grasp of modern therapeutics.

#### 576 Periodontal Therapy (2, max. 4) SULLIVAN

Comprehensive didactic course on periodontal case management, with the exception of occlusal diagnosis and treatment. Soft and hard tissue therapy will be discussed in all its complexities.

### 582 Periodontic Treatment Planning Seminars (1, max. 7)

SCHLUGER

Weekly seminar involved with the presentation, discussion, and tentative solution of moderate to complex problems in diagnosis and treatment.

#### 585 Periodontal Therapy Seminars (1, max. 7) SCHLUGER

Weekly seminar utilizing the case review method and dealing with the treatment of moderate to advanced periodontal disease.

#### 591, 592, 593 Clinical Practice Teaching (1,1,1) HALL

A supervised experience in teaching clinical periodontics to undergraduate dental students. Prerequisites, 546, 547, 548, 576, 577, 578.

#### 599 Pathology of the Periodontium and Contiguous Structures (3) Sp PAGE

A seminar which covers in depth the tissue alterations noted in periodontal disease and the concepts of the nature of the underlying lesion. Prerequisites, Pathology 445 and 500, or permission.

#### 600 Independent Study or Research (\*) SCHLUGER

An investigative program in one of the basic sciences under the direction of the departmental faculty. Prerequisite, permission.

### PROSTHODONTICS

#### 231, 232 Removable Partial Denture Technic (2,6) A,W

FRANK, LORD

A lecture-laboratory course dealing with basic principles of removable partial denture fabrication; construction of selected removable partial dentures for technic manikins.

### 300, 301, 302 Complete Denture

Prosthodontics (1,1,1) A,W,Sp

BOLENDER, LORD

A lecture course devoted to the diagnosis and clinical management of the completely edentulous patient.

#### 303, 304 Removable Partial Denture Prosthodontics (1,1) W,Sp

BOLENDER, LORD

A lecture-participation course devoted to the diagnosis and treasment of the partially eden-

# DENTISTRY

ulous patient requiring the fabrication of a removable partial denture.

#### 346 Junior Clinical Prosthodontics (4-2-2) AWSp

Diagnosis and treatment of completely edentulous and partially edentulous patients.

347 Clinical Prosthodontics (6) S Continuation of 346. Prerequisite, 346.

#### 400 Advanced Complete Denture Prosthodontics (1) A BOLENDER

A lecture course devoted to the diagnosis and clinical management of patients requiring immediate dentures.

#### 401 Advanced Removable Partial Denture Prosthodontics (1) W BOLENDER

A lecture course devoted to the management of patients presenting special problems requiring the making of removable appliances.

#### 446 Advanced Clinical Prosthodontics (2-2-1) AWSp

Diagnosis and management of completely edentulous and partially edentulous patients. Fabrication of conventional and immediate complete dentures and removable partial dentures.

447 Advanced Clinical Prosthodontics (6) S Continuation of 446. Prerequisite, 446.

#### 497 Directed Studies in Prosthodontics (\*) AWSp

Permits students and faculty who have common academic interests to pursue them together within the curriculum by means of independent study and a tutorial student-faculty relationship. Prerequisites, permission of class adviser and instructor.

## **Courses for Graduates Only**

### 560 Complete Dentures (4) A BOLENDER, SWOOPE

A comprehensive seminar-clinical course devoted to the diagnosis and treatment of the completely edentulous patient. Emphasis is placed on management of patients who present difficulties in treatment.

### 561 Immediate Dentures (4) W BOLENDER, SWOOPE

A seminar-clinical course concentrating on those factors which are peculiar to the fabrication of immediate dentures. Emphasis is placed on the management of transition from natural to artificial dentition. This course will provide an opportunity for the application of the principles covered in 560.

#### 562 Removable Partial Dentures (4) Sp BOLENDER, SWOOPE

A seminar-clinical course devoted to the diagnosis and treatment of the partially edentulous patient requiring the fabrication of a removable partial denture. The study of supporting tissues and their physiologic responses is included.

#### 563 Obturators and Speech Appliances (2) AWSpS

BEDER

A seminar-laboratory course devoted to the diagnosis and treatment of the patient with congenital or acquired defects of the palate and contiguous tissue. Various types of appliances are described and constructed.

#### 564 Definitive and Adjunctive Maxillofacial Appliances (2) AWSpS BEDER

A seminar-laboratory course devoted to the theories and principles in the fabrication of somatoprostheses; appliances for resected or traumatized mandible; vehicle and protective devices in irradiation therapy; stents, alloplastic prostheses; splints and other special prostheses. Various materials and types of appliances are utilized.

#### 565, 566, 567 Clinical Practice Teaching (1,1,1) A,W,Sp BOLENDER

Supervised experience in teaching clinical prosthodontics to the undergraduate dental student.

#### 568 Obturators and Speech Appliances (2) AWSpS BEDER

Clinical application of 563. Patients requiring the fabrication of obturators and speech appliances are treated.

#### 569 Definitive and Adjunctive Maxillofacial Appliances (2) AWSpS BEDER

Clinical application of 564. Patients requiring the fabrication of a variety of special appliances are treated.

### 570, 571, 572, 573, 574, 575, 576, 577 Prosthodontics Seminar (2,2,2,2,2,2,2,2,2)

BOLENDER, SWOOPE A continuous weekly seminar devoted to the

review of prosthodontic and related literature.

#### 578 Prosthodontic Technique Practice Teaching (1) WSp LORD

Designed to provide practical experience under supervision, in the teaching of technical procedures in undergraduate dental laboratory courses. The graduate student will assume an active role as instructor, being supervised by full-time faculty.

#### 580 Prosthodontic Dental Materials (2) WSp SWOOPE

A study of common materials utilized in the fabrication of dental appliances. Emphasis is placed on resin systems and various preciousand base-metal alloys.

600 Independent Study or Research (\*) Prerequisite, permission.

## **RESTORATIVE DENTISTRY**

#### 132, 133, 134 Oral Anatomy (4,4,4) A,W,Sp CANFIELD

Detailed study of the human oral and paraoral structures from the standpoints of form and function, with attention to systematized nomenclature. Study of the determinants of occlusion and instruction in the examination and the modification of the occlusal patterns of an individual patient.

#### 135 Dental Materials (2) A

Physical and chemical properties of dental materials.

#### 231, 232, 233 Fixed Partial Denture Technic (4,4,4) A,W,Sp WARNICK

Basic aspects of the theory and the practice of tooth preparation, crown and bridge indication, design and tissue relationships. Selected cases are carried through on a dental model.

#### 241, 242, 243 Operative Dentistry Technic (4,4,4) A,W,Sp

Advanced application of the principles and the requirements of operative procedures; exercises on mannequins to further manual dexterity; consideration of instrumentation and of manipulation of restorative materials.

### 300, 301, 302 Fixed Partial Dentures

#### (1,1,1) A,W,Sp WARNICK

Lectures on various clinical phases of typical crown and fixed partial denture construction.

#### 310, 311, 312 Operative Dentistry (1,1,1) A.W.Sp

Lectures on the clinical application of knowledge acquired in lower-division technic courses.

#### 346 Clinical Crowns and Fixed Partial Dentures (3-1-1) A,W,Sp

Construction of crowns and fixed partial dentures for clinical cases; instruction under close supervision, with cases assigned according to the student's knowledge and abilities.

## 347 Clinical Crowns and Fixed Partial

Dentures (6) S Continuation of 346. Prerequisite, 346.

## 356 Clinical Anarative Dentistry (3.2.3)

#### 356 Clinical Operative Dentistry (3-2-3) A,W,Sp

Clinical procedures in all phases of operative dentistry; varied clinical experience under close supervision.

# 357 Clinical Operative Dentistry (6) S

Continuation of 356. Prerequisite, 356.

#### 400, 401, 402 Advanced Operative Dentistry (1,1,1) A,W,Sp

Lectures on refinements in technical procedures, treatment of atypical cases, and problems in diagnosis and treatment planning.

#### 446 Advanced Clinical Crowns and Fixed Partial Dentures (3-4-1) A,W,Sp

Continuation and advancement of clinical experience, including clinical ceramics, with treatment of more difficult clinical cases under close supervision.

#### 447 Advanced Clinical Crowns and Fixed Partial Dentures (6) S

Continuation of 446. Prerequisite, 446.

#### 456 Advanced Clinical Operative Dentistry (3-3-1) A,W,Sp

Supervised opportunity to attain optimum experience and self-reliance, so that each student may develop as an operator to the best of his ability.

#### 457 Advanced Clinical Operative Dentistry (6) S

Continuation of 456. Prerequisite, 456.

### 497 Directed Studies in Restorative Dentistry (\*) AWSp

Permits students and faculty who have common academic interests to pursue them together within the curriculum by means of independent study and a tutorial studentfaculty relationship. Prerequisites, permission of class adviser and instructor.

### **Courses for Graduates Only**

520 Basic Principles of Operative Dentistry (4) Principles of cavity design for operative dentistry. Laboratory practice in the fundamentals of cavity preparation. Indications and contraindications of outline form for the various types of clinical restorations.

#### 540 Oral Rehabilitation (4, max. 32) AWSpS YUODELIS

Clinical course dealing with treatment of complex restorative cases. Major emphasis on restorative therapy for mouths complicated by either periodontal disease, functional malocclusion, temporomandibular-joint dysfunction, morphological malocclusion, or any combination of these. Course runs continuously for seven or eight quarters, depending on whether student is a candidate for a certificate for a master's degree.

#### **Review of Literature Seminar** 570 (2, max. 6) AWSp

YUODELIS, STAFF

Continuous weekly seminar devoted to a review of restorative and related literature, and discussion of teaching methods, philosophy of teaching and treatment. Offered in odd-numbered years.

#### 571 Resin and Other Interim Restorations (2) DIEPENHEIM

Composition and use of silicates, organic, and composite restorative materials. Application of temporary restorations, emergency treatment, and vital pulp therapy relative to operative dentistry.

#### 572 Dental Amalgam Restorations (3) DIEPENHEIM

Indications and contraindications, physical properties, rationale and techniques of manipulation, cavity preparation and tissue response.

#### 575 Gold Foil Restorations (4) STIBBS

Indications and contraindications for the various types of restorations. Rationale and techniques of manipulation. Modification of cavity preparation forms, with emphasis on W. I. Ferrier designs. Reactions of hard and soft tissues to restorative procedures and environmental changes. (Alternates with 576.)

#### Pure Gold Restorations (4) 576 STIRRS

Physical properties, indications, and contraindications for the various forms of pure gold for dental restorations. History and signifi-cance of pure gold as a restorative material. (Alternates with 575.)

#### 580 **Restorative Treatment Planning Seminar** (2, max. 12) AWSp

YUODELIS, STAFF

Continuous weekly seminar to discuss controversial treatment problems and difficult diagnostic cases selected for either graduate or undergraduate students.

#### 590 **Gnathology (2) AWSp**

YUODELIS, STAFF

Ten seven-hour 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. Prerequisites, Dentistry 588, 589. (Formerly Dentistry 590.)

#### **Restorative Technique Practice Teaching** 591 (1. max. 3) AWSp

Supervised practical experience in teaching technical procedures to undergraduates in dental laboratory courses.

#### 592 **Clinical Practice Teaching** (1, max. 3) AWSp

Supervised experience in teaching clinical fixed prosthodontics to undergraduates.

### . 600 Independent Study or Research (\*) AWSpS

YUODELIS

Investigative program in one of the clinical sciences, under the direction of one of the departmental faculty.

# COLLEGE OF EDUCATION

Specific areas in the College of Education are designated by area letters. These letters must precede course numbers on the student's Official Program. Designation letters and their definitions are:

EDADM—Educational Administration EDC&I-Educational Curriculum and

### Instruction

**EDEPS**—Educational Policy Studies

**EDHED**—Higher Education

EDPSY—Educational Psychology

### **EDSPE**—Special Education

EDUC-Independent study, research, and field experiences (Teaching Practicum)

### EDUCATIONAL ADMINISTRATION EDADM

430 Public School Administration (3) Extensive use of case studies in the development of skills in organizational analysis. Emphasis is given to the concept of influence, the means of influence, and the nature of influence.

#### EDADM

### 440 Social Power in the Educational **Environment** (3)

OSTRANDER

Course examines concepts and issues pertinent to the development and the uses of social power in the educational environment. Covered are such topics as "Authority and Social Power," "Conflicts over Class Interests," "Teacher Militance," "The Distribution of Social Power," and "The Goverance of Public Schools."

#### EDADM

499 Undergraduate Research (\*) For undergraduates. Registration must be accompanied by a study prospectus on a spe-cial form provided by the Office of Educational Administration, endorsed by the faculty adviser most appropriate for the project proposed and the instructor, and the form must be filed in the Office of Educational Administration in Education. 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. (Formerly EDUC 499.)

### EDADM

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 filed in the Office of Educational Administration in Education. (Formerly EDUC 500.)

### EDADM

Seminar in School Supervision (3) 526 ANDERSON

Theory of the process of supervising school personnel, including an analysis of the techniques of supervision, theory of leadership and group process, interpersonal relations, and evaluation of teacher effectiveness. Prerequisites, EDADM 527, master's degree in Educational Administration, or equivalent.

#### EDADM

## 527, 528, 529 Educational Administration

and Supervision (3,3,3) ANDERSON, ANDREWS, BOLTON,

OSTRANDER, STRAYER

Theories, issues, and practices of administering public schools. Includes legal, extra-legal, political, and organizational framework; management and financial practices; instructional, social, and supervisory problems. Prerequisites, graduate standing and one year of teaching experience.

### EDADM

### 530 Seminar in Educational Decision Making (3)

BOLTON

Analysis of nature of decisions in educational setting. Consideration of theory of decisions, social and psychological constraints, and application in simulated situations. Prerequisite, master's degree in Educational Administration or equivalent.

### EDADM

#### 531 Seminar in Administration: Finance (3)

STRAYER

Current problems in school finance, including costs, ability to support schools, and financial implications of educational principles. The economics of public education. Problems of state and local school support. Financing capital outlay, research, and public relations. Prerequisite, master's degree in Educational Administration or equivalent.

### EDADM

#### 532 Seminar in Human Relations in **Educational Administration (3)** ANDERSON, BOLTON

Analysis of factors involved in human relations problems related to operation of public schools. Motivation, perception, communication, role analysis, and dynamics of groups will be studied through use of cases and simulated situations. Prerequisite, master's degree in Educational Administration or equivalent.

### EDADM

#### 533 Seminar in Administration: School **Buildings (3)** SCHNEIDER

Planning procedures; school building surveys; preparation of educational specifications; relationships with architects; types of school buildings and special areas; special problems related to heating, ventilation, acoustics, illumination, and use of site; maintenance and modernization; financing the school plant pro-gram. Prerequisites, EDADM 430 or permission, master's degree in Educational Administration, or equivalent.

### EDADM

### 534 Seminar in Educational Planning and **Organization (3)**

### STRAYER

Application of principles utilized in planning and organizing public schools. Formation of policy and procedures; formal and informal organization; power, authority, and responsi-bility; utilization of people, time, and space. Prerequisite, master's degree in Educational Administration or equivalent.

#### EDADM

535 Research Seminar: Educational Administration and Supervision (3, max. 6)

ANDERSON, ANDREWS, BOLTON,

OSTRANDER, STRAYER Critical analysis of current research results and methods will be used as background to evaluate student's independent research in seminar discussion. May be repeated by per-mission. Prerequisites, 9 quarter credits in Educational Administration and research topic approved by instructor.

#### EDADM

536 Internship in Educational Administration (1-6, max. 6)

ANDERSON, ANDREWS, BOLTON.

OSTRANDER, STRAYER

Recommended for all candidates preparing for administrative positions except those having sufficient experience as administrators. Halftime work in a school district or districts for one, two, or three quarters, depending upon the student's previous experience. Supervision by staff members of the College of Edueation and the superintendent of schools or school principal in the selected school district. Prerequisite, completion of all other require-ments for administrator's credential.

#### EDADM

537 Special Problems in Educational Administration and Supervision (3, max. 9)

ANDERSON, ANDREWS, OSTRANDER, STRAYER

Readings, lectures, and discussions of topics of special and current interest to school administrators or supervisors. Reports on new developments in research. Topics will vary each year. Prerequisites, master's degree in Educational Administration and permission.

#### EDADM

#### 538 School-Community Relations (3) ANDREWS, OSTRANDER, STRAYER

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. Prerequisites, EDADM 528, master's degree in Educational Administration or equivalent, or consent of instructor.

#### EDADM

#### The Law and Education (3) 539 ANDREWS, OSTRANDER

A course designed for educators and administrators to alert them to some of the commonly encountered areas which involve legal problems. Prerequisite, master's degree in Educational Administration or equivalent. (Offered Summer Quarter only.)

#### EDADM

#### 540 Seminar in Conflict Management (3) OSTRANDER

Course examines procedures and techniques pertinent to the management or organizational conflict in educational settings. Among the areas covered are bargaining, appeal procedures, fact-finding, ombudsman, arbitration, mediation, and human relations approaches to conflict resolution.

#### EDADM

550 Workshop in Educational Administration (2-6)

Workshop will focus on current problems facing educational administration. Topics may include personnel management, supervision of personnel, professional negotiations, selection and planning procedures, power relationships, school-community relationships.

#### EDADM

### 563 Seminar in School Personnel Administration (3)

BOLTON

Major emphasis will be on the analysis of factors to be considered in the selection and evaluation of teachers, including determination of relevant criteria, acquisition and analysis of data, planning and decision processes. Less emphasis will be given to other school personnel topics. Prerequisite, master's degree in Educational Administration or equivalent.

#### **EDADM**

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, and which, with permission of the instructor, must be filed with the Office of Educational Administration in Education. Prerequisite, permission. (Formerly EDUC 599.)

### EDUCATIONAL CURRICULUM AND INSTRUCTION

### EDC&I

132 Spanish for the Elementary School (5) Practice in the basic language skills is combined with the demonstration and analysis of methods and techniques appropriate to the Foreign Languages in Elementary Schools program. Emphasis is given to the language structures and vocabulary that normally occur in elementary school Spanish. Offered jointly with the Department of Romance Languages and Literature as Spanish 128.

### EDC&I

#### 200 Industrial Education: Sketching and Technical Drawing (3) BAILY

Freehand sketching; orthographic projection; pictorial representation; dimensioning; lettering; working drawing and blueprint reading. (Offered alternate years; offered 1972-73.)

#### EDC&I

#### 201 Industrial Education: Sketching and Technical Drawing (3) BAILY

Developmental drawing; sheet metal layout drawing; revolutions, mechanical perspectiveangular; mechanical perspective—parallel. Pre-requisite, EDC&I 200 or permission. (Offered alternate years; offered 1973-74.)

### EDC&I

#### 202 Industrial Education: General Shop (5) BAILY

Introduction to industrial education; the common tools, materials, processes, and products of industry.

#### EDC&I

#### General Shop for Occupational 203 Therapists (5)

BAILY

Introduction to the common tools, materials, and processes used in occupational therapy. Freehand sketching, both pictorial and ar-thographic; working drawings and print reading.

#### EDC&I

#### 204 Industrial Education: Fundamentals of Woodwork (3) BAILY

Hand-tool processes; elementary machine operations; methods of assembling and fastening; simple wood finishing.

#### EDC&I

#### 206 Industrial Education: **General Metalwork (3)**

BAILY

Tools, materials, and processes used in sheet metal, forging, casting, bench metal, ornamental iron work, welding, machining, and finishing of metal.

#### EDC&I

#### 269 Education of Black Americans (3) BANKS

Examines the unique characteristics and learning problems of inner-city black children and considers curriculum patterns and teaching strategies designed to enhance their academic achievement and emotional growth.

#### EDC&I

#### 300 Industrial Education: Home Planning (4) BAILY

Consumer knowledge and information in the problems involved in purchasing, planning, financing, and building a home are emphasized. Students draw plans and write specifications for a complete set of house plans. Prerequisite, EDC&I 200 or equivalent. (Offered alternate years; offered 1973-74.)

#### EDC&I

#### **302 Industrial Education for Elementary** Teachers (5)

BAILY

Planning and preparing a representative unit in some area of the elementary school program, with particular emphasis upon those parts which involve construction activity. Development of basic skills in the use of common hand tools. Related information about industrial technology and its place in our society is included.

#### EDC&I

#### 303 Industrial Education: Basic Woodworking for Occupational Therapists (5) BAILY

Hand-tool processes, elementary machine operations, safety practices, problem-solving and planning, methods of assembling and fastening, simple wood finishing.

#### EDC&I

### 304-305 Industrial Education: Woodworking Technology (3-2)

BAILY

Design, construction, and finishing of projects in wood, involving machine operations. Pre-requisites, EDC&I 204 for EDC&I 304-; EDC&I 304- for EDC&I -305.

#### EDC&I

307 Industrial Education: Tools and Materials (2) BAILY

Sources, specifications, and costs of shop materials and equipment. Care, repair, and sharpening of hand and machine tools. (Of-fered alternate years; offered 1972-73.)

#### EDC&I

**Special Problems in Industrial Education** 308 (1-5, max. 5) BAILY

The student works on an individual basis, con-

ferring with the staff as needs arise, on one or more problems of special interest to him in industrial education. An outline and an organized plan of procedure are to be presented to the staff.

### EDC&I

#### 314 Business Education Clinic 3-15, max. 15)

BRIGGS, BROWN, FRERICHS

Business education clinic designed to develop and refine those skills that are considered to constitute basic essential capabilities for beginning business education teachers. Instruction is largely on an individualized basis, with measurement largely by performance standards. Focus is on secretarial skills, accounting, office machines operation, and data processing. Prerequisites, basic skills in typewrit ing, shorthand, office machines operation, office procedures, and accounting; Business, Government, and Society BG&S 101 and 200; Accounting 210 and 220; Economics 200 and 201.

### EDC&I

#### 315 The Teaching of Business Education: Typewriting, Shorthand, and Transcription (2) BRIGGS

Prerequisite, EDPSY 304.

#### EDC&I

316 The Teaching of Business Education: Bookkeeping and General Business (2) BRIGGS

Prerequisites, EDPSY 304 and 9 credits in accounting.

#### EDC&I

#### 321 Health in the Elementary School (2) MILLS, REEVES

Health procedures and techniques for meeting health needs and problems of elementary school children, including screening, observation, emergency care, etc.

#### EDC&I

#### 324 Physical Education in the Elementary School (3)

Special methods and procedures for planning and conducting the physical education program in the elementary schools (grades 1-6). Consideration of the physical activities that are appropriate for children and contribute to their motor efficiency and physical fitness. Prerequisite, EDPSY 304.

#### EDC&I

#### 327 The Teaching of Home Economics (5) MCADAMS

(Credits count: 2 as education and 3 as home economics.) Prerequisites, 2.50 grade-point average, EDPSY 304 and 308 (or taken concurrently), 40 home economics credits, and permission.

### EDC&I

#### 328 Methods of Teaching for Institution Administration Students (3) MCADAMS

Prerequisites, junior standing and 25 credits in home economics, including Home Economics 307.

#### EDC&I

#### 329 Teaching Foreign Language in the Secondary School (2)

A basic course in the methods of teaching foreign languages in the secondary school. Prerequisite, EDPSY 304.

# EDC&I

#### 330, 331, 332 The Teaching of French (3,3,3) LEVIS

Elementary, junior high, and senior high emphases. Prerequisites, EDPSY 304 and demonstration of language proficiency.

#### EDC&I

333, 334, 335 The Teaching of Spanish: Secondary Emphasis, Elementary and Junior High School Emphasis, Elementary Emphasis (3,3,3) FRIEDRICH

Prerequisite to teaching practicum. Elementary and junior high, and secondary emphases. Prerequisites, EDPSY 304, EDC&I 329, and demonstration of language proficiency.

#### EDC&I

336 The Teaching of German in Secondary Schools (3)

RABURA

Prerequisites, EDPSY 304, EDC&I 329, Germanic Languages and Literature 303, or permission.

#### EDC&I

337 The Teaching of German in Elementary Schools (3) FISCHER

Objectives and methods of the FLES (Foreign Languages in Elementary Schools) program. Prerequisites, EDPSY 304, EDC&I 329, German Languages and Literature 303, or permission.

#### EDC&I

338 The Teaching of Russian (2) AUGEROT, HANEY

Special methods in the teaching of Russian to acquaint prospective teachers with materials, methods, and problems. Prerequisites, EDPSY 304, EDC&I 329, and permission.

#### EDC&I

339 The Teaching of Scandinavian (Norwegian, Swedish) (2)

### ARESTAD

Special methods in the teaching of Norwegian and Swedish to acquaint prospective teachers with materials, methods, and problems. Prerequisites, EDPSY 304, EDC&I 329, and permission.

#### EDC&I

#### 340 Elementary Art Education (3) JOHNSON

A study of the stages of development in the art of the young child as expressed through his creative and mental growth.

#### EDC&I

341 The Teaching of Art in the Secondary School (3)

JOHNSON

For majors in secondary art education planning to teach on the junior or senior high school level. Prerequisite, EDPSY 304.

#### EDC&I

342 Art in the Elementary School (3) HOLTZ, KOENIG, O'KEEFE

For students majoring in elementary education. A study of art in the development of children. Experiences in working with various materials used in school art programs. Prerequisites, EDPSY 304 and Art 100.

#### EDC&I

#### 343 Music in the Elementary School: Intermediate Grades (3)

For students majoring in elementary education (not open to music specialists). A study of music in the development of children, ages 8 to 12, with attention to musical activity and the growth of related concepts and skills. Prerequisites, EDPSY 304 and Music 119.

#### EDC&I

#### 345 Fundamentals of Kindergarten-Primary Teaching (3) COONEY

A course in methods, materials, and professional practices relevant to teaching young children. Recommended for students planning to teach in the kindergarten and primary grades. Prerequisite, EDC&I 360.

#### EDC&I

### 346 Music in Pre-School and Primary

Grade Classrooms (3)

### SWANSON

For students majoring in preschool and primary education (not open to music specialists). A study of music in the development of children, ages 4 to 8, with attention to musical activity and growth of related concepts and skill. Prerequisites, EDPSY 304 and Music 119.

#### EDC&I

#### 347 Modern Theories and Practices in Early Childhood Education (3) STEVENS

An introduction to modern theories and practices in early childhood education presented via classroom lectures and observations in selected schools and agencies. Prerequisite, EDPSY 304 or permission.

#### EDC&I

#### 348 Language Arts and Social Studies in Early Childhood Education (3) COONEY

A basic course stressing language arts and social studies as related to the development of the young child. The course familiarizes students with effective teaching procedures and learning resources designed to help children learn language competencies and social awareness within the framework of social studies content.

#### EDC&I

#### 349 Mathematics and Science in Early Childhood Education (3) VOPNI

#### VUPP

A basic course in science and mathematics instruction emphasizing knowledge and skills in teaching scientific and mathematical processes and concepts to young learners.

#### EDC&I

### 350 Program Planning in Early Childhood Education (3)

#### ALLEN, HARRIS

The theoretical and practical aspects of planning, selecting, preparing, presenting, and supervising curricular materials and activities in the prekindergarten are presented. (Course taken concurrently with teaching practicum, 7 credits.)

#### EDC&I

#### 355 Language Arts in the Elementary School (3)

KITTELL, MONSON

A basic course in planning and teaching elementary language arts: listening and speaking, handwriting, spelling, creative and practical writing. Prerequisite, EDPSY 304.

#### EDC&I

#### 356 The Teaching of English (3)

SMITH Designed to draw together the student's previous background in English literature, language, and composition, the course focuses on the techniques and materials for teaching English in junior and senior high schools. Prerequisite, EDPSY 304.

### EDC&I

357 The Teaching of Speech (3) A FEEZEL

A special methods course in the teaching of speech at the secondary level. Prerequisites for majors in speech, EDPSY 304, at least 20 credits in speech; for nonmajors, permission.

#### EDC&I

358 - The Teaching of Journalism (3) DANIEL

For teachers in high schools and junior colleges, or for education students taking first or second areas in journalism. Prerequisites, EDPSY 304, Communications 321 and 325, or permission.

#### EDC&I

#### 360 Reading in the Elementary School (3) MONSON, SEBESTA

A basic course in methods, techniques, and materials used in the teaching of reading from the readiness period in the kindergartenprimary area through the study-techniques of the intermediate grades. Prerequisite, EDPSY 304.

#### ÉDC&I

365 Social Studies in the Elementary

School (3)

BANKS, CLEGG, HUNKINS, KALTSOUNIS

A basic course in the planning and teaching of social studies in the elementary school. Prerequisites, EDPSY 304 and Geography 100.

#### EDC&I

#### 366 The Teaching of Social Studies in Secondary Schools (3)

Application of educational principles and methods to the teaching of social studies on the junior and senior high school levels. Prerequisite, EDPSY 304.

#### EDC&I

#### 370 Science in the Elementary School (3) OLSTAD, SMITH

A 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, EDPSY 304 and 5 credits in an approved course in science.

#### EDC&I

#### 371 Teaching Science in the Secondary School (3) OLSTAD

A basic course in the teaching of science in the secondary school with special emphasis on the nature of science as a process of inquiry. Prerequisite, EDPSY 304.

#### EDC&I

372 The Teaching of Biology (2) OLSEN

Prerequisites, EDPSY 304, EDC&I 371, and 25 credits in biology.

#### EDC&I

#### 373 The Teaching of Chemistry (3) RITTER

Prerequisites, EDPSY 304, EDC&I 371, and at least 20 credits in college chemistry.

#### EDC&I

### 375 Mathematics in the Elementary School (3)

KERSH, VOPNI

An examination of the learning and teaching of elementary mathematics (grades K-6), in light of recent theoretical and pedagogical developments. Prerequisites, EDPSY 304 and Mathematics 170.

#### EDC&I

### 376 The Teaching of Junior High School Mathematics (3)

KINGSTON

Emphasis is upon understanding of junior high school subject matter; supplementary topics include teaching aids and classroom procedures. Not open to students having credit for EDC&I 377. Prerequisites, EDPSY 304, EDC&I 378, Mathematics 101, or equivalent.

#### EDC&I

#### 377 The Teaching of Secondary School Mathematics (3)

Emphasis is upon understanding of subject matter; supplementary topics include teaching aids and classroom problems. (Credits count: 2 as education and 1 as mathematics.) Prerequisites, EDPSY 304, EDC&I 378, Mathematics 412, or equivalent.

### EDC&I

#### 378 Teaching Mathematics in the Secondary School (2) KERSH

A basic course in the teaching of mathematics in the secondary school for preservice teachers.

#### EDC&I

### 400 Selection and Organization

#### of Occupational and Industrial Education Subject Matter (3) BAILY

Problems, techniques, and procedures in the selection and organization of teaching content for industrial education; preparation of instructional units and evaluative devices for industrial education teachers.

#### EDC&I

401 The Teaching of Occupational and Industrial Education (3) BAILY

To acquaint prospective industrial education teachers with teaching aids, classroom procedures, and problems in the teaching of industrial education courses. Prerequisite, EDC&I 400 or permission.

#### EDC&I

#### 402 Instructional Analysis for Industrial Education Teachers (3) BAILY

A study of the techniques and procedures used in analyzing instructional areas into their basic elements, and an arrangement of the elements into a teaching plan and sequence for industrial arts and vocational industrial education course.

#### EDC&I

#### 403 Planning the Industrial Educational Facilities (3)

BAILY

A study of the fundamental concepts and principles in planning industrial education areas to produce safe, efficient, and effective teaching-learning situations. An analysis of the problems encountered in the selecting, purchasing, locating, and installing of equipment, tools, materials, and services.

### EDC&I

#### 404 Principles and Objectives of Vocational Education (3) BAILY

Survey of vocational education, aims, objectives, and types of programs. Relationship to general and practical arts education.

#### EDC&I

#### 405 Supervision of Vocational Education Programs (3)

BAILY

Principles, problems, techniques, and methods of supervision; planning and organizing a supervisory program, equipment and instructional materials; relationship of supervisors to administrators and teachers; evaluation of programs. Prerequisite, permission of the instructor.

### EDC&I

#### 406 Organization and Administration of Vocational Education Programs (3) BAILY

Administrative problems involved in organizing and operating vocational schools and classes. This class is designed for superintendents, principals, vocational directors, supervisors, or other persons with direct responsibility for the administration or supervision of vocational programs.

#### EDC&I

#### 407 Organization and Administration of Industrial Education (3) BAILY

Types of programs of vocational-industrial education and industrial arts; organization and administration of these programs, the relationships between them, and their place in public school programs.

#### EDC&I

#### 408 Current Problems in Vocational and Industrial Arts Education (3) BAILY

A study of the current events and problems in industrial education and their application in the field.

#### EDC&I

#### 409 Improvement of Teaching: Industrial Education (3)

BAILY

An analysis of the types of teaching instructional materials and evaluation devices used in industrial education, with emphasis upon the improvement of existing methods and techniques.

#### EDC&I

#### 410 Field Experience in Industrial Practices (2-10, max. 10)

BAILY

Study of the problems of industry such as employment practices, job requirements, materials handling and processing, plant organization and management that would assist industrial arts teachers interpret industrial practices. Prerequisites, teaching experience in industrial education and permission of instructor.

#### EDC&I

#### 411 Principles and Problems in Distributive Education (3)

Concerned with improvement of instruction, maintenance of high standards in work stations, and special techniques used by experienced coordinators in the solution of common problems. (Offered Summer Quarter only.)

#### 412 Selection and Organization of

**Distributive Education Subject Matter (3)** Problems, techniques, and procedures in the selection and organization of teaching content for distributive education. Prerequisite, permission.

#### EDC&I

#### 413 Coordination of Distributive Education Programs (3)

Stresses fundamentals, records and reports, the use of advisory committees, course titles, qualifications, coordinating activities, course content, and work training stations.

#### EDC&I

### 414 Distributive Education: Post-Secondary Level (3)

BAILY

History and development of midmanagement distributive education programs, organization, and framework. Eight principal elements covering all aspects of the program, including type of students served, qualifications of the instructors, curriculum, research, and coordination aspects. (Offered Summer Quarter only.)

#### EDC&I

#### 415 Materials and Methods of **Teaching Typewriting (3)** RRIGOS

Procedures and materials for developing skills in beginning and advanced typewriting. Dem-onstration and participation in drill techniques; testing and grading; evaluation of recent research findings in the development of speed and accuracy; classroom organization.

#### EDC&I

#### 416 Materials and Methods of Teaching **Office and Clerical Practice (3)** BRIGGS

Objectives and content of office practice and general clerical practice courses; plans for organizing classes and methods of teaching spe-cific machines and subject matter; laboratory study of new inventions in office machines.

#### EDC&I

#### 417 Materials and Methods of Teaching Gregg Shorthand and Transcription (3) BRIGGS

Recent research and experimentation in teaching shorthand and transcription are emphasized. Psychology of skill development; com-parison of the various methods of teaching shorthand; evaluation of teaching materials; consideration of standards, objectives, and teaching techniques. An advanced course for experienced teachers. (Offered Summer Quarter only.)

#### EDC&I

#### 418 Principles and Problems of **Business Education (3)** BRIGGS

Objectives, history, trends, and issues of business education; federal participation in vocational education; economic, occupational, and population trends and their implications in business education; leaders in business edu-cation; research and problems.

#### EDC&I

#### 419 Materials and Methods of Teaching **Bookkeeping and General Business** Subjects (3) BRIGGS

Techniques of teaching bookkeeping and gen-

eral business subjects; relationship to the curriculum; standards to be achieved; content and organization of the subject matter; tests and teaching materials; new trends in the field; motivational devices; visual aids.

#### EDC&I

420 Principles of Safety Education (3) BAILY

Designed primarily for teachers and administrators interested in developing a school safety program in elementary, junior, and senior high schools. Special emphasis is placed on the need for a safe school environment and the role of the teacher in promoting safety.

### EDC&I

#### 423 Workshop in Instructional Improvement: Industrial Education (2-6)

Individual or group study projects on the im-provement of instruction in Industrial Education.

#### EDC&I

425 Programs in Elementary Physical Education (21/2) HORNE

Progress and problems in modern programs. Offered jointly with the Department of Physical and Health Education as Physical Education 478. (Offered Summer Quarter only.)

#### EDC&I

426 Field Training in Health Education (5) MILLS. REEVES

Four and one-half weeks of full-time supervised work experience in the health education division of a local official health agency. Offered jointly with the Department of Health Services as PC HS 426. Prerequisite, permission.

#### EDC&I

427 Improvement of Teaching: Home Economics (3, max. 6)

GRANBERG, MC ADAMS

Identification of goals, concepts, and generalizations in home economics units at the secondary level with emphasis on teaching techniques, evaluation, and use of resources. Offered jointly with the School of Home Economics as Home Economics 462. Prerequisite, teaching experience in home eco-nomics or permission.

#### EDC&I

#### 428 Organization and Supervision of Post-Secondary Distributive Education (3)

Development of supervisory personnel for community colleges and technical vocational schools to initiate, operate, and administer post-secondary midmanagement programs. (Offered Summer Quarter only.)

#### EDC&I

### 429 Field Studies in Home Economics Education (3, max. 6)

GRANBERG

Field-oriented course to provide the opportunity for home economics education students to work on jobs that use wage-earning knowledge and skills related to home economics. After the work experience, each student will develop curriculum and teaching strategies applicable for use in teaching wage-earning units or courses. Prerequisite, permission.

#### EDC&I

435 The Teaching of Foreign Literature (3) The methodology of teaching a foreign literature, with demonstrations by the instructor

and practice by students; preparation of leotures; study of discussion techniques. Offered jointly with the Department of Romance Languages and Literature as Romance Linguistics 475. Prerequisites, senior standing and permission.

#### EDC&I

### 438 Improvement of Teaching: Latin (3)

Examination and evaluation of the various methods of teaching Latin; audio-visual aids, testing materials, textbooks; relation of Latin to other languages; Latin derivatives in English vocabulary. Offered jointly with the De-partment of Classics as Latin 475.

#### EDC&I

#### 439 Caesar for High School Teachers (3) READ

Interpretation of Caesar's works in the light of their historical, political, literary, and geo-graphical background, with special reference to the problems of high school teaching. Of-fered jointly with the Department of Classics as Latin 476. (Offered Summer Quarter only.)

### EDC&I

#### 441 **Improvement of Teaching: Art** Appreciation in the Schools (3)

A survey of the history of art to promote an appreciation of the nation's cultural heritage; designed for teachers at all levels of instruction and subject matter areas. (1) Devel-opment of content in sequential or unit plan studies to incorporate art history in general studies curricula. (2) Development of methods and preparation of materials for classroom presentation. Illustrated lectures. Prerequisite, teaching experience.

#### 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

#### 445 Theory and Practice of Kindergarten and Primary Teaching (3)

A systematic treatment of the content, teaching processes, and learning resources appropriate to kindergarten and primary education with particular emphasis on current research and developments. Prerequisite, teaching experience.

#### EDC&I

# 455 The Language Arts: Instructional Problems and Practices in the Elementary School (3) KITTELL, SEBESTA

A study of important and recent research in elementary school language arts and a consideration of its practical implications for teaching. Prerequisite, teaching experience.

#### EDC&I

Workshop in Instructional Improvement: 456 Language Arts (2-6)

Individual or group study projects on the improvement of instruction in language arts.

#### EDC&I

#### 458 Journalism Teaching in the Secondary School (3) DANIEL

Advanced course in teaching high school journalism. For experienced publications advisers. No credit if EDC&I 358 or Journalism 375J has been taken.

### 460 The Teaching of Reading (3)

FEA, MONSON, SEBESTA FEA, SEBESTA

The teaching of reading in the elementary and intermediate grades of the elementary school, including comprehension and decoding, reading in the content fields, and motivation of voluntary reading. Students will work intensively in one area of special interest. Prerequisite, teaching experience.

#### EDC&I

#### 461 Supplementary Materials for the Teaching of Reading (3)

MONSON

Designed to provide acquaintance with and basis for evaluation of materials used in the teaching of reading. Basal readers, material from the content areas, recreational reading materials, and supplementary practice materials will be examined. Prerequisite, teaching experience.

#### EDC&I

#### 462 Reading in the Secondary School (3) FEA

Teaching of reading in the secondary schools, including vocabulary development, comprehension, speed reading in the content fields, and organization of reading programs at the secondary level. Prerequisite, teaching experience. (Formerly EDC&I 362.)

#### EDC&I

#### 464 The Indian Child and His Education (5) KALTSOUNIS

Will assist students in understanding the North American Indian child from cultural, socioeconomic, and psychological points of view. Also, it will provide opportunities for the student to apply his 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) JAROLIMEK, KALTSOUNIS

Stresses curriculum patterns, instructional procedures, resource materials, and the selection of content in social studies. For elementary and junior high school teachers. Prerequisite, teaching experience.

#### EDC&I

#### 466 Social Studies Education: Secondary School Programs and Practices (3)

Stresses curriculum patterns, instructional procedures, resource materials, and a selection of content in social studies for junior and senior high school teachers. Prerequisite, teaching experience.

#### EDC&I

#### 467 Geography in the Social Studies Curriculum (3)

A discussion of the concepts and content of geography essential to effective social studies curricula. Offered jointly with the Department of Geography as Geography 467.

#### EDC&I

468 Workshop in Instructional Improvement: Social Studies (2-6)

Individual or group study projects on the improvement of instruction in social studies.

### EDC&I

#### 469 Educating the Black Inner-City Child (3) BANKS

Undertakes an intensive analysis and review of the research and the literature, both theo-

retical 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)

OLSTAD, SMITH

Designed for classroom teachers with reference to the teaching and learning of science from kindergarten through grade six. 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) OLSTAD

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

#### 473 Workshop in Instructional Improvement: Science (2-6)

Individual or group study projects on the improvement of instruction in science.

#### EDC&I

#### 475 Improvement of Teaching: Elementary School Mathematics (3) KERSH, VOPNI

Designed for elementary teachers (grades K-6). 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)

An exploration of some modern mathematical concepts for the purpose of improving the teaching of junior high school mathematics. Prerequisite, Mathematics 101 or equivalent.

#### EDC&I

#### 477 Improvement of Teaching: Secondary School Mathematics (5)

An exploration of some modern 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 (2-5, max. 15)

Algebra and geometry for junior high school teachers of mathematics. Offered jointly with the Department of Mathematics as Mathematics 497.

#### EDC&I

#### 479 Workshop in Instructional Improvement: Mathematics (2-6) VOPNI

Individual or group study projects on the improvement of instruction in mathematics.

### EDC&I

#### 480 Introduction to Learning Resources in Teaching (3)

HAWK, TORKELSON

Factors influencing the selection and use of audio-visual resources in instruction.

#### EDC&I

481 Practicum in Learning Resources (3) Design and production of visual and auditory materials for teaching. Prerequisite, EDC&I 480 or equivalent.

### EDC&I

**482** Still Photography in Education (3) Theory and practice in producing still photographs and slides for teaching purposes; camera and darkroom techniques. Producing photographic materials to meet specific learning problems. Prerequisite, EDC&I 480 or permission.

#### EDC&I

#### 483 Educational Film Production (3)

Basic motion-picture techniques, emphasizing cinematography and editing.

#### EDC&I

#### 484 Educational Film Production (3)

Advanced film techniques, including instructional film design, narration writing, sound editing, and rerecording. Prerequisite, EDC&I 483.

#### EDC&I

#### 485 Workshop in Instructional Improvement: Learning Resources (2-6)

Individual or group study projects on the improvement of instruction in learning resources.

#### EDC&I

#### 486 Screen Education (3) TORKELSON

Workshop course in screen education for secondary teachers and others interested in the history and aesthetics of the motion picture; preparation for teaching about film as a communication medium.

#### EDC&I

# 487 Cinematic Animation Techniques (3)

A course for teachers and others interested in understanding animation techniques in educational television and films. Relationships of rhythm, graphic design, and sound. In addition to lecture demonstrations, opportunity will be given for experimentation in simple animation and special effects cinematography.

#### EDC&I

### 488 Television in the Schools (3)

DILWORTH

Television programs to supplement classroom work; the development of the American system of broadcasting; the development and significance of educational television, and the contribution schools can make to broadcasting. Offered jointly with the School of Communications as Communications 459. Open to nonmajors; not open to graduate students in communications.

#### EDC&I

#### 489 Television Production Workshop for Teachers (2½)

Working in University studios under laboratory conditions involving production and oncamera methods, teachers learn to present instructional subject matter through television. For those especially who expect to work with television as instructors or as supervisors of school-oriented television activities. Open to nonmajors; not open to graduate students in Communications or to students with credit for Communications 361. Offered jointly with the School of Communications as Communications 463. (Offered Summer Quarter only.)

#### 494 Workshop in Curriculum Development (1-15, max. 15) HUNKINS

Individual or group work on curriculum development projects in elementary and secondary schools. Prerequisite, EDC&I 493.

### EDC&I

### 495 Improvement of Teaching (3)

To help teachers (1) understand the physical, psychological, emotional, and social needs of children, (2) adapt instruction to the needs of children, (3) select the approaches and instructional resources which will provide the soundest learning experiences, and (4) in the appraisal of themselves and their work. (Offered only by special arrangement with school districts.)

### EDC&I

#### 496 Workshop in Instructional Improvement (2-6, max. 6)

Individual or group study projects on the improvement of instruction.

#### EDC&I

499 Undergraduate Research (2-5, max. 5) For undergraduates. Registration must be accompanied by a study prospectus on a special form provided by the Office of Educational Curriculum and Instruction, endorsed by the faculty adviser most appropriate for the project proposed and the instructor, and the form must be filed in the Office of Educational Curriculum and Instruction in Education. 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. (Formerly EDUC 499.)

#### EDC&I

500 Field Study (3 or 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 Educational Curriculum and Instruction in Education. (Formerly EDUC 500.)

#### EDC&I

#### 510 Seminar in Industrial Arts and Vocational Technical Education (3) BAILY

Intensive study of current events, problems and research studies in industrial arts education, vocational and technical education. Prerequisite, permission of instructor.

#### EDC&I

#### 511 History of Industrial Education (3) BAILY

A study of the leaders, agencies, movements, experiments, and publications that have contributed to the development of industrial education, with special attention to the economic, social, and philosophical factors which have motivated and influenced this development in America.

#### EDC&I

#### 515 Seminar in Business Education (3) BRIGGS

Analysis of selected problems in Business Education; current research in Business Education; evaluation of work experience programs; developments in vocational Business Education. Prerequisites, EDC&I 415, 418, 419.

### EDC&I

### 556 Elementary School Curriculum (3) HUNKINS, KITTELL

Description and analysis of current curriculum practices, with particular emphasis upon the interrelationships and dimensions of content, organization, methods, evaluation, trends, and issues. Prerequisite, teaching practicum. (Formerly EDC&I 490.)

#### EDC&I

### 557 Junior High School Curriculum (3)

Historical, philosophical, and functional analysis of junior high school education, with particular emphasis upon curriculum and teaching procedures. (Formerly EDC&I 491.) EDC&I

558 Secondary School Curriculum (3)

ANDERSON Systematic description and analysis of the current curriculum practices, with particular emphasis upon the factors and forces affecting secondary school curriculum. (Formerly EDC&I 492.)

#### EDC&I

559 Principles and Procedures of Curriculum Development (3) HUNKINS

Intensive study of the basic principles and procedures utilized in the development of curricula. Prerequisite, teaching practicum. (Formerly EDC&I 493.)

#### EDC&I

560 Seminar in Reading (3)

MONSON, SEBESTA Designed to focus primarily on those aspects of the reading process that are of concern in a developmental reading program. Emphasis is on research dealing with factors influencing reading ability, problems in skill development, effectiveness of various methods and approaches for teaching reading, reading in content fields, 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

### 561 Seminar in Language Arts (3)

KITTELL

Study of recent research in language structure with special attention to research pertaining to the teaching of language skills: auding, speech, and written composition. Course work includes group and individual analysis of language arts studies with attention to research design and measurement. Prerequisite, permission of instructor.

#### EDC&I

562 Seminar in Reading and Language Arts: Secondary Emphasis (3) FEA, KITTELL, SEBESTA

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, max. 6) RITTELL

Discussion of problems and issues of current interest and importance in language arts education.

### EDC&I

565 Seminar in Social Studies Education: Elementary Emphasis (3)

JAROLIMER, KALTSOUNIS Intensive study of the social studies curriculum, with particular emphasis on current literature and research. Prerequisite, EDC&I 465 or equivalent.

#### EDC&I

#### 566 Seminar in Social Studies Education: Secondary Emphasis (3) JAROLIMEK

Intensive study of the social studies curriculum, with particular emphasis on current literature and research. Prerequisite, EDC&I 465 or equivalent.

#### EDC&I

#### 567 Current Issues in Social Studies Education (1, max. 6)

JAROLIMEK, KALTSOUNIS

Discussion of problems and issues of current interest and importance in social studies education.

#### EDC&I

#### 570 Seminar in Science Education: Elementary Emphasis (3)

OLSTAD

Investigation of curriculum and instruction in science at elementary school levels, with particular emphasis on current literature and research. Prerequisite, EDC&I 470 or equivalent.

#### EDC&I

### 571 Seminar in Science Education: Secondary Emphasis (3)

OLSTAD

Investigation of curriculum and instruction in science at secondary school levels, with particular emphasis on current literature and research. Prerequisite, EDC&I 471 or equivalent.

### EDC&I

### 572 Current Issues in Science Education

(1, max. 6) OLSTAD. SMITH

Discussion of topics and problems of current interest and importance in science education.

#### EDC&I

### 575 Seminar in Mathematics Education: Elementary Emphasis (3)

VOPNI

Investigation of curriculum and instruction in mathematics at the elementary school level; review of research and preparation of proposals. Prerequisite, EDC&I 475 or equivalent.

#### EDC&I

#### 576 Seminar in Mathematics Education: Secondary Emphasis (3) VOPNI

Investigation of curriculum and instruction in mathematics at the secondary school level; review of research and preparation of proposals. Prerequisite, EDC&I 476 or 477, or equivalent.

### EDC&I

577 Current Issues in Mathematics Education (1, max. 6) VOPNI

Discussion of problems and issues of current interest and importance in mathematics education.

#### EDC&I

580 Seminar in Learning Resources (3) Advanced analysis of learning resources, instructional communications, and technology. Prerequisite, EDC&I 480 or permission of instructor.

#### 581 Management of Learning Resources Programs (3)

A study of 'factors affecting management of educational programs involving production, storage, distribution, and use of visual and auditory materials and equipment. Prereq-uisite, EDC&I 480 or permission.

#### EDC&I

# 582 Learning Resources Systems of

Instruction (3) A study of the "systems" approach to in-struction and the orchestration of relevant components, techniques; and arrangements; e.g., logistics, instructional space and facilities, computer-assisted instruction.

#### EDC&I

583 Learning Resources and Learning Domains (5)

Research and relevant literature concerning visual and auditory stimuli as these relate to learning domains (affective, perceptual-motor, cognitive).

### EDC&I

#### 585 Seminar: International and Cross-**Cultural Education (3)** DRISCOLL

Treats selected instructional problems, innovation strategies, and the management of learning resources in various emerging countries.

#### EDC&I

#### 589 Doctoral Seminar in Learning Resources (3)

For doctoral majors in learning resources, concentrating on contemporary research in the field, and on candidate's individual project and postdctoral research plans.

#### EDC&I

#### 590 Seminar in Elementary Education (3) KITTELL

An exploration of the philosophy, history, purposes, curriculum, methods, school or-ganization, and evaluation in elementary education, with emphasis on individual re-search. Prerequisites, elementary school teaching experience, EDPSY 401, and EDC&I 490.

#### EDC&I

592 Seminar in Secondary Education (3) Research and study of secondary education. Primary focus will be on factors involving change in secondary school curriculum and organization. Prerequisite, EDC&I 491 or 492.

#### EDC&I

#### 593 Seminar in Curriculum: Theory and Practice (3)

HUNKINS

An investigation of the area of curriculum theory and practice. Consideration is given to the development of models to explain the relationships between various curricular variables. These theoretical models are related to curricular practices and innovations. Prerequisites, EDC&I 493 and teaching experience.

#### EDC&I

#### 594 Seminar in Curriculum: Theory and Practice (3)

HUNKINS

Further investigation of the area of curriculum theory and practice. Theoretical models considered and developed in EDC&I 593 are further refined and new models are discussed. Curricular practice and innovation is considered from additional theoretical frameworks. Prerequisites, EDC&I 493, 593, and teaching experience.

#### EDC&I

595 Seminar in Analysis of Teaching (3) CLEGG

An exploration of the dimensions of teaching, including psychological, sociological, and philosophical factors. Particular emphasis is given to research related to the variables involved in teaching. Prerequisites, teaching experience and EDPSY 401.

#### EDC&I

596 Seminar in Strategies of Instruction (3) CLEGO

An exploration of the various media and types of organization relevant to the implementation of strategies based on theoretical models. Prerequisite, EDC&I 595.

#### EDC&I

#### 598 Internship in Curriculum (3-9, max. 9) HUNKINS

Recommended for all doctoral candidates preparing for positions as curriculum directors in public school systems. Half-time work in a school district or districts in close proximity to the University of Washington for one, two, or three quarters, depending upon the student's previous experience. Supervision by staff members of the College of Education and the appropriate school staff member in charge of curriculum in the selected school district. Prerequisite, EDC&I 493.

#### EDC&I

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, and, with permission of the instructor, must be filed with the Office of Educational Curriculum and Instruction in Education. Prerequisite, permission. (Formerly EDUC 599.)

#### **EDUCATIONAL POLICY STUDIES** EDEPS

#### 410 Educational Sociology (3)

An examination of roles played by small and large groups, as they affect the school as a social system. Current sociological theory is modified or extended to explain school events and interrelationships. Field experience in-cluded. (Formerly EDHPS 410.)

#### EDEPS

#### 412 Foundations of Freedom and Education (3)

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. (Formerly EDHPS 412.)

#### EDEPS

#### 458 History of American Education to 1865 (5)

BURGESS

Development of American education in cultural context: colonial period, influence of Enlightenment, and common school move-ment. Offered jointly with the Department of History as HSTAA 458. (Formerly EDHPS 494.)

### EDEPS

#### 459 History of American Education Since 1865 (5) BURGESS

Development of American education in cultural context: progressive education, recent criticism, continuing issues and trends. Offered jointly with the Department of History as HSTAA 459. (Formerly EDHPS 495.)

#### EDEPS

#### 479 Crucial Issues in Education (3)

A course designed to consider in some detail certain of the most significant and critical problems of educational policy. (Formerly EDHPS 479.)

#### EDEPS

#### 480 History of Educational Thought (3) BURGESS, MADSEN

Survey of educational theory and practice in Western culture. (Formerly EDHPS 480.)

#### EDEPS

### 488 Philosophy of Education (3)

TOSTBERG

Consideration of the major philosophic ques-tions that underlie educational theory. (Formerly EDHPS 488.)

#### EDEPS

#### 492 History of European Education Through the Reformation (3)

Development of European education in cultural context: Greece, Rome, Middle Ages, Renaissance, and Reformation. (Formerly EDHPS 492.)

#### EDEPS

#### 493 History of European Education Since the Reformation (3)

MADSEN

Development of European education in cultural context? Pedagogical reformers, national systems, and recent trends. (Formerly EDHPS 493.)

#### **EDEPS**

### 494 History of the University Since the **Reformation (3)**

MADSEN

The growth of the modern university with attention to intellectual trends as well as organizational and curricular changes. Special attention will be given to nine American universities in the twentieth century: Berkeley, Chicago, Columbia, Cornell, Harvard, Michigan, Stanford, Wisconsin, and Yale.

#### **EDEPS**

#### 496 Comparative Education (3)

International efforts in education, primarily the role of the United States in overseas programs. Analysis of the relation of school and society in foreign areas, stressing social change and conflict (Formerly EDHPS 496.)

#### EDEPS

#### 498 **Educational History and Utopian** Thought (3) BURGESS

### Selected studies of education as a key to the good society. (Formerly EDHPS 498.)

### EDEPS

### 499 Undergraduate Research (\*)

For undergraduates. Registration must be accompanied by a study prospectus on a spe-cial form provided by the Office of Educational Policy Studies, endorsed by the faculty adviser most appropriate for the project proposed and the instructor, and must be filed in the Office of Educational Policy Studies in Education. 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. (Formerly EDHPS 499.)

### EDEPS

### 500 Field Study (3 or 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 must be filed in the Office of Educational Policy Studies in Education. (Formerly EDHPS 500.)

#### **EDEPS**

#### 510 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. (Formerly EDHPS 510.)

#### EDEPS

#### 580 Seminar: Research in History of Education (3, max. 6) BURGESS, MADSEN

Study of the literature, bibliography, sources, and critiques of history of education. Research methods analyzed and demonstrated in seminar papers. Prerequisites, graduate standing and permission of instructor. (Formerly EDHPS 580.)

### EDEPS

#### 582 Seminar in Philosophy of Education: Modes of Inquiry (3, max. 6) TOSTREEG

Study of the various ways in which philosophers of education have conducted their inquiries and presented their findings. Prerequisites, EDEPS 488 and permission of instructor. (Formerly EDHPS 582.)

#### **EDEPS**

#### 583 Seminar: Research in Educational Sociology (3)

Theory, concept, and method of sociological inquiry as applied to problems in education. Prerequisite, permission of instructor. (Formerly EDHPS 583.)

### EDEPS

#### 586 Seminar in Educational Classics (3) BURGESS

Analysis in depth and in the context of the relevant history of several major works in educational thought from Plato to Dewey. Prerequisite, permission of instructor (Formerly EDHPS 586.)

#### EDEPS

#### 587 Contemporary Philosophies of Education (3) TOSTBERG

Intensive study of the writings of selected contemporary philosophers of education. Prerequisite, graduate standing. (Formerly EDHPS 587.)

#### EDEPS

#### 588 Analysis of Educational Concepts (3) TOSTBERG

Study of the application of linguistic analysis to the discourse of education. Prerequisites, EDEPS 587 and permission of instructor. (Formerly EDHPS 588.)

#### EDEPS

#### 589 Special Topics in History, Philosophy,

and Sociology of Education (3, max. 12) For advanced degree candidates majoring in history, philosophy, and sociology of education. Prerequisite, permission of instructor. (Formerly EDHPS 589.)

#### EDEPS

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, and, with permission of the instructor, must be filed with the Office of Educational Policy Studies in Education. Prerequisite, permission. (Formerly °EDHPS 599.)

#### HIGHER EDUCATION EDHED

#### 401 Student Protest Movements (3) WILLIAMS

An intensive effort to understand the role college and university students have played during recent decades in educational and social reform. Lunch counter sit-ins and other civil rights activities in the South; the protests at Berkeley, Columbia, and San Francisco State; the violence at Kent State and Jackson State; student protest abroad—these and later activities provide the background for class discussion.

#### EDHED

#### 499 Undergraduate Research (2-5, max. 5) For undergraduates. Registration must be accompanied by a study prospectus on a special form provided by the Office of Higher Education endorsed by the faculty adviser most appropriate for the project proposed and the instructor, and the form must be filed in the Office of Higher Education in Education. Students developing studies under this rubric should be advised that a report or paper setting forth the results of their investigations should be regarded as a basic part of the program. (Formerly EDUC 499.)

#### EDHED

# 500 Field Study (3 or 6, max. 6)

Individual study of an education 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 Higher Education in Education. (Formerly EDUC 500.)

#### EDHED

501 Occupational Programs in Higher Education (3)

SCHILL

Analysis of occupational preparation programs in institutions of higher education, industry, business, and governmental agencies, with emphasis on methods of determining content, on processes for evaluation, and on research.

#### EDHED

#### 502 College Instruction (3) REITAN

Analysis of various instructional modes, media, and instruments, with emphasis on current research findings and methodology. (Formerly EDHED 552.)

#### EDHED

503 The Community College (3) LARSEN

Study of the history, the development, the role, the objective, and the organization of the community college and of the problems and the issues confronting the two-year college. (Formerly EDHED 555.)

#### EDHED

### 505 The American College and University (3)

COPE, WILLIAMS

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 broader coordination of colleges and universities. (Formerly EDHED 500.)

#### EDHED

# 506 History of American Higher Education (3)

Examination of the historical development of the American higher education enterprise. (Formerly EDHED 558.)

#### EDHED

#### 510, 511, 512 The Study of Higher Education (5,5,5)

COPE, WILLIAMS

Comprehensive analysis of the subject matter of higher education. Values, purposes, structures, functions, people, resources, control, and outcomes of higher education. Attention will be given to the relationships between, and the synthesis of, these key concepts. Intended for first-year doctoral students in higher education.

#### EDHED

### 520 Seminar in the Administration of Community Colleges (3)

LARSEN

For students preparing for administrative positions in community colleges. Principles and practices in organization and administration of community colleges. Prerequisite, EDHED 503 or equivalent. (Formerly EDHED 553.)

#### EDHED

### 521 Seminar in Occupational Programs in Higher Education (3)

SCHILL

Analysis of current critical social and educational issues that affect occupational preparation programs in post-high-school instructions. Prerequisite, EDHED 501 or permission.

#### EDHED

### 522 Seminar in Teaching and Learning in Higher Education (3-9)

REITAN

Advanced seminar devoted to a consideration of theory and practice in the area of instruction and learning. May be repeated with permission of the instructor. Open to advanced doctoral students in High Education and to others at the discretion of the instructor.

#### EDHED

#### 523 Seminar in Institutional Analysis and Planning (3)

COPE

A study of the nature, the functions, and the techniques of analysis as they pertain to institutions of higher education. The application of computer-based information systems, program budgeting, behavioral research techniques, and long-range planning procedures are examined as aids to assessment, planning, and change. Intended for doctoral candidates.

#### EDHED

### 524 Seminar in the History and Organization of Higher Education (3)

WILLIAMS

Advanced seminar on special problems in the history and the organization of higher education. May be repeated at the discretion of the student and the instructor. Open to advanced doctoral students in Higher Education and to others at the discretion of the instructor.

#### EDHED

#### 525 Administering the Urban Community College (3)

Examination of the community college in the context of the urban setting. Attention will be given to the impact of ecology, critical events, and social action groups upon structure, operations, and development of the community college.

#### EDHED

540 Internship in Higher Education (3-10, max. 10) REITAN

Field study and experience in college teaching and administration, planned by the College of Education in cooperation with selected colleges. Prerequisite, permission.

#### EDHED

#### 550 Review of Research in Higher Education (1-2)

Open seminar for all students in higher education, devoted to the mutual consideration of research in this field. May be repeated with permission of the adviser.

### EDHED

551 College Problems (3) WILLIAMS

Identification of a number of contemporary problems of American higher education, and an analysis of the methods by which solutions may be sought. Prerequisite, prospective candidacy in higher education.

#### EDHED

### 554 Seminar in the Administration of Colleges and Universities (3)

A study of the internal administration and organization of four-year colleges and universities with emphasis on both practice and theory. Instruction largely by the case or problem method.

#### EDHED

559 Seminar in Higher Education (3, max. 6) Intensive study of selected problems and proposals for research in higher education. Prerequisites, prospective candidacy in higher education, and permission of instructors.

#### EDHED

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, and, with permission of instructor, the form must be filed with the Office of Higher Education in Education. Prerequisite, permission. (Formerly EDUC 599.)

### EDUCATIONAL PSYCHOLOGY EDPSY

#### 304 Educational Psychology (5) GRAY, HAUCK, MC CARTIN

The basic undergraduate course in psychology is concerned with the study of human learning in the educational setting. Learning, motivation, technology, the cognitive process, human development and socialization, the affective processes and attitudes change, and classroom management are examined. Emphasis is placed on the development of competence in manipulation of events known to influence effective classroom learning. EDUC 302 should be taken concurrently. Prerequisites, EDUC 288 and admission to a Teacher Education Program.

#### EDPSY

#### 308 Evaluation in Education (3) CLARK, PECKHAM, SAX

Fundamentals of measurement, construction of achievement tests, selection and administration of standardized tests and scales, and evaluation and application of test results. Prerequisites, EDUC 288 and admission to a Teacher Education Program.

# EDPSY

#### 365 Sensory-Motor and Language

Development in Young Children (3) EVANS, GRAY, MCCARTIN

A study of sensory-motor, language, and general cognitive development in young children. Trends and processes of behavioral development are examined with particular emphasis upon problems and techniques in the assessment of behavior related to school learning. Current theories and practices are reviewed and laboratory experiences provided. This course reflects a pluralistic multiple approach to child study. Prerequisite, EDPSY 304; EDPSY 308 recommended but not required.

#### EDPSY

#### 401 Advanced Educational Psychology-Learning (3)

FEA

Consideration of the major topics in the psychology of learning as applied to the teacher-learner environment. Prerequisite, ED-PSY 304 or equivalent.

#### EDPSY

#### 402 Advanced Child Development (3) EVANS

An advanced course in the psychology of human growth and development with a focal concern for the educational implications of developmental psychology. Prerequisites, EDPSY 304 and 401.

#### EDPSY

#### 407 Teaching the Gifted Child (3) FREEHILL, HAUCK

The role of the teacher and the school in the identification and development of the special abilities and talents of gifted children. Pre-requisite, teaching experience.

#### EDPSY

#### 408 Mental Hygiene for Teachers and Administrators (3)

LAWRENCE, SALYER

Principles of mental health; normal personality development and functioning; relation of school environment to mental health of students, teachers, and administrators. Background in educational psychology is recommended, but is not a prerequisite.

#### EDPSY

#### 421 Remedial Education (3)

Experience in and study of analysis of difficulties in school subjects with special reference to language arts and mathematics. Experience in language arts and mathematics. Experience in and study of appropriate remedial instruction. Analysis and instruction will be that that is both feasible and practical for the teacher working with individuals or with a group.

#### EDPSY

# 425 Reading Disability; Remedial Techniques (3) THALBERG

Discussion and evaluation of methods for

minimizing reading retardation. Descriptions of in-class and clinical procedures supplemented by classroom observations. Prerequisite, EDC&I 360 or equivalent.

#### EDPSY

#### 447 Principles of Guidance (3) ISLAND

A study of guidance programs in elementary and secondary schools. Attention will be given to the roles of specialists with emphasis upon the role of the classroom teacher in school guidance programs. This course is designed for teachers, administrators, and prospective teachers. Prospective counseling specialists should see EDPSY 551, 552, 553.

#### 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 which have either local or contemporary significance. (Not offered every year; check current *Time Schedule.*)

### EDPSY

#### 490 Basic Educational Statistics (3) KLOCKERS, PECKHAM, SAX

requency distributions, measures of central tendency and variability, linear correlation, probability, binomial and random sampling, normal distributions, Chi square, significance of means and correlations, zero order regression and prediction.

#### EDPSY

# 491 Computer Utilization in Education

(3) Ŵ peckham

An introduction to programming languages, computer utilization in the solution of research problems, data reduction to forms amenable to computer processing, appropriate framing of problems for solution by computers, utilization of program packages. Prerequisite, EDPSY 490.

#### EDPSY

#### 499 Undergraduate Research (\*)

For undergraduates. Registration must be accompanied by a study prospectus on a special form provided by the Office of Educational Psychology, endorsed by the faculty adviser most appropriate for the project proposed and the instructor, and must be filed in the Office of Educational Psychology in Education. 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. (Formerly EDUC 499.)

#### 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 Education. (Formerly EDUC 500.)

#### EDPSY

#### 501 Seminar in Concepts and Problem Solving (3)

FEA

The psychology of children's thinking. Course will emphasize study of research results in concept development, and problem solving with application to classroom learning situations. Prerequisite, permission of instructor.
### PDPSV

### 502 Seminar in Critical and Creative Thinking (3) FEA

The psychology of children's thinking. Course will emphasize study of research results in critical thinking and creative thinking with application to classroom learning situations. Prerequisite, permission of instructor.

### EDPSY

### 503 Psychology of Reading (3) FEA

Reading and perception, word recognition, concept development and meaning in reading: psychology of reading interests and skills. Prerequisite, permission.

## EDPSY

#### 504 Verbal Instruction (3) TRA

A study of the psychological implications of verbal behavior as applied to classroom instruction and learning. Prerequisite, permission of instructor.

### EDPSY

### 505 - Educational Issues in Human Learning (3)

FREEHILL

A study of contemporary problems in learning with emphasis on historical antecedents to modern views, methodological problems in the solution of the issues, relevant studies and phenomenological observation, implications and application of conclusions. Prerequisite, at least 20 quarter credits of previous work in educational psychology and/or psychology.

#### EDPSY

### 506 Instructional Theory (3)

An examination of the contribution of psy-An examination of the contribution of psy-chology to teaching and an evaluation of selected elements in instructional strategies. Prerequisite, EDPSY 505. (Offered alternate years; check current *Time Schedule.*)

#### EDPSY

### 507 Reading Disability: Etiology and **Diagnosis**—Practicum (5)

THALBERG

Theory and basic concepts underlying appraisal techniques and causality. Lectures and clinical practicum in administering, scoring, and evaluating each technique, and in interpreting and communicating results. Prerequi-site, EDC&I 360 or equivalent.

### EDPSY

### 508 Clinical Supervision—Practicum (2-6, max. 12)

Practicum in supervising diagnostic activities and remedial reading therapy. Prerequisite, EDPSY 425.

### EDPSY

### 510 Seminar in Educational Psychology (1-3, max. 15)

Seminar on advanced topics in educational psychology. A critical appraisal of current research. Prerequisites, advanced degree candidacy in educational psychology and permission.

### EDPSY

### 511 Seminar in Applied Educational Psychology (1, max. 6)

Designed for graduate students in Educational Psychology during, but not restricted to, their last year of residency. Selected contemporary topics relating to the application of theoretical constructs to school psychology and counseling. Prerequisite, permission.

### EDPSY

513 Adolescence and Youth (3) EVANS, GRAY, MCCARTIN

An overview of the adolescent period for individuals who plan to work with students in the junior and senior high schools and in the early college years. Focus will be on crucial developmental processes and patterns, and will consider the impact of culture upon the adolescent group. Prerequisite, EDPSY 304 or equivalent. (Formerly EDPSY 413.)

### EDPSY

#### 514 Seminar in Quantitative Methods (3, max. 15)

Seminar on such topics as measurement tech-niques, research design, psychometrics and statistics. Prerequisite, permission.

### EDPSY

515 Seminar in Development and Socialization (3, max. 15)

Seminar on such topics as cognitive development, language formation, socialization. Prerequisite, permission.

#### EDPSY

516 Seminar in Learning and Thinking (3. max. 15)

Seminar on such topics as learning theory, cognition, and problem solving. Prerequisite, permission.

### EDPSY

522 Reading Disability Clinic (3-5) Supervised practicum in diagnosing and teaching children with reading disabilities. Prerequi-site, EDPSY 425. (Formerly EDPSY 422.)

#### EDPSY

540 Individual Testing (5)

BASHEY, BROWN, MEACHAM, OLCH A study of intelligence testing with supervised experience. The emphasis is on the Stanford Binet and the Wechsler Intelligence Scale for Children. Prerequisites, EDPSY 308, 541, and permission of instructor.

#### EDPSY

541 Group Tests in Counseling (5)

BASHEY, DOHNER, FORSTER Emphasis on the utilization of objective measures in counseling. Prerequisite, EDPSY 490 or equivalent.

#### EDPSY

542 Career Development (3) SALYER

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.

### EDPSY

543 Seminar in Vocational Psychology (3) ISLAND

Self-directed, shared learning experiences for persons in preparation for eventual work in certain helping professions, such as teaching, counseling, nursing, agency work. The scope of inquiry includes how man spends his time, particularly in work, vocation, occupation, avocation, and leisure time, and how the pro-fessional helping role is related to helping man confront the problems associated with work.

## EDPSY

### 544 Counseling (5)

BRAMMER, LEE, ISLAND

Emphasis on the theory and practice of student counseling.

#### EDPSY

### 545 Practicum in Counseling (3-6, max. 6) BASHEY, BRAMMER, BROWN, ISLAND, LEE Supervised practice in counseling school and college students. Prerequisites, EDPSY 541, 544, and permission of instructor.

### EDPSY

## 546 Internship in Student Personnel

Services (2-12, max. 12) BASHEY, BRAMMER, BROWN, FORSTER, ISLAND, LEE, MEACHAM

Supervised practice in student personnel ac-tivities for advanced students. Prerequisite, permission of instructor.

#### EDPSY

### 547 Organization and Administration of Student Personnel Programs (3)

Basic considerations in planning, organizing, and operating school student personnel programs; analysis of issues and problems encountered in formulating policy; supervising and evaluating services. Prerequisites, EDPSY 551, 552, or equivalent.

### EDPSY

### 548 Educational Implications of Personality Theory (5)

FREEHILL, OLCH

A 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.

### EDPSY

### 549 Seminar in Student Personnel Work (3, max. 9)

Individual problems and issues of student personnel programs at school and college levels. Prerequisite, permission.

### EDPSY

550 Family Counseling (3)

BROWN

Introduction to family counseling theory and practice, emphasizing family dynamics and communication analysis. Prerequisite, EDPSY 544 or permission.

#### EDPSY

### 551 Student Personnel Services in the **Elementary School (3)** BROWN

study of philosophy and practice appropriate to elementary school service.

### EDPSY

## 552 Student Personnel Services in the Secondary School (3)

ISLAND

A study of philosophy and practice appropriate to secondary school service.

#### EDPSY

### 553 Student Personnel Services in Higher **Education (3)** BRAMMER

A survey and critical study of the philosophy and practice of student personnel work in American colleges and universities.

#### EDPSY

555 Seminar in Rehabilitation Counseling (1-2, max. 6)

BASHEY, FORSTER

Oriented toward the role of a rehabilitation counselor as a professional worker. The history, background, scope, and trends of vocational rehabilitation services will be studied. Field trips will be utilized extensively to acquaint the student with resources serving the disabled in the immediate community.

### EDPSY

### 561 Group Process Laboratory (3) BRAMMER

Experience in small group process following the "T" group model. Collateral discussions of process and independent study. Prerequisite, permission.

### EDPSY

### 564 Practicum in School Psychology (1-6, max. 6)

BROWN

A practicum course in appraisal and counseling emphasizing diagnosis and counseling with behavior and learning disabilities and bringing to bear techniques acquired in prior courses (EDPSY 540, 545, 565).

### EDPSY

### 565 Personality Appraisal (5)

FREEHILL, MEACHAM, OLCH Study of personality evaluation with a supervised laboratory emphasizing work with children and their families. Prerequisites, EDPSY 540, 548, and permission of instructor.

### EDPSY

566 Case Study Seminar (1, max. 2)

BROWN, FREEHILL, ISLAND Study and experience in the case method, integrating the work of specialties with emphasis on school and child problems. To be taken with EDPSY 546. Prerequisite, permission.

### EDPSY

### 591 Methods of Educational Research (3) CLARK, SAX, PECKHAM

An introduction to educational research. Primary focus upon hypothesis development, experimental design, use of controls, data analysis and interpretation. Prerequisites, EDPSY 308, 490.

### EDPSY

# 592 Advanced Educational Measurements (3)

KLOCKARS, SAX

Theory of tests and measurement; an examination of assumptions involved in classical test theory, errors of measurement, factors affecting reliability and validity, and problems of weighting. Prerequisites, EDPSY 308, 490.

### EDPSY

### 593 Experimental Design and Analysis (5) KLOCKARS

Experimental design with specific emphasis on the analysis of variance and covariance. Prerequisites, EDPSY 490 or 'equivalent, and EDPSY 591.

### EDPSY

### 594 Advanced Correlational Techniques (5) KLOCKARS

Multivariate analysis, including regression and multiple correlation; partial, phi, tetrachoric, biserial, and point-biserial correlation; the discriminant function; factor analysis; intraclass correlation; trend analysis. Prerequisites, EDPSY 490 or equivalent, and EDPSY 591.

### EDPSY

### 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, and, with permission of instructor, must be filed with the Office of Edu-

cational Psychology in Education. Prerequisite, permission. (Formerly EDUC 599.)

### SPECIAL EDUCATION

### EDSPE

403 Education of the Emotionally Disturbed (3)

Classroom instruction and measurement of emotionally disturbed children; modification of classroom behavior.

### EDSPE

## 404 Exceptional Children (3)

Atypical children studied from the point of view of the classroom teacher.

### EDSPE

### 405 Educating the Mentally Retarded (3) AFFLECK

A basic course for students preparing to teach the educable mentally retarded; organization of programs, curriculum planning, and instructional procedures and materials.

### EDSPE

### 406 Teaching Reading to the Slow Learner (3)

Curriculum adjustment and procedures for developing reading skills for the pupil of below-average ability.

### EDSPE

## 407 Education of Severely Retarded

Individuals with Multiple Handicaps (3) A basic course for students preparing to teach the moderately to severely retarded individual and the multiply handicapped individual. Includes curriculum planning, instructional techniques, and modification of materials for these students.

### EDSPE

### 409 Mental Retardation (3)

SMITH An introductory course on the subject of mental retardation and the problems it presents to parents, the mentally retarded, the

community, the schools, and society.

### EDSPE

411 Learning Disabilities (3)

RYCKMAN

An analysis of major theoretical approaches to the study of children with learning disabilities.

### EDSPE

### 412 Behavioral Measurement and Management in the Classroom (3) HARING

Response measurement in the classroom; use of data analysis for instructional decisions and behavior management; instructional programming for handicapped children.

### EDSPE

### 414 Education of the Exceptional Individual in Inner City (3) TERRY

Survey of social and psychological factors related to the culturally and economically disadvantaged pupil and his education.

### EDSPE

### 416 Evaluation of Instructional Materials for Exceptional Children (3) RYCKMAN

An introduction to techniques of determining the quality of instructional materials in terms of (a) the systems of specific subject matter organization and (b) specified instructional outcomes.

### EDSPE

## 418 Vocational Development of Handicapped Children and Youth (3)

Curricular aspects of vocational training relevant to each age level in the education of handicapped children. Application of programmed instructional techniques to breaking down of the occupational task. Emphasis on familiarizing school personnel with interdisciplinary services and community resources available to assist them in facilitating the maximal vocational development of handicapped children and youth.

### EDSPE

# 433 History, Education, and Guidance of the Deaf (3)

MARSHALL

Consideration of problems of deaf from social, economic, and educational point of view; history of deaf education.

### EDSPE

### 435 Principles and Practice of Manual English (3)

MARSHALL

Nature of manual communication is introduced with an identification of its specific modes: sign language, signed English, simultaneous method, finger spelling, and manual English. Discussions will center on the linguistic structure of signs, the psycholinguistic effects of signs on young children, and a review of the pertinent literature. Laboratory sessions will emphasize manual English.

### EDSPE

## 499 Undergraduate Research (2-5, max. 5)

For undergraduates. Registration must be accompanied by a study prospectus on a special form provided by the Office of Special Education in Education, endorsed by the faculty adviser most appropriate for the project proposed and the instructor, and must be filed in the Office of Special Education in Education. 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. (Formerly EDUC 499.)

### EDSPE

### 500 Field Study (3-6, 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 must be filed in the Office of Special Education in Education. (Formerly EDUC 500.)

### EDSPE

### 506 Internship in Special Education (2-10, max. 10)

AFFLECK

Supervised experiences in special education for advanced students. Ordinarily reserved for post-master students. Prerequisite, permission of chairman of Special Education.

#### EDSPE

### 508 Administration of Special Education (3) HAYDEN

Research and trends in administrative organization, programs, personnel assignments, and instructional groupings for the education of exceptional children as these relate to the total school program, pupil personnel services, community agency services, and state and federal legislation. Prerequisite, background in special education and public school administration.

### EDSPE

509 Seminar in Mental Retardation (3) SMITH

An interdisciplinary approach to the advanced study of selected research topics in mental retardation. Designed for teachers, psychologists, social workers, and related professional personnel.

### EDSPE

#### 511 Individual Assessment and Modification Strategies in Special Education (3) LOVITT

Exploration of variables affecting the academic and behavioral performance of exceptional children. Assessment and establishment of instructional programs and procedures.

### EDSPE

### 513 Clinical Appraisal of Exceptional Children (3)

Diagnostic instruments used in the clinical appraisal of exceptional children. Theoretical considerations will be used to buttress practical experiences in appraisal related to intervention.

### EDSPE

### 515 Problems and Issues in Special Education (3, max. 9)

AFFLECK, HAYDEN

An intensive examination of the issues pertinent to all of special education, such as legislation, interdisciplinary function, and the role of special education in general education and placement practices. Prerequisite, permission of instructor.

#### EDSPE

#### 516 Developing Instructional Materials for Exceptional Children (3) RYCKMAN

Theory and basic concepts underlying the writing of instructional materials for exceptional children. The course will involve a basic review of the literature in programming research and methodology. Students will write, field test, and rewrite a unit of instructional materials for a specific population of exceptional children. Prerequisite, EDSPE 416.

### EDSPE

### 517 Practicum in Research Design and Analysis in Special Education (3) MARSHALL, RYCKMAN

Critical analysis of current research practices

in special education will serve as background to a student carrying out a small independent research project. Projects will be evaluated in seminar discussion. Prerequisites, EDPSY 490 and EDPSY 591 or equivalent, or permission.

#### EDSPE

### 518 Seminar in Special Education Research (1, max. 3)

LOVITT

Designed for doctoral students in special education during their year of residency. Each candidate will select a dissertation problem and submit a proposal. Topics such as the procurement of subjects, the reporting and communication of research findings, and the evaluation of research will be stressed. The seminar will lead to the evolution of a viable dissertation proposal.

### EDSPE

#### The Communicative Disorders of the 521 **Exceptional Child (3)** MARSHALL

Discussion centers on the theory and models of communication. Neurophysiological bases

of communication are then explored with reference to different types of exceptional

children. The course is offered to advanced undergraduates and graduates with permission of instructor. There are no prerequisites, although an introductory course in psychology and special education is desirable.

#### EDSPE

### 530 The Teaching of Speech to the Deaf (6) LOWENBRAUN

Study of principles and techniques used in developing English sound by the analytical method; introduction of speech by the wholeword method; major emphasis on development of speech in the preschool and schoolage deaf child; an introduction to manual communication. Prerequisite, permission. (Formerly EDSPE 430.)

### EDSPE

### 531 The Teaching of Language to the Deaf (6)

MARSHALL

Study of principles and techniques of teaching language to the preschool and school-age deaf. Leading systems of teaching language to the deaf will be reviewed, and a step-by-step development of at least one language system will be covered. (Formerly EDSPE 431.)

### EDSPE

532 Elementary School Methods for the Deaf (6)

### LOWENBRAUN

Principles and methods of teaching the following subjects to deaf children at the primary and intermediate levels: (1) reading, (2) arithmetic, (3) social studies, (4) science. Will also cover use of visual aids in classes for the deaf. (Formerly EDSPE 432.)

### EDSPE

### 534 The Psycho-Educational Principles of Lipreading (3)

#### MARSHALL

Theoretical, practical, human, and intellectual elements of the lipreading process. Historical perspectives, current methods of instruction, and research will be presented and evaluated. (Formerly EDSPE 434.)

#### 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, and, with permission of instructor, must be filed with the Office of Special Education in Education. Prerequisite, permission. (Formerly EDUC 599.)

### INDEPENDENT STUDY, RESEARCH, AND FIELD EXPERIENCES (TEACHING PRACTICUM) EDUC

288 Introduction to Teaching (1) BRIGGS, DIMMITT

Designed to provide an overall introduction to preparation for teaching on the elementary and secondary school levels. Five half-days of school and classroom participation in a specific school situation, level as requested, plus six lectures are scheduled. Prerequisites, application during quarter prior to participation, junior standing, and permission.

#### EDUC

### 301 Introductory Practicum in Community Service Activity (3) DIMMITT

Opportunity is provided for initial tutoring and teaching experiences in a specific community service organization, placement made according to participant interests and needs. Approximately a hundred hours of participation on a prearranged schedule are required. Prerequisites, application during quarter prior to participation and permission.

### EDUC

### 302 'Introductory Practicum in Classroom **Teaching and Management (3)** BRIGGS, DIMMITT

Opportunity is provided for initial participation experience in classroom teaching and management. Assignment is for ten hours per week in a specific school situation, level as requested. Prerequisites, EDUC 288, application during quarter prior to participation, and permission. (Formerly EDUC 289.)

#### EDUC

### 401 Practicum in Community Service Activity (3-18)

DIMMITT

Opportunity is provided for tutoring and teaching experiences in a specific community service organization, placement made according to participant interests and needs. Approximately thirty hours of participation on a predetermined schedule are required for each credit earned. Participants wishing to utilize community service experience to satisfy, in part, certification requirements should make arrangements prior to enrollment with the Director of Field Experiences. Prerequisites, application during quarter prior to participation and permission.

### EDUC

### 402 Practicum in Classroom Teaching and Management: Early Childhood, Kindergarten, Primary (Through Grade 3) (5-36)

DIMMITT

Teaching practicum is completed in an assigned public school. A full day, from 8 a.m. to 4 p.m., must be left free for this assignment. Placement is made by the Director of Field Experiences. Prerequisites, application during Spring Quarter prior to expected participation; completion of the required professional education sequence and of required portion of the elementary education minor; 2.00 grade-point average in professional education; 120 minimum credits; and permission. (18 credits required for certification.) (For-merly EDUC 371 and EDUC 471.)

### EDUC

### 403 Practicum in Classroom Teaching and Management: Intermediate Grades, Middle School (5-36) DIMMITT

Teaching practicum is completed in an as-signed public school. A full day, from 8 a.m. to 4 p.m., must be left free for this assignment. Placement is made by the Director of Field Experiences. Prerequisites, application during Spring Quarter prior to expected participation; completion of the required professional education sequence and of required portion of the elementary education minor; 2.00 grade-point average in professional education; 120 minimum credits; and permission. (18 credits required for certification.) (For-merly EDUC 372 and EDUC 472.)

#### EDUC

404 Practicum in Classroom Teaching and Management: Secondary School (5-36) (Grades 7-12)

DIMMITT

Teaching practicum is completed in an assigned public school. A full day, from 8 a.m.

## ENGINEERING

to 4 p.m., must be left free for this assignment. Placement is made by the Director of Field Experiences. Prerequisites, application during Spring Quarter prior to expected participation; completion of the required professional education sequence; 2.00 grade-point average in professional education; 120 miniquired for certification.) (Formerly EDUC 374, EDUC 375, EDUC 474, and EDUC 475.)

### EDUC

### 501 Advanced Practicum in Community Service Activity (3-18) DIMMITT

Opportunity is provided postbaccalaureate students with selections, in-depth participation, and teaching experiences in a specific community service organization. Approximately, thirty hours of participation 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 adviser and the Director of Field Experiences. Prerequisites, application during quarter prior to participationand permission.

### EDUC

## 502 Advanced Practicum in Classroom Teaching and Management (3-18) DIMMITT

Designed to provide experienced teachers with selective, in-depth classroom participation experiences. Activities include, for example, specialized reading instruction, assessment of learning disabilities, remedial or specialized teaching, experimental approaches to learning, etc. 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 Field Experience. Prerequisites, application during quarter prior to participation and permission.

### EDUC

### 571, 572, 573 Public and Educational Policy Issues in the Development of Human Talent (3,3,3) WOLFLE

Trends, projections, policy issues, problems, and goals in the relation between education and utilization of professional and specialized personnel. Offered jointly with the School of Public Affairs as Public Policy PBPL 571, 572, 573. Prerequisite, permission.

### EDUC

### 600 Independent Study or Research (\*)

Registration must be accompanied by a study prospectus endorsed by the appropriate faculty adviser for the work proposed and be filed with the Office of Graduate Studies in Education. A report or paper setting forth the results of the investigation is required.

### EDUC

### 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. Name of faculty member responsible for supervising the student should be indicated on the Program of Studies. Prerequisite, permission of Supervisory Committee Chairman or Graduate Program Adviser.

### EDUC

### 800 Doctoral Dissertation (\*)

Research for the doctoral dissertation and research preparatory or related thereto. Limited to intermediate, i.e., those who have com-pleted the master's degree or the equivalent, or candidate-level graduate students. Premaster students initiating doctoral dissertation research should register for 600. Name of faculty member responsible for supervising the student should be indicated on the Program of Studies. Prerequisite, permission of Su-pervisory Committee Chairman or Graduate Program Adviser.

# COLLEGE OF ENGINEERING

## **COLLEGE COURSES**

### **Courses for Undergraduates**

### 110 Career Planning I (1) AW CHALK

Meets weekly in both large sections and small sections. The large sections are primarily devoted to an introduction to the College of Engineering, curricular options, fields of engineering, types of occupations, opportunities in engineering, interdisciplinary programs, and information of general interest. The small sections provide an opportunity for students to become acquainted with an engineering faculty member and a time to ask questions and to obtain assistance in preparing a statement of career and educational goals. Offered on credit/no credit basis only.

#### 120 Introduction to Graphical Analysis (2) AWSpS MESSER

Techniques of freehand and instrument drawing. Development of orthographic views and their relationship to each other. Reading and interpreting of engineering drawings. Introduction to dimensioning. Designed for students with little or no exposure to orthographic proiection.

### 121 Graphical Analysis (4) AWSpS MESSER

Designed for students with good spatial ability or with an understanding of basic orthographic projection. Selected topics in applied descriptive geometry and graphical statics. Introduction to the design process. Prerequisite, 120 or permission.

### 130 Techniques of Communication (3) AWSp WHITE

Organization, development, and expression of ideas. Prerequisite, qualifying score on Washington Pre-College Test.

#### 131 Scientific and Technical Reporting (3) AWSpS WHITE

Fundamental principles of making a logical, concise, and effective presentation of technical materials to various types of audiences. Prerequisite, qualifying score on Washington Pre-College Test.

### 140 Fundamentals of Problem Solving (4) AWSp MC NEESE

Introduction to modern computational techniques in the solution of problems in engineering measurements, statistics, probability, error propagation, and unit systems that are common to all fields of engineering. Includes limited use of the computer language BASIC.

### 141 Computer Applications to Engineering Problems I (4) AWSpS DUNN

The language of FORTRAN applied to engineering problems. Flow charts, problem organization, and basic computer statements. Introductory problems solved on CDC 6400. Prerequisite, Mathematics 124 or permission.

### 150 Design and Synthesis (3) AWSp CHALK

An introduction to the engineering design process. Individual and team effort is directed from conceptual and formative stages through preliminary design. The design may involve a concept, a technique, a device, a facility, or a process to meet the needs of a particular problem.

### 160 Measurement Techniques and Experimentation (3) AWSp

SEABLOOM

Design of experiments, theory of measurements, theory of errors, statistical analysis of experimental data collected by the student. Field trips to departments for observation of actual research experiments.

#### 161 Plane Surveying (3) ASp KONICHEK

Plane surveying methods; use of the engineer's level, transit, and tape; computations of bearings, plane coordinate systems, areas, stadia surveying, public land system. Prerequisite, Mathematics 104.

### 170 Fundamentals of Materials Science (4) AWSpS POLONIS

Elementary principles underlying the structure and properties of materials utilized in the practice of engineering. The properties of inorganic and organic materials are related to atomic, molecular, and crystalline structure. Metals, ceramics, multiphase systems, and natural and synthetic polymeric materials are included. Mechanical stress, electromagnetic fields, irradiation, and thermal and chemical changes are considered with respect to their influence upon mechanical, electrical, and chemical properties. For advanced freshmen and sophomores. Prerequisite, Chemistry 150.

### 171 Materials Science Laboratory (1) AWSpS

Experiments in materials science designed to illustrate fundamentals related to the structure and the properties of engineering mate-rials: optical microscopy, X-ray diffraction, mechanical properties, electrical conductivity, crystal growth, solid-state reactions. Prerequisite, 170 or concurrent registration.

#### 180 Engineering Statics (4) AWSpS ALEXANDER

Principles of statics, basic concepts, parallelogram law, Newton's law, resultants, forcecouple relationships, equilibrium diagrams, equilibrium analysis, three-dimensional structures, two-dimensional frames, trusses, fric-tion, and virtual work. Vector algebra used throughout the course. Prerequisite, Mathematics 125, which may be taken concurrently.

#### 190 Introduction to Logical System Design (3) AWSp NOGES

Introduction to concepts of logical algebras

and techniques in the design of certain classes of systems. Formal and informal number systems used in logical models and associated arithmetics. Boolean algebra and its use in the specification and modeling of logical systems will be introduced. Examples of system reduction by logical operations and topological methods along with formal algorithms for combinational logical simplication. Examination of time dimension in logical models for development of sequences of operations or decisions. Examples of simple systems ranging from digital computers to fault trees. Emphasis on selection of system categories eligible for logical modeling. (To start Winter Quarter 1973.)

#### 215 Topics in Digital Computing (3) AWSpS REDEKER

The concept of the higher level language. Advanced FORTRAN techniques used to construct an interpreter including the full set of FORTRAN IV statements, the machine dependent features of the CDC 6400, real and integer binary number conversion, stuffing and unstuffing, object-time formating, logic and Boolean algebra as applied to circuit design, and Polish notation. Several programs in addition to the interpreter will be written and executed. Prerequisite, 141 or equivalent.

### 220 Applied Mathematics (2) AWSp MESSER

Practical applications of graphics to problems from research and industry. Emphasis is on graphical calculus, empirical equations, and nomography. Experience in orthographic drawing and descriptive geometry not required.

### 230 Kinematics and Dynamics (4) AWSpS ALEXANDER

Dynamics, rectilinear motion, vector calculus, kinematics of a particle, kinetics of a particle, statics, friction, vibration, impulse, momentum, work and energy, conservation laws, moving references, central force motion, systems of particles, rigid-body mechanics. Prerequisite, Mathematics 126.

#### 240 Introduction to Continuum Mechanics (4) AWSpS OSBORN

Basic principles in the study of continuous media. Introduction to various field quantities, such as stress, mass density, and temperature, and to the basic balance laws to which these fields are subject. Specific constitutive equations will be developed with applications drawn primarily from the areas of fluid mechanics and solid mechanics. Prerequisites, Mathematics 126 and Physics 121.

## 250 Introduction to Engineering System Dynamics (4) AWSp

NOGES

Lectures and laboratory demonstrations introducing the concept of system analysis and mathematical modeling by ideal-lumped linear elements and their interconnections. Identification of system variables and application of basic physical laws. Discussion of approximations required to describe the response of engineering system elements by linear differential equations with constant coefficients. Computational methods for finding the system response, on both analog and digital computers. Comparison between the system response and that of the computational mode. Prerequisite, Mathematics 126.

# 260 Thermodynamics (4) AWSpS

Introduction to the basic principles of thermodynamics, from a predominantly macroscopic point of view. Development of the basic laws of thermodynamics, together with their illustration by application to energy transformations and state changes in engineering problems. Prerequisites, Mathematics 126, 100level physics and chemistry courses.

### 270 Air-Water Interface Transportation Vehicles (3) AWSp BOLLARD

The force system acting on air-water interface and land vehicles and their resulting mechanics of motion. The effect on the environment will be an important factor in the choice of vehicles for a specific purpose. (To start Winter Quarter 1972.)

### 315 Assembly Language Programming (3) AWSpS DUNN

The central processor assembler language, COMPASS, of the CDC 6400 computer, including program structure and organization, COMPASS language instructions, pseudo instructions, and macroprogramming techniques. Integer and floating-point conversion, character manipulation, simple and nested loops, array accessing, COMPASS-FORTRAN subroutine linkage, and instruction timing. Programs will be coded and executed on the computer. Prerequisite, 141 or equivalent,

# 351 Inventions and Patents (1) Sp

Law and procedures for patenting inventions, employer-employee relationship, and trademarks. Primarily for engineering students. Prerequisite, junior standing.

#### 390 Computer Applications in Engineering Problems II (3) AWSpS MARSHALL

Development and application of numerical methods and algorithms to solve problems in engineering. Simultaneous equations, curve fitting, root-finding algorithms, Taylor series analysis, numerical integration, ordinary differential equations. Prerequisites, 141 or equivalent and Mathematics 238, which may be taken concurrently.

## AERONAUTICS AND ASTRONAUTICS

### **Courses for Undergraduates**

300, 301, 302 Aerodynamics I, II, III (3,3,3) A,W,Sp

DECHER, GANZER, JOPPA, RAE

The atmosphere and the fluid medium. Dimensional analysis and force coefficients. 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, 300 for 301; 301 for 302; Engineering 260 recommended.

### 310 Orbital Mechanics (3) A

KEVORKIAN, NESS, VAGNERS Dynamics of systems of particles. Gravitational field of the earth. Keplerian motion. Orbital transfer. Satellite motion with perturbations. Prerequisite, junior standing.

## 311 Flight Mechanics (3) W

GANZER, JOPPA, NESS Dynamics of systems of particles-rigid body motion: applications to constrained rigid bodies and flight mechanics. Prerequisites, 300, 301.

### 312 Aeroelasticity (3) Sp

ATLURI, BOLLARD, NESS Vibration theory. Approximate methods for determining principal frequencies and modes. Application to the study of aeroelastic instabilities, divergence, control reversal, flutter.

## 320, 321, 322 Junior Laboratory I, II, III

(2,2,2) A,W,Sp 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. Student registers for the entire three quarter sequence.

### 330, .331, 332 Structural Analysis I, II, III (3,3,3) A,W,Sp

BOLLARD, DILL, HOLSAPPLE, PARMERTER Development of the equations of elasticity, viscoelasticity, and plasticity. Plane stress, plane strain; torsion, bending, and stability of rods and beams; virtual work, potential energy, Castigliano's theorem; statically indeterminate structures; bending of plates and shells. Prerequisites, 330 for 331; 331 for 332; Engineering 240 recommended.

### 370 Introduction to Applied Analysis (3) Sp

Advanced calculus, from applications point of view. Matrix methods. Dimensional analysis and theory of modeling. Review of vectors; surface and volume integral identities. Fourier series. Prerequisite, Mathematics 238.

## 400, 401, 402 Gas Dynamics I, II, III

(3,3,3) A,W,Sp

AHLSTROM, CHRISTIANSEN, RAE, RUSSELL Review of thermodynamics. Introduction to kinetic theory and statistical mechanics. Onedimensional gas dynamics, one-dimensional wave motion, waves in supersonic flow, flow in ducts and wind tunnels. Measurements in fluid dynamics. Inviscid equations of motion, incompressible potential flows, vortex flows, small perturbation flows, bodies of revolution, similarity laws. Transonic flow, hypersonic flow, method of characteristics. Equations with viscosity and heat conductivity. Boundary layer flows, Prerequisite, 302.

## 410, 411, 412 Aircraft Design I, II, III (3,3,3) A,W,Sp

GANZER

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. FAA load requirements, loads analysis, structural design of components. Prerequisites, 302 for 410; 410 for 411; 332 and 411 for 412.

420, 421, 422 Senior Projects Laboratory I, II, III (3,3,3) A,W,Sp

Prerequisite, 322.

### 424 Environmental Aspects of Energy Conversion and Heat Engines (3) W DECHER, HERTZBERG

Considerations of ecological constraints on the

design of heat engines. Thermal pollution of air and water, and pollution by electrical power plants. Advanced methods of power production and of waste heat elimination. Chemistry and kinetics of high-temperature gases. Chemical emission by automotive engines, gas turbines, and hybrid engines. Pre-requisites, Chemistry 140, Engineering 260, or permission.

### 430 Matrix Structural Analysis (3) A

ATLURI, DILL, HOLSAPPLE Introduction to matrix methods of structural analysis. Prerequisite, 331.

### 431 Plates and Shells (3) W

ATLURI, DILL, HOLSAPPLE, PARMERTER Introduction to the theory of plates and shells. Prerequisite, 332.

#### Special Topics in Structural Analysis 432 (3) Sp

ATLURI, BOLLARD, DILL, HOLSAPPLE, PARMERTER

Problems and introduction to theory associated with plastic behavior, viscoelastic materials, filament wound and laminated structures, fatigue, creep, and impact. Prerequisite, 331.

### 440, 441, 442 Flight Mechanics I, II, III (3,3,3) A,W,Sp

GANZER, JOPPA

Calculation of aerodynamic coefficients and stability derivatives. Prediction of perfor-mance, stability, and control characteristics of a specified aircraft. Vehicle equations of motion near a flat earth; the performance problem within the atmosphere; an introduction into the dynamic stability of vehicles subject to aerodynamic forces. Wind tunnel tests of an aircraft model to determine performance and stability parameters; comparison of wind tunnel and derived aerodynamic characteristics. Determination in flight of performance, stability, and control characteristics; and comparison with predicted and wind tunnel re-sults. Prerequisites, 302 for 440; 440 for 441: 441 for 442.

### 450, 451, 452 Space Mechanics I, II, III (3, 3, 3) A,W,Sp

**KEVORKIAN**, VAGNERS

Review of kinematics. Review of particle dynamics. Dynamics of a system of particles. Stability of motion. Rigid-body motion. Universal law of gravitation. The two-body problem. Orbit transfer problems. Linearized orbit investigations. Effect of air drag on orbits. Variation of parameters for continuous orbit perturbation. Planetary potentials. Change of orbit elements due to oblateness. Elementary three-particle problem. Rigid-body motion of space vehicles. Elements of orbit determination. Mathematics 238 recommended

### 460, 461, 462 Propulsion I, II, III (3,3,3) A,W,Sp

DECHER, OATES

Study of the aerodynamics and the chemistry of rockets. Rocket vehicles, staging. Introduction to space propulsion. Air-breathing engines as propulsion systems. Turbojets, turbofans, turboprops, ramjets, hybrid engines. Aerodynamics of gas-turbine engine components. Piston engine-propeller performance. Prerequisites, 302 and Engineering 260.

### 470 Analytical Problems in Aeronautics (3) A

PEARSON

Numerical methods for algebraic and differ-

ential equations. Transforms. Introduction to perturbations, eigenvalues, nonlinearities. Probability and statistics. Variational idea. Prerequisite, Mathematics 238.

### Systems Dynamics (3) W

ATLURI, BOLLARD, DILL, FYFE Equations of motion and solutions for selected problems; natural frequencies and mode shapes; response of simple systems to applied loads. Prerequisite, senior standing.

### 481 Aeroelasticity (3) Sp

ATLURI, BOLLARD Discussion of aeroelastic problems in aircraft design; elementary development of static and dynamic aeroelastic problems. Prerequisites, 312, 480.

499 Special Projects (2-5, max. 10) AWSp An investigation on a special project by the student under the supervision of a faculty member. Prerequisite, senior standing.

### **Courses for Graduates Only**

### 501, 502, 503 Physical Gas Dynamics I, II, III (3,3,3) W,Sp,A

CHRISTIANSEN, HERTZBERG, STREET Chemical thermodynamics; thermodynamic properties derived from quantum statistical mechanics, reacting gas mixtures. Equilibrium flow of real gases. Vibrational and chemical rate processes. Problems in molecular laser physics and nonequilibrium flow. Nonequilibrium kinetic theory. Radiation transfer in gases and radiation gas dynamics.

### 504, 505, 506 Fluid Mechanics I, II, III (3,3,3) A,W,Sp AHLSTROM, CHRISTIANSEN, DECHER,

RUSSELL, STREET

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. Derivation of the Boltzmann equation, derivaton of continuum equations from the Boltzmann equation. Dimensional analysis, sound waves, surface waves. Ideal incompressible flows, compressible flows. Laminar and turbulent viscous flows, transonic flow, hypersonic flow, combustion, super fluids. Pre-requisite, 567, which may be taken concur-rently with 504.

# 507, 508, 509 Aerodynamics of Viscous Fluids I, II, III (3,3,3) A,W,Sp

RUSSELL, STREET

Equations of motion of a viscous compressible fluid; forces on a solid; boundary layer equations; incompressible laminar and turbulent flows. Laminar and turbulent boundary layers in compressible flow; change of vari-ables in the compressible flow equations; similarity solutions; integral relations. Numerical integration of the boundary layer equations. Applications to flight vehicles and related problems in viscous flow.

### 510 Wave Propagation in Fluids and Solids (3) Sp FYFE

Examination of the fundamental concepts of wave propagation; group, phase, and shock velocities; interaction of different wave forms; theory and application of the method of characteristics to wave propagation problems.

### 511 Unsteady Aerodynamics (3) W ATLURI

Oscillating airfoils at subsonic and supersonic

speeds; consideration of wings and bodies in unsteady flow. Offered only when warranted by sufficient enrollment.

### 512 Magneto-Fluid Dynamics (3) Sp AHLSTROM

Review of electrodynamics and Maxwell's equations; orbit theory of charged particles, statistical mechanics of ionized gases; continuum magneto-fluid dynamics, the two-fluid model and the one-fluid model; wave propa-gation in a plasma. Prerequisite, 504. Offered only when warranted by sufficient enrollment.

#### Gas Laser Theory and Practice (3) Sp 513 AHLSTROM, CHRISTIANSEN, HERTZBERG, RUSSELL

Study of the gas physics and fluid mechanics related to high power gas dynamics, chemical, and electrical lasers. Techniques of obtaining population inversions, power extraction properties, thermodynamics, and optical problems related to these machines.

### 516, 517 Stability and Control I, II (3,3) W,Sp

GANZER

Aerodynamics of control; the general problem of dynamic stability; the influence of aerodynamic parameters on flying characteristics. Response of airplane to actuation of control; automatic stability and control.

#### 519 Special Topics in Stability and Control (3, max. 6) A JOPPA

Study of recent work in stability and control of aircraft, with special attention to handling qualities. Prerequisite, 516, or permission.

### 523 Seminar in Aerodynamics (1-3, max. 12) AWSp

Study of recent advances in aerodynamics. Topics vary from year to year. Open only to students having the M.S. degree or its equivalent.

### 524, 525, 526 Aerodynamics of Aircraft Gas Turbine Engines I, II, III (3,3,3) W,Sp,A

DECHER, OATES

Aircraft gas turbine cycle analysis, component matching, overall engine performance. Aerodynamics of turbines and compressors, throughflow theories, actuator disc theory, threedimensional effects. Advanced aerodynamicssecondary flows, boundary layers and separation, turbulence in supersonic inlets, engine compatibility. Offered even-numbered years.

### 527, 528 Energy Conversion I, II (3,3) W,Sp

### DECHER, OATES

Analysis of cycles for space and low-pollution commercial power generation. Brayton cycle, very high temperature cycles, direct conversion of heat to electricity, solar collection. Energy storage systems. Offered odd-numbered vears.

### 529 Space Propulsion (3) A

DECHER, OATES Physics, nucleonics, and heat transfer of nuclear heated rockets. Electrothermal, electromagnetic, and electrostatic thrusters. Offered odd-numbered years. Prerequisite, permission.

530, 531, 532 Mechanics of Solids I, II, III (3,3,3) A,W,Sp BOLLARD, DILL, FYFE, HOLSAPPLE,

Linear theory of elasticity, viscoelasticity, and

plasticity. Variational and extremum theorems. Three-dimensional problems. Plane stress. Plane strain.

### 535, 536, 537 Analysis of Shells I, II, III (3,3,3) A,W,Sp

ATLURI, DILL, PARMERTER

Nonlinear equations of thin shells. Solution of the linearized equations for shells of revolution and other shapes. Buckling of shells. Post-buckling deformation of shells. Offered only when warranted by sufficient enrollment.

### 540, 541, 542 Finite Element Analysis I, II, III (3,3,3) W,Sp,A ATLURI, DILL, HOLSAPPLE

The finite element concept; historical background; relation to classical theory; finite element models; general finite element theory. Finite elements in structural mechanics; structural idealization; constraints; linear and nonlinear problems. Finite element theory for inelastic bodies; problems in structural dynamics and wave propagation; finite element applications to other fields.

### 545, 546 Bioastronautics I, II (3,3) W,Sp BOLLARD

Systematic study in how the principles of engineering science apply to specific biosystems; to acquaint the student with the principles of structure and function of the human organism. Prerequisite, 545 for 546. Offered only when warranted by sufficient enrollment.

#### 547 Engineering Aspects of the Fluid Mechanics of the Human Body (3) Sp OATES

Engineering background to the many flow regimes existing in the human body. Specific examples of flow problems such as cardiovascular, bronchial, microcapillary, urethral, etc. Prerequisite, permission of instructor.

### 550, 551 Aerospace Systems I, II (3,3) W,Sp BOLLARD, FYFE, GANZER

The study of aerospace system analysis employing transform methods. The effect of subsystem behavior such as the flexibility of flight vehicle structure, aerodynamic forces. Offered only when warranted by sufficient enrollment.

### 553 Vibrations of Aerospace Systems (3) W ATLURI, BOLLARD, DILL, FYFE

Natural frequencies and modes of vibrations of linear systems; forced vibrations and motion dependent forces; Lagrange's equations and Hamilton's principle; matrix methods for discrete and continuous systems; nonlinear oscillations, parametric oscillations.

### 555 Special Topics in Aerospace Systems (3, max. 6) AWSp

### 556 Aeroelasticity (3) Sp ATLURI

Concept of functional diagrams and aeroelastic operators; quasi-static lifting-surface deformations and stability; control surface effectiveness; nonstationary lifting-surface deformations and stability; general dynamics of aerodynamic, structural, and control system interactions. Prerequisites, 481, 553. Offered only when warranted by sufficient enrollment.

### 557 Nonlinear Problems in Aerospace Systems (3) A

The application to aeronautics of nonlinear ordinary differential equations and the topology of their integral curves in the phase plane; dynamical interpretation of singular points; existence of periodic solutions, questions of stability; nonlinear resonance; frequency demultiplication; relaxation oscillations. Offered only when warranted by sufficient enrollment.

## 562, 563, 564 Methods of Partial

Differential Equations I, II, III (3,3,3) A,W,Sp

KEVORKIAN

First order partial differential equations: characteristics, conservation laws, shocks, applications to geometrical optics and Hamilton-Jacobi theory. Elliptic equations: fundamental solution, Green's function, conformal mapping, boundary-value problems. Parabolic equations. Hyperbolic equations: characteristics, shocks, examples from fluid dynamics, approximate methods. Prerequisite, 569. Offered odd-numbered years.

### 565, 566 Approximate Analysis I, II

(3,3) A,W PEARSON, STREET

Approximation theory, curve-fitting. Numerical differentiation and integration. Linear and nonlinear algebraic equation systems. Ordinary differential equation methods. Asymptotic nary differential equation methods. Matrix iterative techniques. Numerical methods for elliptic, parabolic, hyperbolic partial differential equations. Variational methods. Eigenvalue problems. Nonlinearities. Applications to problems in fluid flow, stress analysis, heat flow.

## 567 Analysis in Engineering I (3) A

Algebra and calculus of vector and tensor fields. Linear mappings, matrices, finite dimensional eigenvalue problems. Curvilinear coordinates. Complex variables, contour integration, conformal mappings.

### 568 Analysis in Engineering II (3) W

Survey of properties and practical techniques for ordinary differential equations. Series expansions. Eigenvalue problems. Laplace transforms and applications. Variational methods. Asymptotic expansions. Perturbations, regular and singular. Difference equations. Numerical procedures.

### 569 Partial Differential Equations (3) Sp Properties of diffusion, wave, and Laplacetype equations. Initial and boundary value

problems. Series expansions, transform methods. Singularities, Green's functions. Classification of second order equations; theory and applications of method of characteristics. Numerical techniques. Offered jointly with the Department of Mathematics as Mathematics 569. Prerequisite, 568 or Mathematics 428.

### 571, 572, 573 Principles of Dynamics I, II, III (3,3,3) A,W,Sp

FYFE, KEVORKIAN, VAGNERS

Review of rigid body dynamics; calculus of variations. Lagrangian mechanics. The canonical equations of Hamilton; canonical transformations. Hamilton-Jacobi theorem; Hamiltonian perturbation theory. Periodic and quasi-periodic motion. Stability of dynamical systems; resonance in dynamical systems. Motion near a given motion. Applications to particle and rigid body space mechanics, nonlinear oscillations. 571 offered every Autumn Quarter; 572, 573 offered even-numbered years.

### 575 Thermo- and Electrodynamics of Continua (3) W DILL, HOLSAPPLE

The application of the principles of the phe-

nomenological theory of irreversible thermodynamics and of the electrodynamics of continuous media to fluids and solids. Prerequisite, 567.

### 576, 577, 578 Perturbation Theory I, II, III (3, 3, 3) A, W, Sp

KEVORKIAN Basic concepts of asymptotic expansions: evaluation of integrals. Singular perturbations: limit process expansions, matching, uniformly valid approximations. Theory for nonlinear oscillations: multiple variable expansions, adiabatic invariance, canonical perturbation theory. Offered even-numbered years.

## 580, 581, 582 General Theory of Continuous Media I, II, III (3,3,3) A,W,Sp

DILL, HOLSAPPLE

General formulation of the classical field theories: fundamental concepts of motion, stress, energy, entropy, and electromagnetism for a continuum; conservation of mass; balance of momentum; balance of energy, including thermodynamics of irreversible deformations; balance of electromagnetism. General nature of constitutive equations for a continuum. Examples of kinematic, energetic, mechanical, thermomechanical, electromagnetic, and electromechanical constitutive equations. Prerequisites, 567 and intermediate standing.

### 583 Special Topics in Solid Mechanics (3) AWSp

DILL, HOLSAPPLE

Study of recent advances in the mechanics of solids. May be repeated for credit by permission.

### 587, 588, 589 Techniques of Applied Analysis I, II, III (3,3,3) A,W,Sp

PEARSON w of complex variable.

Review of complex variable. Series expansions, contour integration, generating functions, conformal mapping. Differential equations in the complex plane. Special functions. Asymptotic methods (saddle point, stationary phase, WKB, and others). Fourier and related transforms. Radiation conditions, signal propagation, singular inversions. Green's functions. Applications to problems in engineering and physics. Integral equations. Wiener-Hopf and other special techniques. Prerequisites, 567, 568, 569 or equivalent. Offered even-numbered years.

### 590 Special Topics in Applied Analysis (3, max. 9) AWSp

PEARSON

Research-level seminar; topic varies from year to year.

599 Special Projects (2-5, max. 15) AWSp An investigation on a special project by the student under the supervision of a faculty member.

### 600 Independent Study or Research (\*) AWSp

700 Master's Thesis (\*) AWSp

800 Doctoral Dissertation (\*)

## CHEMICAL ENGINEERING

## **Courses for Undergraduates**

### 198 Career Planning II (1) Sp

Professional field of chemical engineering will be defined and illustrated by examples chosen from industry. Careers in this profession will be evaluated.

### 200 Introduction to Chemical Engineering (3) Sp

The engineering design process: conception, analysis, detailed process and equipment design, operation; familiarization with the techniques of design. Prerequisite, sophomore standing or permission.

### 210 Material and Energy Balances (4) A

Chemical and physical process calculations: steady and unsteady state material and energy balances with specific examples in vapor-liquid contact operations and multi-phase extraction, and introductory thermochemistry. Prerequisite, 200 or permission.

### 326 Chemical Engineering Thermodynamics (4) W

Phase equilibria and chemical equilibria in multicomponent systems; theories of solution; chemical reaction analysis. Prerequisites, 325 and Chemistry 456, which may be taken concurrently.

### 330 Transport Processes I (4) W

Diffusive transport of momentum, heat and mass; general aspects of fluid flow; the Navier-Stokes equations; one-dimensional flow with engineering applications. Prerequisite, 326.

### 340 Transport Processes II (4) Sp A continuation of 330. Prerequisite, 330.

### 435 Transport Processes III (4) A

Applications of the principles of heat and mass transfer to problems of engineering significance. Methods for evaluating heat and mass transfer coefficients; use of coefficients in equipment design. Particular attention is given to problems in physical separations and to alternative means of accomplishing desired mass exchange. Prerequisite, 340.

## 436 Chemical Engineering Laboratory I (3) A

Lectures on statistical analysis of data, instrumentation, and report writing; laboratory experiments on transport phenomena and the analog computer. Emphasis on experimental methods and report writing. Prerequisite, 340.

### 437 Chemical Engineering Laboratory II (3) W A continuation of 436. Laboratory investiga-

tion of chemical engineering principles applied to equipment design with emphasis on heat transfer and mass transfer operations. Prerequisite, 436.

440 Fluid Mechanics (3) A A concise survey of fluid mechanics. Quali-tative aspects of non-Newtonian behavior; basic physical and mathematical ideas of parallel flow, creeping motion, potential motion, turbulence, and boundary layers. Prerequisite, 340.

### 450 Heat Transfer (3) W

Application of steady-state and transient conduction theory, including numerical methods; elements of heat transfer by radiation; basic concepts and applications of convective heat transfer theory. Prerequisite, 435.

### 460 Mass Transfer (3) W

Diffusion equations; interphase mass transfer; models and analogy expressions; simultaneous heat and mass transfer; mass transfer design principles. Prerequisite, 435.

## 465 Reactor Design (3) W

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. Prerequisite, 435.

## 470 Chemistry of Wood (3) A

Chemical and physical properties of cellulose, lignin, hemicellulose, and extractives; wood as a raw material for the chemical industry. Prerequisite, Chemistry 102 or 232, or permission.

# 471 Pulp and Paper Technology (3) W

Morphology of wood fibers, manufacture of mechanical and chemical pulps, stock preparation, paper machine operation, coated papers, paper-plastic combinations, converting operations. Prerequisite, Chemistry 102 or 232, or permission.

**472** Pulp and Paper Laboratory (2) Sp Laboratory experiments in the pulping of wood, fiber technology, and the physical and chemical characterization of paper and pulp. Prerequisite, 471.

Process Dynamics and Control (3) A Analysis of the dynamics of simple chemical process units and systems; applications to stability, control, and instrumentation of such processes. Prerequisite, senior standing.

### 481 Process Optimization (3) Sp

Concepts and techniques of optimizing chemical engineering processes and systems, in-cluding classical and direct methods of experimental search, linear and nonlinear programming, and dynamic programming. Prerequisite, 435.

### 485 Process Design I (3) W

Applied economics in chemical engineering design and operations; market survey and plant location; introduction to plant and process design. Prerequisite, 435.

## 486 Process Design II (5) Sp

Comprehensive design of a specific process, including economic feasibility studies, utiliza-tion of market survey and plant location studies, process equipment design and optimization, and overall plant integration and layout. Prerequisite, 485.

#### 487 Industrial Waste Management (3) W DAVID, MAR, PILAT

Application of chemical engineering concepts to industrial-waste management and to the analysis of constraints and criteria encountered in such application. It includes design of biological and physical control systems, as well as nontreatment alternatives. Offered jointly with the Department of Civil Engineering as Water and Air Resources CEWA 487. Prerequisite, senior standing in chemical engineering or civil engineering or permission.

#### 490 **Materials for Engineering Biomedical** Applications (3) A

Combined application of the principles of physical chemistry, biochemistry, materials engineering, mass transfer, and fluid mechanics to biomedical problems. Case studies will 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. Offered jointly with the Center for Bioengineering as Bioengineering 490. Prerequisite, permission.

#### 499 Undergraduate Research (1-6, max. 12) AWSp

Independent research projects in chemical engineering. Prerequisite, permission.

### **Courses for Graduates Only**

520, 521, 522 Seminar (0,0,1) A,W,Sp

#### Seminar in Chemical Engineering 523 (0-3, max. 12) AWSp

Reports by students and staff on topics of current interest in chemical engineering. Prerequisite, one year of graduate study or permission.

### 525 Chemical Engineering Thermodynamics (3) A

Review of principles of thermodynamics; stain multiphase and multicomponent systems. Irreversible thermodynamics. Prerequisite, undergraduate thermodynamics.

### 526 Topics in Thermodynamics (3) W

Classical and molecular thermodynamics of phase equilibria, solution theory, thermody-namic stability, and critical phenomena. Prerequisite, 525 or permission.

### 530 Momentum, Heat, and Mass Transfer I (3) A

Derivation of the differential equations for mass, heat, and momentum transport from both continuum and molecular viewpoints of matter. Irreversibility and dissipation. Formulation of flux relations and determination of transport coefficients. Prerequisite, 340 or permission.

### 531, 532 Momentum, Heat, and Mass Transfer II, III (3,3) W, Sp

A continuation of the material presented in 530 with particular emphasis on molecular mechanisms for transport in dense gases and liquids. Prerequisite, 530 or permission.

#### 540 Topics in Fluid Mechanics (3) A SLEICHER

An introduction to fundamental concepts and methods of analysis in fluid mechanics. Stress rate-of-strain relationships, general deductions from the equations of motion, parallel flow, vorticity and circulation, creeping motion, irrotational motion, introduction to stability and turbulence, boundary layer theory. Prerequisites, 530 and Aeronautics and Astronautics 567, or permission.

### 543, 544 Fluid Turbulence (3,3) A,W GESSNER, SLEICHER

Statistical and phenomenological theories of turbulence. Introductory concepts, velocity correlations, the energy spectrum, the decay of turbulence, scalar fields, turbulent transport, shear turbulence, wall turbulence, phe-nomenological theories of energy transport, instrumentation, recent literature. Offered jointy with Mechanical Engineering as Mechanical Engineering 543, 544. Prerequisite, 6 credits in graduate fluid mechanics. Offered Autumn Quarter in odd-number years, Winter Quarter in even-numbered years.

#### 550 Topics in Heat Transfer (1-3, max. 6) Sp DAVID

Methods and developments in heat transfer theory of interest in chemical engineering with emphasis on convection (including condensation, boiling, and two-phase flow) and radiation. Prerequisite, permission.

#### 555 Interfacial Phenomena (4) BERG

Capillary statics and dynamics; classical and statistical thermodynamics of interfaces; adsorption. Prerequisites, 525, 540.

### 560 Topics in Mass Transfer (1-3, max. 6) W HEIDEGER

Consideration of special topics in the general area of mass transfer. Discussions and readings of the current literature. Subject matter changes from year to year. Prerequisite, one year of graduate study in chemical engineering or permission.

564 Fundamentals of Chemical Kinetics (3) Sp Modern experimental and theoretical techniques for the study of the rates and the mechanisms of chemical reactions. Investigation of systems of homogeneous gas phase reactions from molecular and phenomenological viewpoints. The mathematical characterization of reacting systems. Relationships between the stationary state and the exact solutions to rate equations. Chain reactions. Kinetic isotope effects. Absolute-rate theory. Classical and quantum statistical description of spontaneous decomposition. Photochemical, thermal, and chemical activation techniques. Intramolecular and intermolecular energy transfer. Theoretical descriptions of unimolecular and bimolecular reactions. Characterization of solution and surface reactions. Prerequisite, 525.

### 565 Kinetics and Catalysis (3) Sp JOHANSON

Homogeneous and heterogeneous systems with emphasis on chemical engineering principles applied to industrial reactor design. Prerequisite, 525.

### 566 Topics in Reaction Kinetics (1-3, max. 6) W JOHANSON

Considerations of particular problems in chemical reactions, combustion, elevated temperature systems, reactor design. Prerequisite, 565 or permission.

### 570 Chemistry of High Polymers (3, max. 6) Sp

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.

### 571 Cellulose and Lignin (3)

Chemistry and technology of cellulose, lignin, and related substances. Origin and status in plant tissue, isolation procedures, physical characteristics, and chemical reactions. Chemical processing in pulp, paper, rayon, and plastics industries. Prerequisite, an undergraduate sequence in organic chemistry.

### 575 Topics in Analysis in Chemical Engineering (1-4, max. 7) A GARLID

Discussion of topics in applied mathematics of importance in chemical engineering problems, including both classical contributions and topics of current interest. Subject matter varies from year to year. Prerequisite, one year of graduate study in chemical engineering or permission.

### 578 Environmental Protection in the Pulp and Paper Industry (3) Sp HRUTFIORD

Sources of air and water pollution in the pulp and paper industry are identified, and the chemistry of formation of the pollutants is discussed. Methods of pollution control are discussed in detail, with emphasis on newer techniques involving water recycle and operations integrated to minimize pollution loading. Waste-water treatment also will be considered. Prerequisite, senior standing or permission; Forest Resources 407, 476 or Chemical Engineering 470, 471 recommended. Offered jointly with Forest Resources as Forest Resources 578.

### 580 Topics in Chemical Engineering Design (3) GARLID

Mathematics of process dynamics and control including differential equations, perturbation techniques, transform methods. Basic methods of control system design. Effects of control loop imperfections such as hysteresis, measurement lag, and dead time. Prerequisite, one year of graduate study in chemical engineering or permission.

### 582 Advanced Topics in Mass Transfer (3)

- 583 Advanced Topics in Chemical Engineering (1-3)
- 584 Advanced Topics in Chemical Engineering Science (1-3)
- 585 Topics in Chemical Engineering Plant Design (1-3)
- 588 Nuclear Fuel Management (3) W GARLID

Technical and economic principles for management of nuclear fuels including: energy resources, fuel cycle schemes, fuel cycle neutronics, fuel cycle economics, irradiated fuel processing, isotopic separations, utilization of fission products and other radioactive isotopes. Offered jointly with the Department of Nuclear Engineering as Nuclear Engineering 588. Prerequisites, 530, Nuclear Engineering 484, or permission.

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.

600 Independent Study or Research (\*) AWSp

### 700 Master's Thesis (\*) AWSp.

800 Doctoral Dissertation (\*)

## **CIVIL ENGINEERING**

Specific areas in Civil Engineering are designated by area letters. These letters must precede course numbers on the student's Official Program. Designation letters and their definitions are:

CIVE—Civil Engineering Core Courses

CESM---Structural Engineering and Engineering Mechanics

**CETC**—Transportation, Construction, and Geotechnical Engineering

**CEWA**—Water and Air Resources (Sanitary Engineering)

### CORE COURSES

## **Courses for Undergraduates**

CIVE

198 Career Planning II (1) WSp HENNES

Review of the areas of specialization that compose the whole field of civil engineering and of the functions performed by the civil engineering practitioner.

### CIVE

### 316 Geometronics (4) ASpS COLCORD

Introduction to geodetic and photogrammetric concepts and their applications to engineering surveys. Errors. Measurement of position with modern techniques including use of tachometric, optical, and electronic instruments. Reduction to plane coordinates. Analysis and adjustment of measurements. Prerequisites, Engineering 141 or permission and 18 credits in mathematics.

### CIVE

### 320 Transportation Engineering I (4) WS EKSE, HOAG

Introduction to the planning, financing, and administration of a transportation system. Mathematical theory and practice in the design of alignment and grade of the traveled way, as well as its physical components; roadbed, drainage, pavement, and other design elements. Relationship of design elements to vehicle and human characteristics, and design commonality of roadway, railway, runway, and waterway. Prerequisite, CIVE 316.

CIVE

# 342 Fluid Mechanics I (4) AWSpS

Elementary mechanics of incompressible fluids, Hydrostatics. Continuity, energy, and momentum equations. Introduction to potential flow. Resistance phenomena for laminar and turbulent flows. Dynamic similitude. Prerequisite, Engineering 230 or permission.

### CIVE

#### 345 Hydraulic Engineering (4) AWSp RICHEY

Extension and application of fluid mechanics principles to hydraulic engineering problems. Diffusion and mixing processes, surface-water and groundwater hydrology, open channel flow, pipeline systems, turbomachinery. Prerequisite, CIVE 342.

CIVE

### 350 Environmental Engineering (4) WSp

Introduction to the basic concepts of environmental engineering and evaluation of man's interaction with his ecology. Introduction to several major environmental engineering problem areas, including the characteristics and control of air and water pollution, the collection and disposal of solid wastes, and the planning of urban water supply and sewerage and drainage systems. Prerequisite, CIVE 342, which may be taken concurrently, or permission.

### CIVE

### 363 Constructional Materials (4) AWS MILLER, TERREL

General treatment of physical and mechanical properties and engineering behavior of metallic and nonmetallic materials. Steel, aluminum, concrete, wood, asphalt, soils, and bituminous mixtures. Laboratory testing, instrumentation, and investigation into microbehavior. Correlation with microstructure and various aspects of materials science. Prerequisites, Engineering 170, Engineering 240, CIVE 393, which is to be taken concurrently, or permission.

### CIVE ·

366 Soils Engineering (4) ASp

Mechanical properties of soils. Theoretical

mechanics and engineering practice in the evaluation of lateral earth pressures, bearing capacity, and settlement of foundations. Underground exploration techniques and foundation construction methods. Prerequisite, CIVE 363.

### CIVE

**380** Analysis of Elastic Structures (4) AWSp Elastic theorems; superposition and virtual work. Solution of statically determinate and indeterminate problems by virtual work. Moment distribution. Limit analysis. Prerequisite, CIVE 393.

### CIVE

381 Concepts of Structural Design (4) AWSp CLANTON

Planning, design, and construction aspects of structural projects. Criteria for structural adequacy and efficiency. Examination of the design process. Introduction to design in wood, steel, and concrete components for both fixed and moving load systems. Prerequisites, CIVE 363, 380.

### CIVE

### 390 Environmental Systems Planning (4) ASp

The systems approach. Topics selected from the acquisition and the use of data in the planning process, decision theory, regional demographic forecasting. Examples stressing environmental aspects in various fields of civil engineering practice. Prerequisite, junior standing.

### CIVE

393 Mechaines of Materials II (4) AWSpS Statics with application to structures. Stress, strain, linear stress: strain law. Torsion. Simple beam analysis. Stability of equilibrium, buckling. Prerequisite, junior standing.

### **Courses for Graduates Only**

### CIVE

### 504 Public Works—Finance, Policy, and Programming (3) W

HENNES, HORWOOD

Research seminar in the study of public works planning and evaluation systems, particularly emphasizing programming and review processes and social, political, and environmental concerns. Students select topics in their areas of public works interest.

### CIVE

### 505 Economic Analysis of Public Works (3) A HENNES

The use of benefit cost ratio, rate of return, and maximization of benefits as criteria in project justification, cost allocation, and selection among engineering alternatives in the design and construction of public works. (Formerly CETC 505.)

### CIVE

### 540, 541, 542 Social Management of Technology I, II, III (3,3,3) A,W,Sp WENK

Analysis of the interaction of technology and society through general principles and case studies of contemporary issues and public policy: the nature of the technological enterprise, its scientific base, ingredients of capital, specialized manpower, organizational structure and management; employment of public and private institutions; policy planning to generate, utilize, and manage technology so as to maximize opportunities and minimize unwanted consequences; institutional conflicts; development of goals, strategies, program priorities, and policies; legal and economic considerations; processes of public decision making. Prerequisite, permission. Offered jointly with the Graduate School of Public Affairs as Public Policy 540, 541, 542.

#### CIVE

### 543 Marine Technology Affairs (3) Sp WENK

Case studies in marine legislation, fishery conventions, coastal pollution, oil and gas extraction, environmental observations, planning for international exploration of the sea, federal organizations, etc., to identify components in the marine technology enterprise, dynamics of interrelationships, externalities, policy planning and institutional conflicts in setting goals, priorities, and program strategies. Prerequisite, CIVE 540.

### CIVE

700 Master's Thesis (\*) AWSpS

CIVE

800 Doctoral Dissertation (\*)

### STRUCTURAL ENGINEERING AND ENGINEERING MECHANICS

### **Courses for Undergraduates**

CESM

470 Advanced Mechanics of Materials I (3) ASp

General theory of torsion and bending of straight and curved beams; beams on elastic foundations and beam-columns. Prerequisite, CIVE 393 or permission.

### CESM

#### 472 Stability and Plastic Analysis (3) Sp Elements of structural stability and pla

Elements of structural stability and plastic analysis. Stability of columns and beamcolumns in the elastic and inelastic ranges. Stiffness and flexibility matrices and their applications to buckling. The basic hypotheses of simple plastic analysis, upper- and lower-bound solutions, interaction diagrams, and the effects of incremental loading and geometry changes. Prerequisite, CIVE 380.

### CESM

### 477 Structural Design through Model Studies (3) W

ALBRECHT, MATTOCK

Theory of models, dimensional analysis, direct model analysis; studies employing specific materials, techniques of testing and measurement. Offered jointly with the Department of Architecture as Architecture 521. Prerequisite, permission.

### CESM

### 481 Bridge Design (3) Sp HAWKINS

Design of highway bridges. Design considerations; planning; characteristics of different types, economy, esthetics, loading, vibration, deflection, distribution of loads to slabs and girders. Design of typical slab and beam bridge in accordance with AASHO specifications and orthotropic plate analysis. Prerequisite, senior standings

### CESM

### 482 Advanced Reinforced and Prestressed Concrete (3) W

BIRKELAND, HAWKINS, MATTOCK, MITTET Analysis, design, and construction of reinforced and prestressed concrete structures. Prerequisite, CIVE 381.

### CESM

## 483 Design of Steel Structures (3) ASp

CLANTON, NICHOLLS, VASARHELYI Design of steel structures, structural steels, manufactured products, and fabrication methods. The design of members and structural systems for various load conditions accepted in practice. Prerequisite, CIVE 381.

### CESM

### 484 Design of Reinforced Concrete Structures (3) AW

HAWKINS, MATTOCK, MITTET

Fundamentals of design of buildings in reinforced concrete in accordance with current codes and practices. Prerequisite, CIVE 381.

#### CESM

### 485 Applied Structural Analysis (3) AW Classical and matrix methods of structural analysis for static loading. Introduction to the

analysis for static loading. Introduction to the dynamic analysis of structures. Prerequisite, CIVE 380.

### CESM

### 486 Design of Timber Structures (3) W CLANTON

The design and construction of timber structures, using elements made of sawn wood, glued-laminated wood, and plywood. Prerequisite, CIVE 381.

### CESM

### 487 Structural Unit Masonry (3) Sp LEBERT, MATTOCK

Structural behavior and design of reinforced brick, tile, and unit concrete masonry structures. Offered jointly with the Department of Architecture as Architecture 426. Prerequisite, CIVE 381 or permission.

### CESM

### 494 Introduction to the Mechanics of Continuous Media (3) WSp EVANS, HARTZ

A rigorous development of the basic equations of motion of elastic solids and Newtonian fluids through the use of vectors and Cartesian tensors, mechanical behavior of materials, problems in linear elasticity and fluid statics and dynamics. Prerequisites, Engineering 230, Engineering 240, CIVE 342 or Aeronautics and Astronautics 300, or permission.

### CESM

### 498 Special Topics: Structural Engineering

and Engineering Mechanics (1-5) AWSpS Special topics in civil engineering offered as course with lecture and/or laboratory. Prerequisite, permission of Department Chairman. A maximum of 6 credits may be applied toward an undergraduate degree.

### CESM

### 499 Special Projects: Structural Engineering and Engineering Mechanics (1-5) AWSpS

Individual undergraduate research projects. Prerequisite, permission of Department Chairman. A maximum of 6 credits may be applied toward an undergraduate degree.

## **Courses for Graduates Only**

## CESM

## 520 Seminar (1, max. 6) AWSp

Prerequisite, permission of thesis supervisor.

## CESM

### 571 Advanced Mechanics of Materials II (3) W

Theory of stretching and bending of plates. Introduction to membrance theory of shells. Prerequisite, CESM 470 or permission.

### CESM

### 572 Advanced Mechanics of Materials III (3) Sp

Theory of elastic stability of columns, frames, and arches. Introduction to inelastic stability. Buckling of frameworks. Lateral and torsional buckling of beams. Stability of plates and shells. Prerequisite, CESM 470 or permission.

## CESM

### 573 Structural Mechanics I (3) A HARTZ

Matrix methods in structural mechanics. Review of basic structural theory. Principle of virtual work. Development of basic matrix force (flexibility) and displacement (stiffness) methods of structural analysis. Prerequisite, graduate standing or permission.

### CESM

### 574 Structural Mechanics II (3) W HARTZ

Dynamic response of structures using mode superposition and matrix methods. Lumped and distributed parameter systems. Application to earthquake, moving and blast loads. Approximate and numerical methods. Prerequisite, CESM 573 or permission.

### CESM

575 Structural Mechanics III (3) Sp HARTZ

Variational and energy methods in structural and solid mechanics. Application of calculus of variations and minimal principles of mechanics to nonlinear structural analysis, elastic stability, theory of elasticity, plates and shells, and vibrations. Prerequisite, CESM 574 or permission.

### CESM

#### 576 Theory of Plates and Shells (3) A ELIAS

General theory of thin shells. Membrane and bending behaviors. Application to axisymmetric shells, shallow translational shells, and circular cylindrical shells. Prerequisite, graduate standing or permission.

### CESM `

### 577 Finite Element Methods in Structural Mechanics (3) Sp

HARTZ

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, CESM 573 or permission.

#### CESM

### 579 Introduction to Structural Design Optimization (3) Sp

Introduction to structural design optimization. Linear programming, dynamic programming, and gradient techniques. Application to both linear and nonlinear problems. Prerequisite, graduate standing or permission.

### CESM

### 580 Strain Measurements (3) W VASARHELYI

Experimental determination of strain under static and dynamic loads; mechanical, optical, and electrical strain gauges; transducers for displacement, velocity and acceleration; photoelasticity, strain rosette, brittle coating and other methods; problems of instrumentation, and analysis of data. Prerequisite, graduate standing or permission.

### CESM

### 582 Advanced Structures II (3) W VASARHELYI

Analysis of trussed structures. Deflections and secondary stresses. Influence lines. Strain energy theorems, flexibility matrix, specialized computer programs. Prerequisite, CESM 573 or permission.

### CESM

### 583 Advanced Structures III (3) Sp VASARHELYI

Curved members and arches. Approximate and rigorous methods. Strain energy theorems, flexibility matrix, specialized computer programs. Prerequisite, CESM 573 or permission. CESM

### 584 Plastic Design of Steel Structures (3) W VASARHELYI

Plastic (inelastic) behavior of structural steels. Applications to the design of structural members and systems. Upper- and lower-bound theorems, minimum weight design. Limitations and economy of the procedure. Prerequisite, graduate standing or permission.

#### CESM

585 Advanced Design of Concrete Structures (3) Sp

### MATTOCK

Advanced topics in the design of reinforced and prestressed concrete structures. Design of cast-in-place and precast statically indeterminate prestressed concrete structures. Design of prestressed concrete flat plate structures. Unusual design problems in reinforced concrete structures; e.g., combined torsion, bending, and shear, etc. Prerequisites, CESM 482, 484, or similar basic courses in design of prestressed and reinforced concrete.

### CESM

586 Structural Materials and Design (3) W HAWKINS

A critical review and discussion of the mechanical properties of structural steel, structural aluminum alloy, and reinforced concrete which affect structural design. Fatigue and impact in metal structures. Failure of structures and structural members. Prerequisite, graduate standing in civil engineering.

#### CESM

## 587 Advanced Design of Steel Structures

(3) Sp vasarhelyi

Broad review of the factors influencing the function of a structure, such as material properties and fabrication methods. Welded, riveted and bolted connections. Particular problems of welded structures. Design projects. Prerequisite, CESM 586 or permission.

### CESM

### 588 Behavior of Concrete Members (3) A MATTOCK

Behavior of structural concrete members subject to long- or short-term loading by axial force, bending, shear, and torsion. Prerequisite, CESM 484.

#### CESM

### 589 Behavior of Concrete Structures (3) W MATTOCK

Behavior under load of concrete structures; continuous beams, frames, and slabs. Effect of creep and shrinkage on the behavior of structures. Prerequisite, CESM 588.

### CESM

590 Structures Under Wind (3) W HARTZ

Fundamental principles governing the static or

dynamic response of suspended structures, transmission lines, tall stacks, and other flexible structures subject to deflection, overturning, or oscillation as a result of wind action. Prerequisite, graduate standing in engineering.

## CESM

### 591 Theory of Elasticity I (3) Sp

Elementary formulation of linear elasticity using indicial notation. Use of Airy stress function for solution of plane elasticity problems in rectangular and polar coordinates. Saint Venant's theory of torsion. Elementary treatment of thermal stress problems. Energy methods. Prerequisite, graduate standing in engineering.

### CESM

### 592 Theory of Elasticity II (3) A ELIAS, EVANS, HARTZ

Rigorous formulations of classical theory making use of Cartesian tensor analysis. Stress functions. Use of potential theory to obtain solutions in terms of Papkovitch functions. Prerequisite, Aeronautics and Astronautics 530 or Mechanical Engineering 551, or permission.

### CESM

### 593 Theory of Elasticity III (3) W ELIAS, EVANS, HARTZ

Further topics in elasticity theory, including the Muskhelishvili method for plane elastostatics, integral transforms, contact problems, and finite elastic deformations. Prerequisites, CESM 592 and Aeronautics and Astronautics 580.

### CESM

### 594 Wave Propagation in Solids (3) W EVANS, HARTZ

Dynamic formulation of the theory of elasticity; elastic waves in two- and three-dimensional solids; elastic waves in rods, beams, and plates; plastic and viscoelastic wave propagation in solids. Prerequisites, CESM 574 or equivalent and 592, or permission.

### CESM

### 599 Special Topics: Structural Engineering and Engineering Mechanics (2-5, max. 15) AWSpS

Prerequisites, permission of instructor and department chairman.

### CESM

600 Independent Study or Research: Structural Engineering and Engineeringg Mechanics (\*) AWSpS

### TRANSPORTATION, CONSTRUCTION, AND GEOTECHNICAL ENGINEERING

### **Courses for Undergraduates**

### CETC

### 310 Forest Highway Location and Design (5) Sp

SAWHILL

Reconnaissance, preliminary, and location surveys for forest highways. Earthwork computations, with and without use of electronic computers. Testing of road constructional materials and subgrade soils. Design of roadway elements. Not to be taken for credit by civil engineering majors. Prerequisites, Engineering 161 and Mathematics 125.

#### CETC

### 401 Highway and Traffic Engineering Functions (3) AS SAWHILL

Historical development of highway transpor-

## ENGINEERING

tation in the United States and significant legislation in its development, including federal, state, and local programs. An overall view of traffic engineering in relation to planning, design, operations, administration, safety, and research. Prerequisite, graduate or senior standing. (For students in traffic safety education. Not approved for students with credit for CETC 410.)

### CETC

### 405 Critical Path Methods of Project Scheduling (2) AWSp

HORWOOD

Precedence analysis of project activities. The Critical Path Method (CPM) and time-cost algorithms. Program Evaluation and Review Techniques (PERT). Project exercises and computer applications. Prerequisite, Mathematics 105.

### CETC

### 406 Construction Engineering (3) W MEESE

An introduction to construction engineering, including such topics as selection of equipment, work analysis, and the role of the engineer in heavy construction operations. Prerequisite, senior standing in engineering or permission.

### CETC

### 407 Contracts and Specifications (3) AWSp SECREST

Specification writing and the elements of contract law relating to heavy construction and engineering services. Prerequisite, junior standing.

### CETC

### 410 Traffic Engineering—Fundamentals (3) A SAWHILL

General review of scope and functions of traffic engineering including its relation to urban planning, municipal engineering, motor vehicle registration, safety, and administration. Prerequisite, senior or graduate standing in engineering, or permission.

### CETC

### 413 Highway Capacity and Traffic Flow

Theory (3) W

SAWHILL

Modern practices in the estimation of street and highway capacity; mathematical models; application of queuing theory to traffic events. Prerequisite, senior or graduate standing in engineering.

### CETC

### 415 Photogrammetry (3) AS COLCORD, VERESS

Geometrical characteristics of photographs. Planning and control considerations for mapping in terrestrial, aerial, and underwater environments. Theory of stereoscopy and parallax measurement. Photogrammetric instrumentation. Evaluation of accuracies and error sources. Prerequisite, CIVE 316 or permission. (Offered Winter Quarter in evennumbered years.)

### CETC

## 417 Cadastral Surveys (3) WS

COLCORD

Boundaries; the system of public lands; adverse and riparian rights; subdivision design and site planning. Professional ethics.

### CETC

### 419 Celestial Methods in Geodesy (3) Sp COLCORD

Concepts of time and the celestial sphere.

Determination of time, latitude, longitude, and azimuth for geodetic and control surveys. Sources of error. Introduction to satellite observations and methods.

### CETC

### 421 Transportation Engineering II (3) WSp EKSE, HENNES

Physical elements of transportation facilities: roadbed, drainage, pavement, railways, runways, waterways, and other design components of transportation systems. Prerequisites, CIVE 320, 345.

### CETC

## 424 Pavement Design (3) Sp

TERREL Current rational pavement design procedures. Viscoelastic behavior of flexible pavements. Layered systems. Elastic slab theory, considering such factors as temperature and warping stresses. Other elements of highway design. Prerequisite, senior standing in civil engineering.

### CETC

#### 425 Introduction to Urban Transportation (3) Sp HORWOOD

Identification of the framework, central con-

cepts, constraints, and issues of the urban transportation planning problem. Offered jointly with the Department of Urban Planning as Urban Planning 425.

### CETC

### 430 Map Projections (3) W VERESS

Classification of projections, theory of distortion. Projection from ellipsoid to sphere. Theory of conformal projections (Lambert, Mercator, stereographic). Equal area projections. Polyconic and other projections. Offered jointly with the Department of Geography as Geography 430. Prerequisite, permission. (Offered odd-numbered years.)

### CETC

# 463 Structure of Materials (3) W

Exploration and development of those aspects of material science applicable to civil engineering. The nature of metals, ceramics, polymers, and composites in terms of thermal, chemical, physical, and mechanical properties. Metallurgy of fracture. Laboratory optical techniques. Prerequisite, CIVE 363.

### CETC

### 467 Soil Mechanics II (3) A MEESE

Fundamental principles of soil mechanics, with emphasis on problems involving plastic equilibrium and seepage forces. Prerequisite, CIVE 366.

#### CETC

### 498 Special Topics: Transportation, Construction, and Geotechnical Engineering (1-5) AWSpS

Special topics in civil engineering offered as course with lecture and/or laboratory. Prerequisite, permission of department chairman. A maximum of 6 credits may be applied toward an undergraduate degree.

#### CETC

### 499 Special Projects: Transportation, Construction, and Geotechnical

Engineering (1-5) AWSpS

Individual undergraduate research projects. Prerequisite, permission of department chairman. A maximum of 6 credits may be applied toward an undergraduate degree.

### **Courses for Graduates Only**

### CETC

### 500 Transportation Safety—Introduction Seminar (1) A

SAWHILL

A general review of all aspects of transportation safety, reflecting federal, state, and local safety programs; motor vehicle and driver administration, enforcement, courts, traffic engineering, insurance, and public support. Prerequisite, graduate standing or permission.

### CETC

### 502 Transportation Safety—Highway Design and Traffic Control (3) SpS

SAWHILL A review of roadway and intersection design elements as related to accident rates. The role of traffic control devices, illumination, and traffic characteristics in highway safety. A review of research and identification of future research needs. Prerequisite, senior or grad-

### CETC

uate standing.

### 510 Traffic Engineering—Analysis (3) A SAWHILL

Measurement and evaluation of characteristics of vehicular volume, speed, travel time, delays, and travel desires. Parking studies and computer analysis of traffic engineering studies. Prerequisite, CETC 410 or permission.

### CETC

### 511 Traffic Engineering—Administration and Safety (2) W

SAWHILL Comprehensive review of Uniform Vehicle Code and Manuals on Uniform Vehicle Control Devices. Warrants and uses of signs, signals, markings, and channelization. Traffic engineering administration, federal, state, county, and municipal. Prerequisite, CETC 410 or permission. (Formerly Civil Engineering 511.)

#### CETC

### 512 Urban Traffic Planning (3) Sp

(3) Sp

## SAWHILL

A general review of studies and data associated with planning and preliminary design for access facilities serving downtown areas and special generators, such as shopping centers, universities, stadia, parking structures, etc. An urban design team project course. Prerequisite, senior or graduate standing in engineering or urban planning.

### CETC

### 513 Highway and Traffic Engineering— Geometric Design (3) Sp

SAWHILL

Factors and elements in the geometric design, of arterials, freeways, intersections, interchanges, and parking facilities. Special design studies and reports. Prerequisite, senior or graduate standing in engineering.

### CETC

### 515 Stereo-Photogrammetry (3) W VERESS

Theory of orientation; mathematical concept of relative and absolute orientation for vertical and convergent photography. Error propagation and corrections. Accuracy element of orientation. Critical surfaces. Standard residual Y-parallaxes. Prerequisites, CETC 415, 530.

### CETC

### 516 Analytical Photogrammetry (3) W VERESS

Basic principle of analytical photogrammetry. Stereo comparators and the analytical plotter. Reduction of plate coordinates. Perspectivity. Colinearity, coplanarity, space coordinate systems, transformations. Space intersection and resection and their adjustments. Solutions using high speed electronic computers. Prerequisites, CETC 415, 530.

### CETC

### 518 Aerial Triangulation (3) Sp VERESS

Radial aero-triangulation; instrumental aerial triangulation by independent pairs, aero-polygon, aero-leveling, and independent geodetic control methods. Semi-analytical aero-triangulation. Mathematical strip and block adjustment. Analytical aero-triangulation methods. Prerequisites, CETC 515, 516.

#### CETC

520 Seminar (1, max. 6) AWSp Prerequisite, permission of thesis supervisor.

#### CETC

#### 522 Transportation Systems (3) A EKSE, HENNES

Interregional highways, state trunk lines and local roads; their functions and appropriate standards of design. The characteristics of road, rail, water, and air transport in relation to selection and design of the facility. Pipeline and conveyor transportation. Prerequisite, graduate standing in engineering or permission.

### CETC

### 523 Transportation Terminals (3) W EKSE, HENNES

Coordination of transportation facilities. Port and harbor installations. Airports. Rail belt lines and terminals. Prerequisite, graduate standing in engineering or permission.

#### CETC

### 524 Rapid Transit (3) Sp

EKSE, HENNES

Engineering problems in the mass movement of people in metropolitan areas. Demand in relation to level of service. Equipment. Route selection. Running time. Station spacing. Prerequisite, graduate standing in engineering or permission.

### CETC

#### 525 **Transportation and Land Use Planning** Models (3) A SCHNEIDER

Theory underlying land use and transportation planning models. Past attempts to model urban development. Modeling of alternatives. Forecasting technological innovation, assessing land use implications. Offered jointly with the Department of Urban Planning as Urban Planning 525. Prerequisite, CETC 425 or permission.

### CETC

#### **Transportation Studies, Model** 526 Calibration, and Network Flow (3) Sp SCHNEIDER

Review of the organization of regional transportation studies, including the functions of engineers, planners, and others. Examination of transportation and land-use models as applied to transportation studies and analysis of current models. Application of technology of traffic assignment to transportation networks, with problems of tree building, network flow, restrictions and system optimization by computer. Prerequisite, graduate standing or permission.

### CETC

Information Systems for Planning and 527 Research (3) A HORWOOD

Computer programming technology and data systems designed for large scale data inputs. Machine editing, data manipulation, and retrieval. Laboratory problems adapted to specialized interests of students. No previous computer programming experience required. Offered jointly with the Department of Geography as Geography 527 and the Department of Urban Planning as Urban Planning 527.

### CETC

### 528 Automated Mapping and Graphing (3) W HORWOOD

Computer applications to statistical and areal analysis. Laboratory problems adapted to specialized interests of students. Offered jointly with the Department of Geography as Geography 528 and the Department of Urban Planning as Urban Planning 528. Prerequisite, basic statistics, CETC 527, or permission.

#### CETC

### 529 Computer Applications to Urban and **Regional Analysis (3) Sp** HORWOOD

Simulation models and automated systems for the study of land use and related economic and demographic data. Machine methods of planning analysis and feedback review. Laboratory projects. Offered jointly with the Department of Geography as Geography 529 and the Department of Urban Planning as Urban Planning 529. Prerequisite, CETC 528 or permission.

### CETC

#### Adjustment Computations (4) A 530 VERESS

Two- and multi-dimensional distributions and concept of errors, variances, co-variances, weight and error propagation. Least square adjustment by variation of parameters and other methods. Adjustments of hybrid systems using matrix notation inversion by high speed computers. Prerequisite, permission.

### CETC

531 Geodesy (3) A

COLCORD

Introduction to gravimetric and geometric geodesy. Potential attraction, gravity observa-tion and reduction. Properties of the ellipsoid and geoid and computations of geodetic position and distances. Prerequisite, permission.

### CETC

### 535 Airport Systems Planning (3) W SHINN

Investigation of physical, sociopolitical, and economic features of air transportation system planning. Emerging technologies. Inter-modal relationships. The decision-making environment for resource allocation, land-use planning, programming, and organization. of anticipated conflict resolution Scenarios problems. Offered jointly with the Department of Urban Planning as Urban Planning 535. Prerequisites, CETC 425, Urban Planning 400, or permission.

### CETC

537 Electronic Surveying I (3) W COLCORD, HARRISON

Fundamentals of electronics. Receivers, an-

tennae, radar equation, lasers, circular, hyperbolic and other methods. Radar, linescan radar, radio and laser altimeters. Theory of geodimeter, tellurometer, electrotape, and other electronic surveying equipment. Prerequisite, permission.

### CETC

#### 538 Electronic Surveying II (3) Sp VERESS

Relation of doublepath propagation to phase measuring technique. Curvature of ray path. Propagation velocity. Distance reduction. Long-line measurement. Control point extension. Trilateration adjustment. Hydrographic surveying applications. Prerequisites, CETC 530, 537.

### CETC

### 565 Remote Sensing of Environment (3) W COLCORD

Use of aerial photographs, multispectral imagery, and other sensors for object evaluation and environment studies. Factors in system and target signature evaluation. Prerequisite, permission.

### CETC

### 566 Engineering Properties of Clay (3) A SHERIP

Shearing strength, consolidation character-istics, structural concepts, rheological behavior, and related properties of clay. Prerequisite, CIVE 366.

### CETC

### 567 Stresses in Earth Masses (3) W SHERIP

Stress function. Stress-strain analysis within elastic range with emphasis on soil/water systems. Stress distribution under various loadings. Prerequisites, CETC 467 and Mathematics 324, or permission.

### CETC

568 Seepage and Slope Stability (2) W MRESE

Analysis of groundwater flow, using relaxation, matrix and finite-element methods. Slope stability analysis, considering seepage forces and pore-water pressures. Prerequisites, CETC 467, 566.

### CETC

### 569 Applied Soil Mechanics (3) Sp HENNES, MEESE

Passive pressure and bearing capacity theories. Foundation soils engineering project to develop design recommendations and performance estimates for deep and shallow foundation schemes. Prerequisite, CIVE 366.

### CETC

#### Special Topics: Transportation, 599 **Construction**, and Geotechnical

Engineering (2-5, max. 15) AWSpS

Prerequisites, permission of instructor and department chairman.

### CETC

600 Independent Study or Research-Transportation, Construction, and Geotechnical Engineering (\*) AWSpS

### WATER AND AIR RESOURCES

### **Courses for Undergraduates**

CEWA

### 441 Intermediate Fluid Mechanics (3) A HUNT, RICHEY

Potential flow, boundary layer mechanics, generalized similarity problems, introduction

to mixing processes. Application of equations of motion and control volume concepts. Prerequisite, CIVE 345 or permission.

### CEWA

### 442 Introduction to Hydraulics in Water **Resources (3) Sp**

NECE

An introduction to the physics of water movements in natural freshwater bodies and inshore marine waters. Brief review of some essential fluid mechanics. Flow in rivers and streams; surface water hydrology. Motions in lakes, reservoirs, and estuaries as related to water and heat budgets. Some aspects of diffusion. Instrumentation and procedures for obtaining field data. Not open to students with undergraduate civil engineering backgrounds. Prerequisites, senior or graduate standing and permission.

### **CEWA**

### 444 Coastal Engineering I (3) W RICHEY

Linear theory of water waves, wave transfor-mations due to boundary conditions, sediment motion, elementary tidal theory; applications illustrated by case histories selected to show the interaction with environmental facets of coastal problems. Prerequisite, CIVE 342.

### CEWA

445 Hydraulic Machinery (3) W CHENOWETH

Application of hydraulic principles to the design and function of hydraulic machinery, with emphasis on centrifugal pumps. Hydraulic transients in penstocks and force mains, including use of digital computer in analyzing such conditions. Prerequisite, CIVE 345.

### CEWA

#### 447 Physical Hydrology (3) W

BURGES, RICHEY

Global water picture, data sources and data homogeneity, precipitation, evapotranspiration, flow to wells, hydrographs, storm and snowmelt, runoff, streamflow routing, unit hydrographs, frequency studies. Hydrologic design: storage reservoirs; flood mitigation; drainage; introduction to deterministic and stochastic models.

## CEWA

### 448 Open-Channel Engineering (3) Sp STRAUSSER

The transportation of water by gravity flow. Analysis and design of canals, transitions, energy dissipators, and similar structures. Analysis of surface profiles and effect of nonlinear alignment on flow. Design-oriented problems in open-channel hydraulics. Prereq-uisite, CIVE 345.

## CEWA

### 450 Man and Pollution 'of His Environment (3 or 5) ASp CHRISTMAN

Description of growing problems of air, water, and land pollution that the engineer must define and solve if the quality of man's en-vironment is to be maintained. The quantity and quality of present production of wastes; their known environmental effects; practical methods of control; prospects for the future. The essential team approach to these engineering problems is stressed, noting the in-terrelationship of physical, chemical, and biological causes and effects. Students must register for minimum of 3 credits; 5-credit registration optional with additional term project. Primarily for nonengineering students. Prerequisite, junior standing.

## CEWA

### 451 Environmental Engineering Design (3) AW

BOGAN, CARLSON, SYLVESTER

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 computer programs for designing basic system elements. Prerequisite, CIVE 350.

## CEWA

### 452 System Engineering Fundamentals (3) ASp

MAR Development of scientific methods for the tasks of problem definition, goal setting, system synthesis, system analysis, and decision making necessary in the application of the system approach to complex environmental problems. These methods consider social, political, and institutional factors as part of the

## system. CEWA

#### 453 Water and Waste-Water Treatment BOGAN, CARLSON, SYLVESTER

Objectives of water and waste-water treatment; associated physical, chemical, and biological phenomena; design of common treatment systems. Prerequisite, CEWA 451 or permission.

### CEWA

#### 454 Sanitary Engineering Design Studies (3) Sp ROGAN

Individual and group design studies involving local communities. Application of the principles and methods presented in CEWA 451. Preparation of comprehensive plans and of preliminary design and cost studies for urban water supply, sewerage and drainage, and solid-waste collection systems. Presentation of engineering reports dealing with selected design problems. Prerequisite, CEWA 451, which may be taken concurrently.

### CEWA

### 455 Ecological Effects of Waste Water (4) A WELCH

Principles of aquatic ecology with emphasis on aspects related to water quality problems and methods of measuring associated biological changes. Topics include nutrient cycles, autotrophic and heterotrophic metabolism, environmental factors that affect planktonic and benthic plants, and effects of various types of wastewaters on benthic and nektonic animals. Prerequisite, senior or graduate standing.

### **CEWA**

#### The Chemistry of Natural Water 456 Systems (3) ASp CHRISTMAN

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 waste waters. Prerequisite, one year of general chemistry or equivalent.

### CEWA

### 457 Water Quality Analysis (3) W CHRISTMAN

Laboratory evaluation of chemical quality of

natural and waste waters. Theory and application of instrumentation used in waterquality measurement.

### **CEWA**

#### 458 The Chemistry of Air Pollution (3) A CHARLSON

The analytical and physical chemistry of trace atmospheric constituents, both natural and man made. Lecture and laboratory. Prerequisite, Chemistry 160 or equivalent.

### CEWA

#### Air Microbiology (3) W 459

ROSSANO

The collection, distribution, and survival of the atmospheric microbial content will be discussed in lecture and studied in the laboratory. Pertinent aspects of medical and agricultural air microflora will be considered. Prerequisite, CEWA 455 or equivalent, or Microbiology 400, or permission.

## CEWA

### 461 Air Resources Engineering I (3) ASp ROSSANO

Fundamental aspects of air pollution. Analysis of interrelationship between the essential factors of emission sources, meteorology, and topography and adverse effects on sensitive receptors. Review of the principles of air-pollution control, with emphasis on engineering approaches. Prerequisite, CIVE 350 or equivalent or permission.

## CEWA

### 466 Air Pollution Control (4) W PILAT

Overall approach for controlling air pollution. Definition of the problem, including identification of air pollutants, atmospheric dilution capacity, emission sources, and detrimental effects. Factors involved in air resources engineering: legal aspects, air pollution control legislation and regulation, processes and equipment for controlling emissions of gaseous and particulate air pollutants. Case studies of specific air pollution problems. (Primarily for nonengineering students.) Prerequisite, sophomore standing.

### CEWA

### 467 Air Pollution Source Testing and Equipment Evaluation (3) Sp PILAT

Engineering evaluation of air pollutant sources and air pollution control equipment. Air pollutant source testing and stack sampling. Analysis of equipment performance and source emissions in the field and in the laboratory. Prerequisites, junior standing and permission.

### CEWA

### 470 Solid Wastes Disposal (3) A CARLSON

For students majoring in the solid wastes program and an elective for undergraduate and graduate engineers and urban planners covering the sources and the handling of industrial, municipal, and agricultural wastes, with examination of processing, by-product recovery, and waste treatment methods, particularly those of biological systems. The role of urban and industrial planning and of collection and transportation aspects in solid wastes production and disposal is discussed, especially as related to community location and planning and to methods of hauling and controlling wastes concentration and utilization. Laboratory composting studies.

### CEWA

#### 485 Sampling Techniques for Water Quality (3) Sp WELCH

Collection and analysis of water for selected abiotic and biotic characteristics in lakes, rivers, and estuaries. Emphasis is placed on the natural variability of water quality characteristics as determined by application of appropriate field sampling techniques and data analysis with the objective of designing adequate sampling programs. Prerequisite, CEWA 457 or permission.

### **CEWA**

### 487 Industrial Waste Management (3) W DAVID, MAR, PILAT

Application of chemical engineering concepts to industrial-waste management and to the analysis of constraints and criteria encountered in such application. It includes design of biological and physical control systems, as well as nontreatment alternatives. Offered jointly with the Department of Chemical Engineering as Chemical Engineering 487. Prerequisite, senior standing in chemical engineering or civil engineering or permission.

### **CEWA**

498 Special Topics—Water and Air Resources (1-5) AWSpS

Special topics in civil engineering offered as course with lecture and/or laboratory. Prerequisite, permission of department chairman. A maximum of 6 credits may be applied toward an undergraduate degree.

### CEWA

499 Special Project—Water and Air Resources (1-5) AWSpS

Individual undergraduate research projects. Prerequisite, permission of department chairman. A maximum of 6 credits may be applied toward an undergraduate degree.

### **Courses for Graduates Only**

### CEWA

520 Seminar (1, max. 6) AWSp

Required of all graduate students in the Water and Air Resources Division each quarter.

### CEWA

### 525 Seminar in Atmospheric Problems Associated with Air Pollution (2) W BADGLEY, CHARLSON

Seminar for both engineers and atmospheric scientists in the atmospheric problems related to air pollution. A wide variety of topics is covered. Faculty lectures and student participation. Offered jointly with the Department of Atmospheric Sciences as Atmospheric Sciences 525. Prerequisites, CEWA 461 and Atmospheric Sciences 301 or Geophysics 403.

### **CEWA**

#### 528 Acoustics of Environmental Noise (4) A CHALUPNIK

Introduction to the measurement and the evaluation of environmental noise. Covers mathematical, physical, and psychological aspects of community noise; includes sources, scales for rating, propagation, and control of noise. Laboratory demonstration of lecture principles. Offered jointly with the Department of Mechanical Engineering as Mechanical Engineering 528. Prerequisite, permission.

## CEWA

#### 541 Hydrodynamics in Water Quality (3) A NECB

Theoretical, field study, and laboratory model

approaches to mixing, diffusion, thermal effects, and stratified flow in problems of concern to water resources engineers. Prerequisite, CIVE 342 or permission.

### **CEWA**

542 Hydrodynamics I (3) W HUNT, NECE

Fundamentals of fluid potential motion. Twoand three-dimensional flow examples, including free surface flows. Conformal mapping, other solution techniques. Prerequisite, CIVE 342 or equivalent.

### CEWA

### 543 Hydrodynamics II (3) Sp HUNT, NECE

Fundamentals of the flow of a real fluid. Viscous flows; the Navier-Stokes equations, and some exact solutions. Boundary layer theory. Introduction to turbulence and diffusion. Prerequisite, CEWA 542 or permission.

### CEWA

#### 544 Coastal Hydraulics (3) Sp RICHEY

The mechanics of waves, their prediction and interaction with coastlines, estuaries, and engineering installations. Prerequisite, major in engineering or physical sciences.

### CEWA

### 545 Groundwater Flow

HUNT

The application of Darcy's law to steady-state problems in groundwater flow. The fundamentals of Dupuit's theory and the techniques of conformal mapping are applied to obtain solutions for both confined and unconfined flows. Typical applications covered in the course include flow toward wells and seepage through earth dams, under concrete dams and sheet piles, and from rivers, canals, and irrigation ditches. Prerequisite, Mathematics 126 or equivalent.

### CEWA

### 547 Advanced Hydrology (3) W BURGES

Detailed treatment of statistical methods used in hydrologic analysis. Stochastic hydrology, detailed examination and use of a deterministic watershed model (Stanford Watershed Model). Economic aspects of hydrologic design. Prerequisite, graduate standing or permission.

### CEWA

### 549 Experimental Hydrodynamics (3) W NECE, RICHEY

Experimental studies of steady and unsteady flow phenomena. Model tests as used in hydraulic design. Instrumentation and experimental techniques. Prerequisite, CEWA 441 or permission.

### CEWA

### 550 Biological Waste Treatment (3) W CARLSON

Biological treatment processes and systems used in water quality control. Biological and engineering considerations of waste water treatment, including theory, purpose, evaluation, and design of secondary and tertiary processes.

### CEWA

# 551 Sanitary Engineering Unit Operations(3) W

BOGAN

Major unit operations employed in water and waste treatment, including solids separations, filtration, chemical coagulation, ion exchange, and gas transfer and adsorption. Theory and basic principles. Development of mathematical models and evaluation of current design criteria and methods. Prerequisite, CEWA 456 or permission.

### CEWA

### 552 Design of Water and Waste Treatment Processes (3) Sp

CARLSON, BOGAN

Selection and functional design of water and waste treatment processes to satisfy specific requirements. Comprehensive design of a specific process selected by the student, including process equipment selection, plant layout, site development, and cost studies. Introduction to the use of mathematical models, computer simulation techniques and systems analysis methods in the design of treatment processes.

### CEWA

### 553 Topics in Ecological Effects of Waste Water (3) W

WELCH

Application of ecological concepts for analysis and interpretation of bioenvironmental problems and data from inland and coastal waters. Students participate in presentation and discussion of current research on selected topics. Prerequisites, CEWA 455, CEWA 456, or permission.

### CEWA

### 554 Advanced Process Chemistry for Sanitary Engineers (3) W CHRISTMAN

Properties of colloidal systems, natural, and synthetic organic materials encountered in water and waste water treatment, and laboratory methods for their analysis. Prerequisite, CEWA 456 or permission.

### CEWA

### 555 Topics in Computer Simulation of Environmental Engineering Systems (3) Sp

Discussion of mathematical models and computer programs for simulating processes and systems of interest to engineers in the field of environmental pollution control and the related areas of air and water resources, solid wastes management, and water and waste treatment. Intended for the graduate student who has acquired a fundamental understanding of the principal processes and systems of concern to his major field. No previous computer programming experience necessary. Class problems and term assignments adapted to the student's special interests.

### CEWA

#### 556 Industrial Waste Treatment (3) Sp CARLSON

Sanitary engineering problems relating to biological and biochemical systems influencing man's environment. Biological treatment of industrial wastes and advanced waste treatment processes. Prerequisite, CEWA 550 or permission.

#### CEWA

### 558 Water Quality Management (3) W MAR, SYLVESTER

Water quality control objectives, methods and philosophies; effect of various uses on water quality; receiving water characteristics; dispersion and behavior of pollutants; treatment required for various water usages. Prerequisites, CEWA 445, 456, or permission.

### CEWA

### 559 Water Resource Management (3) A MAR, SYLVESTER

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.

### CEWA

### 569 Topics in Environmental Health (3) A ROSSANO, WELCH

Introduction to human biology, including physiology, epidemiology, ecology, and toxicology. Study of modern environmental health problems and practices regarding radiological health, solid waste disposal, food- and vectorborne diseases, occupational health, fluoridation, biometeorology, and bioengineering.

### **CEWA**

### 562 Air Resources Engineering II (3) W ROSSANO

A study in depth of the major sources of air pollution, including analysis of flow diagrams, raw materials, off-streams, pollution control facilities, and environmental impact. Field trips to representative plants; trip reports and term paper. Prerequisite, CEWA 461 or permission.

### CEWA

### 563 Air Resources Management (3) Sp ROSSANO

The atmosphere as a vital natural resource. Administrative and legal aspects of air conservation; air quality criteria and standards; design of area-wide surveys; long-range planning. Prerequisite, CEWA 461 or permission.

### **CEWA**

### 564 Aerosol Science and Technology I (3) W

CHARLSON

Topics related to suspended particulate matter in a gaseous medium. Statistics, mechanics, and physical chemistry of aerosols. Particular reference to particulate matter in air and to experimental and engineering methods. Prerequisite, permission.

### CEWA

### 565 Aerosol Science and Technology II (3) Sp CHARLSON

A continuation of CEWA 564; light scattering, Brownian motion, diffusion and coagulation of aerosols. Prerequisite, permission.

### **CEWA**

### 566 Design of Gaseous Air Pollutant Control Equipment (5 or 3) A

PILAT

Principles and design of the physical and chemical processes employed in the removal of gaseous pollutants. Design of adsorption towers (packed and spray), absorption beds, and flame incinerators for controlling the emissions of gaseous air pollutants. Case studies of design, construction, performance, and cost of actual gaseous air pollutant control systems. Students not majoring in air resources engineering may register for 3 credits by permission.

### CEWA

#### 567 Design of Particulate Air Pollutant Control Equipment (5 or 3) W PILAT

Principles and designs of processes used to control the emission of particulate air pollutants. Design of settling chambers, cyclones, filters, wet scrubbers, and electrostatic precipitates. Design, construction, performance, and cost of actual particulate air pollution control installation. Students not majoring in air resources engineering may register for 3 credits by permission. Prerequisites, CEWA 564 and 566, or permission.

### CEWA

# 571 Solid Waste Management (3) W

Graduate workshop for engineers, applied scientists, planners, administrators, economists, and public health students to examine current solid waste planning, management, and operating practices. Teams of interdisciplinary students will be introduced to the systems approach for diagnosis of solid waste problems. Each student is required to be proficient only in his own major. The workshop will attempt to apply the results of each student's education prior to the solid waste problem. During the course the use of simulation models, information systems, and optimization methods will be introduced.

### CEWA

### 599 Special Topics: Water and Air

Resources (2-5, max. 15) AWSpS Prerequisites, permission of instructor and department chairman.

### **CEWA**

600 Independent Study or Research—Water and Air Resources (\*) AWSpS

### ELECTRICAL ENGINEERING

### **Courses for Undergraduates**

201 Introduction to Electrical Engineering (3) AWSp

Introduction to the fundamentals of electrical engineering. Topics covered include fundamentals of communication, power, electronics, and the techniques of engineering analysis and design in these areas. This course is intended as an introductory course only, and cannot be used as an electrical engineering elective. Prerequisite, Mathematics 125, which may be taken concurrently.

### 299 Special Topics in Electrical Engineering (1-5) AWSp

New and experimental approaches to basic electrical engineering. May include design and construction projects. Prerequisite, permission of department chairman.

### 301 Elements of Electrical Engineering (4) AWSp

Short course in the analysis of direct- and alternating-current circuits for nonelectrical engineering majors. Provides the background' needed for the understanding of electrical systems and electronic instrumentation. Prerequisites, Physics 122 and Mathematics 126. (To be taken concurrently with 302.)

### 302 Electrical Engineering Laboratory (1) AWSp

One three-hour laboratory each week covering fundamental electrical measurements. (To be taken concurrently with 301).

### 304 Basic Electrical Engineering Laboratory (1) AWSp

One three-hour laboratory each week covering fundamental electrical measurements. For mechanical engineering majors. Must be taken concurrently with Mechanical Engineering 363.

### 310 Electronics Laboratory I (3) AWSpS

Fundamentals of laboratory practices; fundamentals of instrumentation; switches, elementary gates, and flip-flops; elementary amplifiers, input and output impedances; use of integrated circuits and devices to typical applications, such as regulated power supplies, multipliers, operational amplifiers, and oscillators. Prerequisite, 351, which may be taken concurrently, or permission.

### 312 Electrophysics Laboratory (3) AWSpS

Two three-hour laboratory periods each week, covering topics in solid-state devices, properties of materials, energy and force, optics, acoustics, transmission of waves, guided waves, and computer applications. Prerequisites, 383, which may be taken concurrently, and 310.

### 331 Circuits and Systems I (4) AWSpS

Introduction to linear systems theory. Electrical circuits, their elements and equilibrium equations. Solution of linear differential equations by classical and Laplace transform methods. Illustrations from electrical circuits and other linear systems. Prerequisites, Physics 122, Mathematics 238.

### 333 Circuits and Systems II (4) AWSpS

Continuation of 331. System functions, complex frequency, and pole-zero properties. The sinusoidal steady-state. Energy and power. Frequency response of systems. Fourier series and introduction to Fourier integral transform. Prerequisite, 331.

### 338 Energy Transmission (4) AWSp

Lumped and distributed circuits. Steady-state and transient waves on low-loss lines. Traveling waves on dissipative lines. Natural oscillations, standing waves, and resonance. Laboratory techniques. Prerequisite, 333.

### 343 Introduction to Electromechanical Energy Conversion (5) AWSp

Fields and forces associated with the interaction of circuits in a relative motion. Analysis of lumped parameter electromechanical devices and systems. Energy conversion and power flow. Includes a weekly three-hour laboratory. Prerequisite, 381.

### 351 Electronics (4) AWSpS

Semiconductor device characteristics and circuit models; integrated circuits used for basic digital and analog applications, such as counters, amplifiers, and comparators. Prerequisites, Physics 122, Mathematics 238.

### 353 Analog Electronic Circuits (4) AWSpS

Application of semiconductor devices and semiconductor integrated circuits to analog electronic systems. Emphasis on frequency response, amplification, feedback, and power amplification. Prerequisites, 310, 333, and 351.

### 354 Analog Electronic Circuits Laboratory (1) AWSpS

A three-hour laboratory each week. To be taken concurrently with 353.

### 371 Fundamentals of Computer Operation (4) AWSp

Organization and operating principles of digital computers. Representation of information, processor components, machine operation, and data transfers. Relation of computer design to programming and computer applications. Prerequisite, 351.

## 381 Electrophysics I (4) AWSpS

Electromagnetic fields and polarization; Maxwell's equations and electromagnetic waves in linear media. Energy conversion; fluxlinkages, transformers, and electromechanical systems. Particle-probability-density waves, and atoms. Prerequisites, Physics 123, Mathematics 238.

### 383 Electrophysics II (4) AWSpS

Propagation of electromagnetic, elastic, and particle-probability-density waves in homogeneous and periodic regions. Elements of statistical mechanics. Electromagnetic properties of materials; polarization, charge transport, p-n junctions. Prerequisite, 381.

### 399 Special Topics in Electrical Engineering (1-5) AWSp

New and experimental approaches to current electrical engineering problems. May include design and construction projects. Prerequisite, permission of department chairman.

### 400 Electronic Instrumentation and Control (5) AWSp

Principles of operation and application of electronic devices, transistors, and circuits in the fields of instrumentation, control, and communication. Includes one 3-hour laboratory weekly. For nonelectrical engineering majors. Not acceptable for graduate credit in electrical engineering. Prerequisites, 301 and 302, or 304 and Mechanical Engineering 363.

### 411 Introductory Network Synthesis (3) A

Network representations 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, 333 and senior standing.

415 Computer-Aided System Analysis (3) Sp Concepts, principles, and techniques concerned with the design, testing, and application of general-purpose problem-oriented computer programs for analyzing large-scale systems. Specific attention to implementation on computers. Prerequisites, Engineering 141 and senior standing.

### 417 Introductory Stochastic Systems Analysis (4) W

Elementary concepts of probability, random variables, and random processes, with a view toward engineering systems analysis. Correlation functions and spectral analysis of random processes. Introduction to one or more of such topics as reliability theory, estimation techniques, and hypothesis testing with applications to engineering systems. Prerequisite, 333 or permission.

### 418 Introductory Communication Theory (3) Sp

Techniques of digital and analog communications; modulation coding, and noise. Examples of practical communication systems and channels, channel capacity. Prerequisite, 417 or permission.

### 421 Electroacoustics (4) A

Fundamentals of acoustics and the electroacoustical aspects of electromechanical systems. Characteristics of transducers. Synthesis of systems. Includes laboratory to be arranged. Prerequisite, 383 or permission.

## 433 Electronic Circuit Design (4) ASp

Electronic circuit design using modern electronic devices. Topics include application of integrated-circuit amplifiers and multipliers, design of solid-state amplifiers for low noise, wide bandwidth, high frequency, high power output, and the application of modulation theory to modern systems. The design aspect of solid-state electronic circuitry is emphasized. Prerequisite, 353.

### 439 Applied Electronic Design (3) AWSp

Laboratory-oriented course in applied digital and analog circuit design. Stressed are practical aspects of circuit design, including specification, interpretation, application of theory, error analysis, component selection, breadboarding, test preparation, and interpretation of results. Instruction by practicing electronics design engineers. One-hour lecture and three-hour laboratory weekly. Prerequisite, 353 or 475.

### 441 Linear System Analysis (3) AWSp

Frequency and time domain properties of signals. Fourier methods used for determining the response of linear systems. Transform methods and operational properties. Comparison of Fourier and Laplace transform methods. Prerequisite, 333 or permission.

## 445 Nonlinear Systems Analysis (4) W

Dynamic analysis of nonlinear circuits and of other simple systems. Exact methods, graphical methods, approximate methods, including linearization and numerical and analog computer solutions. Stability. Forced vibrations. Prerequisite, 315 or 333 or permission.

### 449 Electrical Machinery (5) A

Steady-state and transient theory of rotating machines and transformers in single-phase and polyphase applications. Elements of design and prediction of performance, including losses, efficiency, and economics of application. Includes one four-hour laboratory each week. Prerequisite, 343.

### 454 Power System Analysis (4) W

Polyphase circuits in balanced and unbalanced cases. Symmetrical and related components. System impedances. Fault computations. Load flow computations. System stability in steadystate and transient cases. Introduction to economic operation of power systems. Prerequisites, 333, 381.

### 460 Wave Effects in Bio-Materials (3) Sp

Ultrasonic, electromagnetic, and optical wave effects in biological materials. Applications to biomedical uses in diagnosis, therapy, and surgery. Prerequisite, 381 or other course in wave propagation as approved by instructor. Offered jointly with the Bioengineering Center as Bioengineering 460.

### 467 Introduction to Radio Science (3) Sp

Introduction to radio astronomy, including radio telescope antennas and interferometry, radio telescope receivers, nature of radio sources. Remote sensing of the earth's surface in meteorology and ocean and land surface applications, including mapping of agricultural areas and natural resources. Sensing of the propagation medium by passive (radiometric) and active (scattering, acoustic sounding) techniques, ionosphere, and magnetosphere. Prerequisite, 383 or permission.

### 468 Applied Optics (4) W

Fundamentals of optical image formation, data processing, holography, interferometry, laser principles, optical detection, material interactions, scattering, and fiber optics. Prerequisite, 383.

### 469 Boundary Value Problems and Wave Fundamentals (4) A

Wave propagation in varying types of material

media of practical importance, including ionized, lossy, layered, anisotropic. Techniques for the solution of boundary value problems, including wave guides and other passive elements of microwave systems. Emphasis on electromagnetics problem-solving methods, together with their relevance to modern optics, bioengineering, and radio science. Prerequisite, 383: senior standing recommended.

### 470 Design of Digital Data Systems (4) Sp

Fundamental gating circuits are developed into large logic gating structures. The use of these structures in the design of central processing units, memories, and peripheral equipment is illustrated. Primarily for nonelectrical engineering majors. Offered jointly with the Computer Science Group as Computer Science 470. Prerequisite, permission of instructor.

### 472 Computer Software Systems (3) W

Principles of operating systems, compilers, assemblers, interpreters, and loaders for digital computers. Not intended for graduate students who require a detailed knowledge of system programming. Not open to students who have taken 501 or 502. Offered jointly with the Computer Science Group as Computer Science 472. Prerequisite, 478.

## 473 Wave Shaping (5) AW

Generation and transmission of special waveforms, including pulses, square waves, and linear ramps; clipping, clamping, and d-c restoration; astable, monostable, and bistable multivibrators; applications to analog and digital systems. Includes one 4-hour. laboratory on alternate weeks. Prerequisite, 353.

### 475 Digital Systems (4) Sp

Synthesis of digital systems from functional electronic subassemblies; integrated logic circuits; shift registers; generation and conversion of digital codes; analog to digital conversion. Includes one 4-hour laboratory on alternate weeks. Prerequisite, 371.

# 476 Logical Design of Digital Devices(3) WSp

Number theory of formal and informal systems, translation, error detection characteristics. Arithmetic operations. Boolean algebra, algebraic manipulation and simplification. Topological methods. Switching and logic applications. Analysis and synthesis of sequential logic, minimization criteria. Systems design. Prerequisite, upper-division standing.

477 Digital Computer Applications (4) ASp Advanced topics in numerical analysis and their application to the solution of engineering problems, with additional work on computer graphics and non-numerical problem solving. Theory and practice are involved, and the facilities of the Computer Center are utilized. Prerequisite, Engineering 390.

### 478 Computer Organization and Machine Language Programming (4) ASp

Differences and similarities in computer structure. Flow of control. Instruction codes and their execution for arithmetic, logical, character manipulation, and input-output operations. Indexing and indirect addressing; subroutine linkage. Study of information representations and their relationship to processing techniques. Offered jointly with the Computer Science Group as Computer Science 478. Prerequisites, Engineering 141, 315, or equivalent.

479 Fundamentals of Automatic Control (4) AWSp

Linear servomechanism theory and design

principles. Pole-zero analysis, stability of feedback systems by root-locus and realfrequency response methods. Design methods of Bode and Nichols. Introduction to advanced topics in automatic control theory. Prerequisite, 315 or 333.

### 481 Fundamentals of Microwaves (4) Sp

Microwave circuit elements, waveguides and resonators; microwave measurement techniques; high frequency triodes, klystrons, and other transit-time devices; beam-type and solid-state amplifiers. Includes one 3-hour laboratory per week. Prerequisite, 383 or 353.

### 485 Semiconductor Devices (4) AW

Physics of p-n junctions and semiconductor surfaces; operating principles of various semiconductor devices. Development of smallsignal and switching circuit models. Includes junction transistors, controlled rectifiers, field effect transistors, microwave and integrated circuit devices. Prerequisite, 383 or equivalent.

### 488 Introduction to Quantum Electronics' (3) Sp

Elementary theory of the interaction of high frequency and optical radiation with atomic and molecular systems. Practical design technology of gaseous and solid-state stimulated emission devices. Laser system materials and components. Use of nonlinear phenomena for material diagnostics, energy conversion, and optical communications. Prerequisite, 383 or permission.

### 493 Guidance and Control (3) Sp

Analysis and design problems in attitude control and flight-path guidance of aerospace vehicles. Principles of inertial instruments and navigation systems. Prerequisite, 479.

### 498 Control System Components and Measurements (3) Sp

Study of control system components and formulation of their mathematical models. Amplifiers, servomotors, synchros, gyroscopes, and fluid-power devices. Experimental determination of dynamic parameters, and behavior of closed-loop systems. Two 3-hour laboratories per week. Prerequisite, 479, which may be taken concurrently, or permission.

## 499 Special Projects (2-5, max. 10) AWSp

Assigned construction or design projects carried out under the supervision of the instructor. Prerequisite, permission of department chairman.

### **Courses for Graduates Only**

## 501-502 Programming Languages and Systems I, II (3-3) WSp

Classification, formal definition, and comparison of computer languages. Basic concepts and design of interpreters, assemblers, and compilers. Offered jointly with the Computer Science Group as Computer Science 501-502. Prerequisites, 478 and graduate standing.

### 504 Theory of Digital Computer Arithmetic (3) W O'KEEFE

Fundamental principles of arithmetic processors; classical number systems. Algorithms and design principles for implementing fast binary arithmetic; efficient addition, multiplication, division, square rooting, and floatingpoint hardware. New number systems and their application; residue, negative radix, and signed-digit codes. Error detecting and cor-

### 505 Analysis of Random Processes (4) AS LYTLE, MARTIN

Probability theory; discrete and continuous random variables; stochastic processes. Spectral analysis of random signals and noise. Prerequisite, graduate standing.

### 506, 507 Stochastic Processes and

### Communication Theory I, II (3,3) WSp LYTLE, MARTIN

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.

### 508 Random Processes—Engineering Applications (3) W

LYTLE, MARTIN

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.

### 509 Engineering Applications of Linear Graphs (3) W 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.

### 510 Introductory System Theory (4) A DAMBORG, LYTLE, MARTIN

Mathematical foundations for system theory are presented from an engineering viewpoint. Topics include set theory, functions and inverse functions, metric spaces, finite dimensional linear spaces, linear operators on finite dimensional spaces. Applications to engineering systems are stressed. Prerequisite, graduate standing or permission.

### 511 Principles of Network Synthesis (3) W LEWIS

Network representation in the complex frequency 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, 411.

### 513 Active Circuit Theory (3) Sp 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, 441 or permission.

### 515 Physical Principles in Instrumentation (3) Sp

HARRIS, HELMS, SIGELMANN, YEE

Physical laws that underlie the operation of selected electronic instruments are discussed.

Generation and detection of sensory signals and wave interactions with materials are treated. Topics include electron microscopy, X-ray and infrared imaging and spectroscopy; motion, density, and biomedical measurements. Prerequisite, graduate standing or permission.

### 517 Introduction to System Optimization (3) W

HSU

Systems engineering and optimization; classical optimization techniques; equality constraints and inequality constraints; Kuhn-Tucker conditions; linear inequalities and linear programming; nonlinear optimization and programming; Fibonacci, Golden-section, and minimax search; gradient search; method of Davidon, Fletcher, and Powell; method of conjugate gradients; elements of quadratic and geometric programming; applications to engineering systems. Prerequisite, 510 or permission.

## 518 Digital Signal Processing (3) A

O'KEEFE

Fundamental principles of systems that process signals by digital means. difference equations, z transforms and discrete linear systems theory. Effects of computational error caused by A/D conversion, arithmetic roundoff and parameter quantization. Discrete and fast Fourier transform algorithms, real-time systems, and the design and the simulation of digital filters. Special-purpose software for digital signal-processing facilities. A threehour laboratory session will be held on alternate weeks. Prerequisite, 441 or permission.

### 519 Measurement and Analysis of Random Data (3) Sp

MARTIN Parameter estimation; bias, mean square error, variance of parameter estimators; efficiency and robustness; Lease Squares techniques; confidence intervals for estimates; X<sup>a</sup> and Kolmogorov-Smirnov goodness of fit tests; estimating probability density functions; cor-

relation function estimation; spectral density

## estimation; estimation of cross spectrum. Prerequisite, 505 or equivalent.

### 525 Acoustics in Engineering I (3) Sp CHALUPNIK, MERCHANT, SIGELMANN

Acoustic wave transmission, reflection, refraction, and diffraction in solids, liquids, and gases. Includes review of continuum mechanics and examples from electromechanical systems. Offered jointly with Mechanical Engineering as Mechanical Engineering 525. Prerequisite, graduate standing in electrical or mechanical engineering, or permission.

### 526 Acoustics in Engineering II (3) A

MERCHANT, OSBORN, SIGELMANN Continuation of 525. Material will differ each year, covering such topics as scattering, moving media, ultrasonics, acoustic holography, optoacoustics, transducer propagation in anisotropic medium, etc. Offered jointly with the Department of Mechanical Engineering as Mechanical Engineering 526. Prerequisite, 525 or permission.

# 529 Optical Electronics (4) A

Radiation coupling to microsystems. Theory of laser oscillation. Tensor formulation of optical constants. Nonlinear optics and parametric amplifiers. Electro-optic and acoustooptic modulation. Photodetectors. Modern applications. Prerequisite, 383 or equivalent.

### 530 Electromagnetic Properties of Materials (4) W

AUTH, BJORKSTAM, YEB

Matrix formulation of quantum theory, perturbation theory, Dirac Matrix formulation of quantum theory, Dirac notation. Semiclassical theory of the interaction between electromagnetic radiation and matter. Lattice vibrations and specific heat. Dielectric and magnetic properties of materials. Prerequisite, 383 or permission.

### 531 Electronic Conduction in Solids (4) Sp BJORKSTAM, YEE

Electron transport in periodic solids; solutions to the Boltzmann equation, scattering mechanisms. Thermoelectric and thermomagnetic effects. High magnetic field effects in metals and semiconductors. Optical properties of semiconductors. Some aspects of superconductivity. Prerequisite, 530 or permission.

### 532 Engineering Quantum Electrodynamics (4) A

BJORKSTAM, YEE

Electromagnetic field quantization; coherent and incoherent states of the radiation field. Fully quantum theory of the interaction between electromagnetic radiation and matter. Quantum theory of the laser. Photon counting, correlation and noise. Parametric conversion; Raman and Brillouin scattering. Prerequisite, 530 or permission.

### 533 Advanced Semiconductor Devices (3) W SCHIBLI

Analysis of selected devices with heavy emphasis on extreme operating conditions of bias, temperature, and frequency; includes p-n junctions, Schottky barriers, microwave devices; recent developments from the current literature. Offered odd-numbered years. Prerequisite, 485 or permission.

### 535 Semiconductor Circuits (4) Sp

GUILFORD, LAURITZEN, SCHIBLI Modeling of transistors, resistors, and other devices used in integrated circuits. Design of digital and analog integrated circuits. Design of digital and analog high-frequency transistor models and circuits. Laboratory project is included as a part of the course. Prerequisite, 485 or permission.

### 539 Advanced Topics in Solid State Electronics (1-5, max. 5) AWSp AUTH, BJORKSTAM, LAURITZEN, SCHIBLI, YER

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.

### 545 Linear Control System Analysis (3) A BERGSETH, CLARK

Linear continuous system theory applied to feedback control systems. Block diagrams and signal flow graph representations. Steady-state errors and performance. Stability and dynamic response by root-locus, Nyquist, and Bode techniques. Not open to those who have taken 479. Prerequisite, graduate standing.

### 546 Advanced Topics in Control System Theory (3) AWSp

Topics of current interest in control system theory, for advanced graduate students having adequate preparation in linear and nonlinear system theory. Prerequisite, permission of instructor. (Offered when sufficient enrollment develops prior to close of advanced registration.)

### 547 Neural Communication and Control in Biological Systems (3) Sp PINTER

Conveys quantitative knowledge of the means by which electrochemical events generate, modulate, and demodulate neuronal signals and noise, and the manner in which these signals interact in the nervous system. The constraints placed on transmission of information in the nervous system are discussed, together with pertinent examples, such as the visual system. Prerequisite, 505 or permission.

### 548 Optimal Control (3) A HSU

Variation calculus and optimal control, the Pontryagian Minimum principle, Bellman's principle of optimality and dynamic programming, optimum control of distributed parameter systems, sensitivity in optimum control, quasilinearization and computational methods for optimal control. Prerequisite, advanced graduate standing or permission.

### 551 Power System Control and Protection (3) Sp

### BERGSETH

Dynamics of power system behavior, including the effects of the governor loop and the voltage regulator loop. System models in the small-signal and nonlinear cases. System faults and protection by relays and circuit breakers. Load shedding as a tool of system control and protection. Prerequisites, 454, and 479 or 545.

### 560 Wave Phenomena (4) W ROGERS

A general study of wave phenomena in which vibrations in physical structures and in elastic media are compared with electromagnetic waves. Interaction of physical materials with electromagnetic wave. Prerequisite, 383 or permission. (Offered when adequate enrollment develops prior to close of advance registration.)

### 563 Noise in Electron Devices (3) W LAURITZEN

The physical mechanisms of noise generation in electronics; thermal noise, quantum noise, shot noise, flicker noise. Characterization of noise; noise figure, noise temperature, noise measurements. Optimum low noise circuit design, low noise operation of semiconductor and optical electronic divices. Offered evennumbered years. Prerequisites, 485, 505, or permission.

### 570 Antenna Theory (3) A

REYNOLDS, SWARM

Theory of radiation; impedance characteristics and radiation patterns of thin linear antenna elements; antenna arrays; pattern synthesis; aperture antennas. Prerequisite, graduate standing or permission.

### 572 Electromagnetic Theory and Applications I (4) A

CARLSON, HARRIS, ISHIMARU, SIGELMANN Plane, cylindrical, and sperical electromagnetic waves; eigen-values, and boundary value problems applied to wave guide, cavity, microwave networks, junctions, and other guiding structures; fast and slow waves; wave propagation in magnetoplasma and ferrite; waves in dispersive, inhomogeneous and anisotropic media. Prerequisite, graduate standing or permission.

### 573 Electromagnetic Theory and Applications II (4) W

CARLSON, HARRIS, ISHIMARU, SIGELMANN Boundary value problems for scattering, diffraction, and radiation of electromagnietic waves using Green's function, integral equation, and Foúrier transform techniques. Approximation techniques using the saddle point method, Watson transform, residue series, the WKB method, and variational principle. Prerequisite, 572 or permission.

### 574 Electromagnetic Theory and Applications III (4) Sp

CARLSON, HARRIS, ISHIMARU, SIGELMANN Topics of current interest, including the radiation of waves, transients in dispersive media, Wiener-Hopf techniques, fluctuations and coherence, and moving sources and media. Applications to radio wave propagation and optics. Prerequisite, 573 or permission.

### 575 Waves in Random Media (4) A

CARLSON, ISHIMARU, SIGELMANN Propagation and scattering of electromagnetic, optical, and acoustic waves in turbulence and random media, and scattering from rough surfaces and randomly distributed particles. Examples include atmospheric turbulence, fog, rain, smog, clear-air turbulence detection, scattering from blood cells and tissues. Applications to atmospheric sciences, bioengineering, and ocean engineering. Prerequisite, graduate standing or permission.

### 576, 577 Information Theory and Coding I, II (3,3) WSp

LYTLE, MARTIN

Mathematical theory of communication. Information theory for discrete and continuous systems. Channel capacity and coding; principles and techniques of algebraic and other types of error-detecting, error-correcting codes. Prerequisite, 505 or permission.

### 578 Radio Propagation I (3) W

HELMS, REYNOLDS, SWARM Theory of the propagation of radio waves in the neutral lower atmosphere, including effects of scattering, diffraction, and refraction. Techniques of remote sensing in the lower atmosphere using radio waves are investigated and related to geophysical problems. Prerequisite, graduate standing or permission.

### 579 Radio Propagation II (3) Sp

HELMS, REYNOLDS, SWARM Propagation of radio waves in the ionosphere and beyond. The structure and phenomena of the ionosphere and magnetosphere of the earth is related to the overall solar system environment with topics that include plasmasphere diagnostics using Whistler waves, natural VLF emission mechanisms, polar cap absorption, and magnetic storms. Prerequisite, graduate standing or permission.

### 582 Stochastic Control Systems (3) W ALEXANDRO, HSU, PINTER

Performance measure and minimization techniques; continuous and discrete random processes in control systems; optimal design of systems having stochastic signals and noise; application of the Wiener-Hopf method to control system design; the Wiener-Kalman filter and its application in stochastic control systems. Prerequisites, 505, 545, 584.

583 Nonlinear Control Systems (4) Sp NOGES

Dynamic analysis of nonlinear control sys-

tems. Analytical, graphical, numerical and simulation techniques for solving nonlinear control system problems. Lyapunov functions, phase space and describing functions. Introduction to contractions mapping methods. Prerequisites, 545, 584.

#### Continuous and Discrete State Variable 584 Methods (3) AW

ALEXANDRO, CLARK, HSU

Matrices and linear spaces, quadratic forms; system representation in state variable form; selection and transformation of state variables; controllability and observability of multivariable control systems; state transition matrix for continuous and discrete time systems; difference equations and Z-transform; application of state space approach to control system design. Prerequisite, graduate standing or permission.

### 585 Digital and Sampled-Data Systems (3) Sp

ALEXANDRO, HSU

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. Prerequisites, 545, 584.

### 586 Digital Computer Applications and **Communications I (4) A**

JOHNSON, HOLDEN, GOLDE

Theory and practice of number systems, logical analysis, digital computer system organization. Numeric and non-numeric techniques and processes. Algorithmic and heuristic applications by various representative languages. Prerequisites, FORTRAN and graduate standing.

### 587 Digital Computer Applications and Communications II (4) W JOHNSON

Evaluation and application of computational methods in solution of typical systems problems. Optimization, error analysis, stochastic and statistical methods, computer learning, pattern recognition. Prerequisite, 586.

### Logical Design of Digital Computers I (3) Sp JOHNSON

Number systems, error detect-correct, Boolean algebra. Optimization of logical systems under various criteria. Topological methods of optimization and synthesis. Sequential logic, memory input, and application equations. Application of logical techniques to digital systems. Prerequisite, graduate standing.

### 589 Logical Design of Digital Computers II (3) A

JOHNSON

Analysis and synthesis of digital systems from logical models. Time-independent and sequen-tial logic, multi-function logic. Boolean matrix synthesis, partitioning, weighting, cellular implementation. Threshold logic theory. Evaluation of various analysis and synthesis methods in logical systems. Prerequisite, 588.

### **Advanced Topics in Digital Computers** (2-5, max. 15) AWSp GOLDE, HOLDEN, JOHNSON

Lectures or discussions of topics of current interest in the field of digital computers. Subject matter may vary from year to year. Prerequisite, permission.

#### 591 **Advanced Topics in Network Theory** (2) Sp LEWIS

Lectures and discussion of current developments in network theory. Selection of topics will vary from year to year. Prerequisite, 511 or 513 or permission.

### Advanced Topics in Communication Theory (3) AWSp 595

LYTLE, MARTIN

Extension of 507, 508, 577. Material will differ each year, covering such topics as: detection theory, decision theory, game theory, adaptive communication systems, nonlinear random processes, etc. May be repeated for credit by permission. Prerequisite, permission.

#### 599 Selected Topics in

Electrical Engineering (\*) AWSp Prerequisite, permission of department chairman.

- 600 Independent Study or Research (\*) AWSpS
- 700 Master's Thesis (\*) AWSpS

800 Doctoral Dissertation (\*) AWSpS

# HUMANISTIC-SOCIAL STUDIES

### **Courses for Undergraduates**

# 300 Practice in Technical Reporting (1) ASp

SOUTHER, TRIMBLE, WHITE Application of the fundamentals of technical reporting to the specific reporting activity of students who are enrolled in a laboratory, project, or other designated course in the College of Engineering.

### 302 Technical Writing (3) Sp SOUTHER

Course focus is on various types of technical and scientific writing: articles, technical papers, manuals, proposals, books.

#### 304 Introduction to Scientific and Technical **Communication for Foreign Students**

(4) A

SELINKER, TRIMBLE Scientific and technical writing and reading for foreign students well grounded in oral English. Concentration on (1) application of rhetorical concepts most frequently used in scientific and technical writing, (2) grammat-ical analysis in areas traditionally difficult for foreign students, and (3) grammatical-rhetor-ical analysis of scientific and technical discourse. Offered jointly with the Department of English as English 304.

#### Scientific and Technical Report Writing 305 for Foreign Students (4) W

SELINKER, TRIMBLE

Application of the problem-solving approach to scientific and technical writing. Concentration on (1) undergraduate laboratory reports, (2) advanced grammatical analysis in areas traditionally difficult for foreign students, and (3) advanced grammatical-rhetorical analysis of scientific and technical discourse. Offered jointly with the Department of English as English 305. Prerequisite, 304 or English 304 or permission.

#### 310 Self, Symbol, and Society (3) AWSp CHAPMAN, SKEELS

Anthropological concepts of social institutions and psychological concepts of the self are used for the interpretation of myth and literature from one or more historical cultures, e.g., ancient Greece and medieval France and England, and for the comparison of these with the individual, his symbolic creations and his situation in today's world.

#### **Development of Western Cultural** 320 Institutions (3) AWSp

BOTTING, CHAPMAN, HIGBEE, HUNNER The growth of modern institutions and of the ideas underlying them during the periods of the Renaissance, the Protestant Revolt, the Commercial Revolution, the Enlightenment, and the Industrial Revolution. Major emphasis is on political, economic, religious, and intellectual change.

#### The Human Image in Medieval and 351 **Renaissance Literature (3)** AWSp WHITE

Selected literary figures and works of Western civilization in the Middle Ages and the Renaissance.

#### The Human Image in Eighteenth- and 352 Nineteenth-Century Literature (3) AWSp HUNNER

Selected literary figures and works of Western civilization in the eighteenth and nineteenth centuries.

#### Thesis Guidance for Foreign 407 Students (1, max. 3) AWSp

TRIMBLE

Individual tutorial assistance in writing problems for the foreign student preparing to write or writing a thesis in one of the engineering disciplines. Prerequisite, permission.

### 410 Contemporary Political and Social Problems (3) AWSp BOTTING, HIGBEE

Twentieth-century background and develop-ment of contemporary political and social problems; comparison of competing political philosophies and systems: democracy, Fascism, Communism; current international and national events and issues.

#### **Technology in Contemporary Western** 420 Culture (5) AWSp BOTTING

Examines the nature of technology, its rela-tionship to culture and to the physical environment; treats with the problems and issues created by the impact of technology on society, including the relationship between technology and social change, effects of tech-nology on economic and political organizations, and the relationship between technology, human values and the individual; examines implications of future technological development for man and his culture.

#### Socio-economic Consequences of 421 Technology (3) AWSp HENNES

Overview of the role of technology in forming public policies and in determining personal alternatives. A nonmathematical exposition of engineering objectives, practices, capabilities, and constraints, and an appraisal of the need for developing an informed public opinion in a technology-dependent society if there is to be democratic participation in the decisionmaking process.

#### 431 Human Rights and the Governmental Process (3) AWSp HIGBEE

An analysis of governmental actions (particularly antidiscrimination legislation) designed to reduce discrimination on account of race, color, religious creed, national origin, and, more recently, age and sex in various

sectors of American life. The attendant issues, problems, and administrative solutions to leading cases are examined. Prerequisite, upper-division standing.

#### 450 The Human Image in Twentieth-Century Literature (3) AWSp WHITE

Selected literary figures and works of Western civilization in the twentieth century.

# 451 The Living Theater (3) AWSp

Introduction to the art of theatrical performance by reading, attending, and discussing plays offered currently in theaters on campus and in the community.

### 461 Experience in the Arts (1) W LEAHY, MUELLER

Informal experiences with the arts through attendance at theatres, concerts, art exhibits, etc.; through discussions with creative artists; and through personal attempts at producing a work of art. Offered jointly with the Department of Mining, Metallurgical, and Ceramic Engineering as Ceramic Engineering 442.

### 471 Introduction to the Folktale Among Literate Peoples (3) A

SKEELS

Techniques of classification, geographic-historical distribution, theories of origin and interpretation, and related areas of investigation of the oral prose folk narrative of literate peoples. Offered jointly with the Department of English as English 471. Prerequisite, upperdivision standing.

### 472 Introduction to American Folklore (5) W SKEELS

Study of different kinds of folklore inherited from America's past and to be found in America today. The cultivation of an awareness of authentic folklore and of how to collect it. Offered jointly with the Department of English as English 472.

### 480 Science Fiction and Fantasy: Prophecy and Symbol (3) AWSp

LEAHY, SKEELS

Science fiction will be compared with forecasts of the future by authorities in science and technology. Categories of prophecy and degrees of departure from the probable to the fantastic will be determined. The fiction will be analyzed in terms of depth of meaning and of the particular stylistic qualities and abilities of the authors.

## 498 Special Projects (1-5, max. 5) AWSp

Work on a special project by a student under the supervision of an instructor. Prerequisites, upper-division standing and permission of the instructor and the department chairman.

### 499 Special Topics (1-5) AWSp

Special topics in humanities and social sciences to be offered occasionally by permanent or visiting faculty.

## INDUSTRIAL ENGINEERING

For a description of courses required in this curriculum, see *College of Engineering* section.

## MECHANICAL ENGINEERING

## Courses for Undergraduates

201 Metal Casting (1) AW

FORD Theory and application of the science of producing metal castings; preparation and testing of foundry sands; manual and machine preparations of sand molds and cores; gravity casting of gray cast iron and aluminum alloys into sand, shell, and permanent molds. Lecture and laboratory.

#### 202 Welding (1) AWSp HOLT

Basic theory and application of the art and science of thermal metal-joining processes; fundamentals of weld design, sequence, and distortion; flame cutting and flame bending. Lecture and laboratory.

## 203 Metal Machining (1) WSp

ANDERSON

Introduction to basic machining methods used in industrial metal processing. Fundamental concepts of the use of machine tools, layout methods, and measuring tools. Lecture and laboratory.

### 204 Introduction to Manufacturing Methods (3) AWSp

WOLAK

A survey of production techniques in the foundry, welding, and machining manufacturing areas. Emphasis is on the economics and the mechanical characteristics produced by the design choice specifying the manufacturing process. Projections beyond current techniques are included. Lecture and laboratory.

#### 215 Statistical Methods in Engineering (3) AWSp ROBERTS

Application of statistical techniques to provide a measure of confidence in experimental data; normal and discrete distributions, least squares, elementary design of experiments. Prerequisite, Mathematics 124.

### 22 Introductory Mechanical Engineering Laboratory (2) AWSp EMERY

A laboratory course emphasizing measurements, interpretation of instrument readings, and analysis of errors. Special topics such as themometry, piezometry, and dynamometry. Study of basic mechanical engineering equipment. Prerequisite, sophomore standing in engineering and 215.

# 261 Kinematics and Dynamics (3) AWSp

Introduction to kinematics and dynamics. Newton's laws applied to particles and elementary systems of particles. Study of motion in various coordinate systems. Prerequisites, Engineering 180 and Physics 121.

### 263 Mechanical Systems (3) AWSp BALISE

Study of the mathematically common ground in engineering principles. State variables, system equations, mechanical and electrical circuits, free and forced response, complex plane representation. Illustrative use of analog computer. Prerequisites, Mathematics 125 and Physics 122.

### 304 Manufacturing Processes (3) AWSp MC FERON

Study of manufacturing processes, including interrelationships between the properties of the material, the manufacturing process, and the design of component parts. Prerequisite, 343.

### 308 Production Methods (3) AWSp HOLT

A study of the principles and application of

thermal and mechanical processes in the production of manufactured parts. Lecture and laboratory. Prerequisite, 204.

#### 312 Machine Tool Fundamentals (3) A ANDERSON

Study of machine tools and machining processes, including exercises on all principal tools. Laboratory. Not open to engineering students. Prerequisites, junior standing in industrial education and 203, or permission.

### 320 Thermodynamics I (4) AWSp WAIBLER

An introduction to classical, macroscopic thermodynamics, beginning with the required concepts and definitions, and including the development of the basic laws applicable to energy transformations. Theoretical developments are reinforced by their application to engineering problems.

### 321 Thermodynamics II (4) AWSp WAIBLER

A continuation of classical thermodynamics, lectures and laboratory. The mathematical relations between thermodynamic properties are developed. The basic principles are applied to the study of mixtures and solutions, chemical reactions, phase and chemical reactions, phase and chemical equilibria and the flow through nozzles and passages. The laboratory experiments are related to the current classroom work. Prerequisite, 320 or Engineering 260.

### 322 Microscopic Thermodynamics (4) AWSp

ROBERTS

An introduction to kinetic theory and statistical thermodynamics. A preliminary treatment of transport phenomena, mathematical probbility statistics and relevant mathematical procedures. The macroscopic and microscopic viewpoints are related, and quantum mechanics is introduced with some solutions of the Schrödinger wave equation. (No background in quantum mechanics is assumed.) Prerequisite, 320 or Engineering 260.

### 323 Thermodynamics and Heat Transfer (4) AWSp

DEPEW

Application of thermodynamic principles to power and refrigeration cycles. Study of nonreacting mixtures, psychometrics, and air conditioning. Study of reacting mixtures, chemical reactions, phase and chemical equilibria. Applications to combustion and fuel cells. Introduction to heat transfer, including conduction, convection, radiation, and heat exchangers. Prerequisite, 320 or Engineering 260.

### 331 Introduction to Heat Transfer (4) AWSp MC FERON

Study of steady-state heat transfer by conduction, radiation, and natural and forced convection; design of elementary heat-exchangers. Prerequisite, 320 or Engineering 260. 320 or equivalent, and CIVE 342 or ME 333, which may be taken concurrently.

### 333 Introduction to Fluid Mechanics (4) Sp. CHILDS

Introduction to the basic laws and their application to the solution of engineering problems. Conservation equations, vorticity, potential flow, compressible one-dimensional flow, dynamic similarity, boundary layer concepts, flow in ducts with friction, fluid machinery, and measurement techniques. Prerequisite, Mathematics 238.

### ENGINEERING

#### 340 Engineering Materials (3) AWSp DAY

Fundamental aspects of the behavior of engineering materials. Elastic and plastic deformation, fracture, creep, fatigue, impact, temperature effects, and corrosion. Destructive and nondestructive evaluation. Prerequisites, Engineering 170 or equivalent and CIVE 292 or ME 352.

### 342 Industrial Materials and Processes (3) Sp FORD

The nature, properties, and behavior of materials and finishes used in industrial design and their effects on processing or fabrication methods. Factors involved in materials selection for design adequacy and processing suitability. Not open to engineering students. Lecture, laboratory, and field trips. Prerequisite, junior standing in industrial design or permission. Offered odd-numbered years.

### 343 Behavior of Engineering Materials (4) AWSp

SANDWITH

Material science and mechanics of solids concepts applied to the study of materials that are used in engineering design and manufacturing: deformation, properties, fracture, impact, creep, fatigue, and corrosion. Destructive and nondestructive tests in laboratory; evaluate properties and demonstrate nature and behavior of materials. Lecture and laboratory. Prerequisite, 352 or permission of adviser.

### 352 Introduction to Mechanics of Solids (3) AWSp

SHERRER

Development of equations of elasticity with applications to tension, torsion of rods, and bending of beams. Energy methods and column buckling. Prerequisites, Mathematics 238 and Engineering 180, or permission.

### 353 Mechanical Design Analysis (3) AWSp KIELING

Analysis, design, and selection of mechanical subsystems and elements, such as gears, linkages, cams, and bearings. Lecture and laboratory. Prerequisites, 343 and 352.

### 360 Dynamics of Machines (3) AWSp MERCHANT

A study of the principles of dynamics as applied to the analysis and design of machinery. Includes force, momentum, and energy analysis of linkages and rotating machinery. Prerequisite, 261 or CEEM 291 or Engineering 230.

### 361, 362 Machine Design (3,3) AWSp MORRISON

Introduction to the synthesis of mechanical components and systems, emphasizing principles of mechanics, properties of materials, and manufacturing methods as they relate to design. Lecture and laboratory. Prerequisites, 340 for 361; 360 and 361 for 362.

### 363 Mechanical Systems II (3) AWSp BALISE

Continuation of 263 to include sinusoidal inputs, Fourier series, Fourier integral, and introduction to Laplace transform. Transfer functions, poles and zeros, immittance, resonance, filtering. Prerequisites, 263 and Mathematics 238.

### 364 Mechanical Systems Dynamics (3) AWSp CHALUPNIK

Application of system concepts to the study

of mechanical system dynamics. Vibrations of systems with several degrees of freedom; random oscillations. Laboratory emphasizing dynamic measurements of various physical quantities. Prerequisites, 360 and 363 or 373.

### 365 Dynamics (4) AWSp

### MERCHANT

Newtonian dynamics from a vector point of view, with topics applicable to mechanical design. Prerequisites, Engineering 180 and Mathematics 126.

### 373 Dynamic Systems Analysis (4) AWSp JORGENSEN

Introduction to modeling and analysis of physical systems involving energy storage and transfer by lumped parameter linear elements. State variables, ideal elements and sources, system equations by node and loop analysis. Response and stability of linear systems. Exponential excitation, the system function, and pole-zero configurations and their interpretation. Generalized impedance concepts, source equivalents, and transformations. Unified treatment of active and passive systems through graphical methods. Prerequisites, Mathematics 238 and Engineering 180.

### 401 Metal Casting Theory and Design (3) Sp FORD

Study of the physical phenomena involved in the metal casting process and how their effects can be controlled. Introduction to quantitative analysis of process variables for control. Prerequisites, 201 or 204 or 304, and 340 or 343 or permission.

### 403 Material-Removal Processes (3) A WOLAK

Cutting and noncutting processes for material removal in the shaping of manufactured products. Study of forces and of power consumption in the various processes, and relative costs. Prerequisites, 204 or 203, and 340 or 343, or permission.

### 404 Theory of Welding (3) W HOLT

Theory of arc welding and flame cutting application to structural aircraft, and nuclear fabrication. Prerequisite, senior standing in mechanical engineering or permission.

### 406 Corrosion and Surface Treatment of Materials (3) W SANDWITH

Corrosion, plating, coating, welding, diffusion bonding, carburizing, and nitriding, from the standpoint of solid-state diffusion theories, adhesion theories, and phase equilibria. Prerequisite, 340 or 343, or permission.

# 410 Engineering Administration (3) AWSp DRUI

Structure, organization, management, and operation of manufacturing enterprises as related to production planning and control, methods analysis, product development, and industrial.and human relations. Prerequisite, senior standing or permission.

### 411 Engineering Economy (3) AWSp FORD

The evaluation of engineering alternatives. Use of interest computations, valuation, depreciation, and operating cost estimates to predict the economic result of the application of engineered products or processes. Prerequisite, senior standing in engineering or permission.

### 414 Industrial Safety (2) Sp ANDERSON

Recognition of hazards; analysis of industrial

accidents, their costs, and fundamentals of prevention; organization of safety programs; personnel training for safety. Prerequisite, senior standing in engineering or permission.

### 415 Statistical Quality Control (3) AW ROBERTS

Statistical methods applied to the control of manufacturing processes, estimating lot and process characteristics, and acceptance sampling procedures. Statistics of variables and proportions. Design of decision instructions. Prerequisite, senior standing in engineering or business, or permission.

## 417 Methods Analysis (3) ASp

DRUI Work design and work measurement principles; time utilization studies by work sampling, flow and operations studies, principles of motion economy, time study principles and practices, physiological and psychological aspects of work. Lectures and studies in selected local businesses as laboratory. Prerequisite, senior standing in engineering or business, or permission.

# 418 Work Simplification (2) Sp

For majors in nursing, home economics, and allied fields. Principles of motion economy; work distribution and human-activity analysis; flow-process charts and diagrams; layout of work areas; economic and human factors involved in methods-study applications. Lecture and laboratory. Prerequisite, senior standing in nursing or home economics, or permission.

### 419 Industrial Facilities Design (3) WSp DRUI

Engineering approach to the design of new or expanding industrial facilities. Scope considers environmental engineering, heat and power requirements, structural equipment selection, economic factors, modifications, maintainability. Prerequisite, senior standing in engineering.

## 420 Engineering Reliability (3) W

ROBERTS

An introductory course in reliability technology, covering prediction, measurement, control, reporting, and analysis of failure modes and failure rates. Prerequisite, senior standing in engineering or permission.

### 425 Air Conditioning (3) W

CRAIN

Theory and practice in the field of heating, ventilating, and air conditioning for human comfort, including psychometry, heat transfer, air distribution, humidity and temperature control, cooling and dehumidifying equipment, and air cleaning. Prerequisite, 321 or 323.

### 432 Gas Dynamics I (3) Sp CHILDS

A study of the dynamic and thermodynamic relationships for the flow of a gas within closed channels. Analysis of the basic flow equations; study of the effects of friction and normal shock; application to thermodynamic processes involving nozzles, diffusers, compressors, and turbines. Prerequisites, 321 or 323, and CIVE 342 or ME 333.

### 434 Advanced Mechanical Engineering Laboratory (3) ASp

CRAIN

Methods of planning, carrying out, and interpreting engineering experiments on prime movers, refrigerators, and other heat power plants. Design and operation of complete multicomponent plants. Prerequisite, 321 or 323.

### 436 Friction and Lubrication (3) ASp FIREY

Study of the fundamental principles of friction and lubrication. Behavior of lubricants and bearing materials. Engineering applications, including journal bearing design, gear lubrication, cutting fluids, and rolling bear-ings. Prerequisite, senior standing in engineering or permission.

#### 440 Mechanical Behavior of Solids (3) Sp WOLAK

Study of elastic and plastic deformation of solids, with particular reference to metalforming processes. Yield criteria. Strain-hardening characteristics. Plastic instability of materials in tension and in compression. Classification of metal-forming processes. Prerequisite, 340 or 343 or permission.

### 445 Fracture of Engineering Materials (3) A TAGGART

Deformation processes leading to fracture, and the basic mechanics of materials fracture from microscopic and macroscopic viewpoints. Microscopic aspects of plastic deformation and crack propagation. Principles of design and testing for fracture resistance. Prerequisite, 340 or 343, or permission.

### 451 Human Factors in Design (3) W WALKER

Engineering considerations of the abilities and limitations of the human operator in the design of industrial systems and components. The scope includes functional, psychological, physiological, and environmental aspects. Prerequisite, senior standing in engineering or permission.

### 460 Kinematics and Linkage Design (3) W KIELING

Introduction to the theories of advanced kinematics. Emphasis on synthesis and design of linkages, cam surfaces and mechanical computer mechanisms, number synthesis for plane and space mechanisms using graphical and computer methods. Prerequisite, 360 or 365, or permission.

## 465 Welding Design (3) Sp

HOLT Theory of joint design, sequence, fixturing, and dimensional control in fusion welding. Prerequisite, senior standing in mechanical engineering or permission.

### 468 Machine Design (3) AWSp MORRISON

Current topics in engineering design. Projects in the design of major mechanical systems. Prerequisite, 362.

### 469 Introduction to Advanced Dynamics (3)W SHERRER

Energy methods in classical mechanics: Hamilton's principle, derivation of Euler-Lagrange equations using variational principles: generalized coordinates, constraints, and forces of constraint, inertia tensor; Euler's equa-tions; with applications to problems in particle, and rigid-body dynamics. Prerequisite, 360 or 365, or permission.

#### Mechanical Vibrations (3) Sp 470 MERCHANT

Application of single degree of freedom linear systems techniques to mechanical vibration problems. Vibration of multidegree of freedom linear systems using matrix techniques. Applications in vibration isolation, transmission, and absorption problems instrumentation. Prerequisite, 373 or and permission.

### 471 Automatic Control (3) ASp GALLE

Introduction to automatic control system analysis through classical methods. Dynamic system modeling; identification of the control problem; stability analysis by Routh, Nyquist, Bode, and Root Locus techniques. Lecture and laboratory. Prerequisites, 363, 373, or permission.

## 473 Instrumentation (3) W

GALLB

Principles and practice of industrial measurement. Dynamics of instrument response; theory of transducers for temperature, pressure, flow, and other measurements. Indicating, recording, and telemetering in industry. Lecture and laboratory. Prerequisites, 363, 373, or permission.

### 480 Engineering Data Analysis (4) AWSp EMERY

Introduction to engineering measurement problems and techniques; includes interpretation of experimental data. Foundation of statistics and probability as applied to measurement. Error analysis, sampling techniques, and elementary experiment design. Physical measurement experiments in one of three areas: materials and stress analysis, or operations and systems, or thermodynamics and fluids. Lecture and laboratory. Prerequisite, senior standing.

### 481 Internal Combustion Engines (3) ASp GUIDON

Study of the fundamental principles of opera-tion of gasoline and diesel engines; analysis of theoretical and actual cycles; fuels; combustion; detonation; carburetion, ignition, injection and performance characteristics of typical engines. Prerequisite, 321 or 323.

### 482 Internal Combustion Engine Laboratory (3) W

FIREY

Laboratory experiments on gas, gasoline, and diesel engines and gas turbines with analysis and interpretation of results. Effects of principal design and operating variables. Prerequisite, 481 or permission.

#### 483 Internal Combustion Engine Design (3) Sp FIREY

Fundamental principles of engine design, laws of similitude; properties of engine materials; design of important component parts; preliminary calculations for an engine. Lecture and laboratory. Prerequisite, 481.

### 485 Rocket Propulsion (3) W

GUIDON Study of the types of rocket engines; thermodynamic relations and nozzle theory; charac-teristics of gaseous, liquid, and solid propellant systems; rocket testing; performance calculations. Prerequisite, 321 or 323.

### 490 Naval Architecture (3) A

ADEE Theory of naval architecture; ship's lines, displacement, stability, curves of form, displacement sheet computations, and launching. Prerequisites, junior standing in engineering.

#### 491 Naval Architecture (3) W ADEE

Theory of naval architecture; arrangements, strength, A.B.S. rules, construction, weights, shipyard practices. Prerequisite, junior standing in engineering.

### 492 Naval Architecture (3) Sp

ADEE Waves and ship motions, resistance, propellers, powering, model testing, and steering. Prerequisite, junior standing in engineering.

### 495 Mechanical Engineering Design (4) AWSp LOVE

Design laboratory involving the identification and synthesis of engineering factors to plan and achieve specific project goals. Projects will be selected from topics of current interest. Current literature and prerequisite texts will be used as reference sources. Lecture and laboratory. Prerequisite, senior standing.

499 Special Projects (2-5, max. 9) AWSpS Prerequisite, permission of department chairman.

## **Courses for Graduates Only**

### 501 Advanced Materials Processes (3) A SANDWITH

Consideration of hot and cold fabrication processes with respect to their effects on the mechanical properties of engineering materials. Fundamental aspects of strengthening, anisotropy, and thermal stability in materials processing. Prerequisite, graduate standing in engineering or permission.

### 502 Plastic Metal Forming (3) W WOLAK

Stress-strain and stress-strain-rate relations in metal forming. Work of deformation. The slip-line field. Load bounding. Metal characteristics and forming. Applications to basic metal forming processes. Prerequisite, graduate standing in engineering or permission.

## 506 Friction and Wear (3) Sp

FIREY, WOLAK

The general nature of the processes of friction and wear. Rough surfaces and the area of contact. Temperature rise at contact surfaces during sliding, and resulting wear. Boundary friction. Friction and antifriction materials. Prerequisite, graduate standing in engineering or permission.

#### **Statistical Analysis of Engineering** Measurements (3) ASp ROBERTS

Application of statistical techniques to engineering problems; design of engineering test procedures so as to evaluate experimental error; investigation of inherent variability of processes and systems. Prerequisites, 215 and graduate standing, or permission.

### 518-519-520 Seminar (0-0-1, max. 6)

521 Thermodynamics III (3) AW

DEPEW, EMERY, WAIBLER The fundamental concepts of temperature, thermodynamic properties, and systems. The first, second, and combined laws. The general form of the energy equation, and applications. Development of the relations of classical thermodynamics. Prerequisites, 321 and graduate standing in mechanical engineering or permission.

## Thermodynamics IV (3) Sp

CORLETT, DEPEW, EMERY, ROBERTS, WAIBLER

Topics from statistical thermodynamics, in-

cluding the Boltzmann, Bose-Einstein, and Fermi-Dirac statistics. Solutions of the Schrödinger wave equation and evaluation of the partition function for translation, rotation, and vibration. Prerequisite, 521 or permission.

#### Combustion (3) Sp 524

CHALUPNIK, MERCHANT, SIGELMANN Chemical and physical processes of combustion, sources, and preparation of fuels, applications, design of combustion equipment. Prerequisite, graduate standing in mechanical engineering or permission.

#### 525 Acoustics in Engineering I (3) Sp

CHALUPNIK, MERCHANT, SIGELMANN Acoustic wave transmission, reflection, refrac-tion, and diffraction, in solids, liquids, and gases. Includes review of continuum mechanics and examples from electromechanical systems. Offered jointly with Electrical Engineering as Electrical Engineering 525. Prerequisite, graduate standing in mechanical or electrical engineering, or permission. Electrical Engineering 526. Prerequisite, 525

or permission.

### 526 Acoustics in Engineering II (3) A MERCHANT, OSBORNE, SIGELMANN

Continuation of 525. Material will differ each year, covering such topics as scattering, moving media, ultrasonics, acoustic holography, optoacoustics, transducer propagation in anisotropic medium, etc. Offered jointly with the Department of Electrical Engineering as

#### Acoustics of Environmental Noise (4) A 528 CHALUPNIK, CHARLSON, OSBORNE

Introduction to measurement and evaluation of environmental noise. Covers mathematical, physical, and psychological aspects of com-munity noise; includes sources, scales for rating, propagation, and control of noise. Laboratory demonstration of lecture principles. Offered jointly with the Department of Civil Engineering as CEWA 528. Prerequisite, permission.

#### 529 Experimental Heat Transfer (3) A DEPEW, EMERY, KIPPENHAN, MC FERON, WAIBLER

Study of instrumentation and techniques used in heat transfer measurements; investigation of conduction, radiation, and convection phenomena. Water heat-transfer loops will be used for experiments to determine heat flux, film coefficients, boiling pressure drops, and other phenomena of current interest. Prerequisite, graduate standing in mechanical engineering or permission of instructor. Offered evennumbered years.

#### Radiative Heat Transfer (3) W 530 DEPEW, EMERY, MC FERON

Fundamentals of thermal radiation for black, gray, nongray, diffuse, and specular surfaces. Gaseous radiation and special applications of thermal radiation. Prerequisite, graduate stand-ing in mechanical engineering or permission.

#### 531 Conductive Heat Transfer (3) A CORLETT, EMERY, GESSNER, MC FERON. OSBORN, WAIBLER, WOLAK

Fundamentals of the conduction process. The analysis of steady-state and transient heat conduction in single and multidimensional systems by mathematical, graphical, numerical, and analogical methods. Solutions for transient systems with unsteady boundary conditions, and with moving or fixed heat sources. Prerequisite, graduate standing in mechanical engineering or permission.

### 532 Convective-Heat Transfer (3) Sp EMERY, GESSNER, WAIBLER

An introduction to fluid flow and boundary layer theory as applicable to forced- and natural-convection heat transfer. Dimensional analysis. Condensation and boiling heat transfer. The design of heat exchangers. Prerequisites, CEWA 542 and graduate standing, or permission.

### 533, 534 Gas Dynamics (3,3) W,Sp BODOIA, CHILDS, CORLETT, EMERY, GESSNER

A study of the dynamic and thermodynamic relationships for the flow of fluids; application of basic laws to flow processes in pipes, nozzles, diffusers, compressors, turbines; wave phenomena; multidimensional flow; unsteady flow; processes involving chemical reactions. Prerequisite, CEWA 542 or permission.

### 535 Heat Transfer Studies (3) CORLETT, DEPEW, EMERY, KIPPENHAN,

MC FERON, WAIBLER

Advanced heat transfer studies of interest to mechanical engineers. Subject coverage will vary from year to year. Offered when demand is sufficient. Prerequisite, permission.

# Boundary Layer Theory (3) W

BODOIA, CHILDS, GESSNER A study of the dynamic and thermodynamic relationships for the flow of real fluids considering effects of viscosity and heat con-ductivity; applications of basic laws to problems involving flow through nozzles, diffusers, and ducts; jets and wakes. Prerequisites, 432 and CEWA 542, or permission.

### 538 Turbulent Boundary Layer Theory (3) A BODOIA, CHILDS, GESSNER

A continuation of 537 with special emphasis on turbulent boundary layers. The origin of turbulence; turbulent flow through pipes; in-fluence of pressure gradient on turbulent boundary layers; free turbulent flows, jets, and wakes; application to base pressure and wakes; application to base pressure and base heating problems. Prerequisite, 537 or permission. Offered even-numbered years.

### 541 Advanced Engineering Materials (3) W DALY, MILLS, SANDWITH, TAGGART

Behavior of engineering materials as affected by various conditions of loading and environment. Lecture, laboratory, and studies of tech-nical literature. Prerequisite, graduate standing in mechanical engineering or permission.

## Topics in Engineering Materials (3) Sp

DALY, MILLS, SANDWITH, TAGGART Selected topics of current importance concerning the nature and behavior of engineering materials. Lecture, laboratory, and studies of technical literature. Prerequisite, 541 or permission.

### 543, 544 Fluid Turbulence (3,3) A,W GESSNER, SLEICHER

Statistical and phenomenological theories of turbulence. Introductory concepts, velocity correlations, the energy spectrum, the decay of turbulence, scalar fields, turbulent trans-port, shear turbulence, wall turbulence, phenomenological theories of energy transport, instrumentation, recent literature. Offered jointly with Chemical Engineering as Chemical Engineering 543, 544. Prerequisite, 6 credits in graduate fluid mechanics. Offered Autumn Quarter in odd-numbered years; Winter Quarter in even-numbered years.

## 551 Applied Elasticity (3) A

KOBAYASHI, OSBORN, SHERRER, WOLAK General equilibrium and stress-strain relations in homogeneous, isotropic, elastic materials. Elastic stress distributions in machine components; plane-stress and plane-strain problems; torsion and bending in machine members; problems in thermal stresses. Prerequisite, graduate standing in mechanical engineering or permission.

## 552 Applied Plasticity (3) W

EMERY, KOBAYASHI, OSBORN, SHERRER Elastic-plastic stress distributions in machine components; stress-strain relations in the plastic range; yield in thick-walled pressure vessels, rotating cylinders and disks; torsion and bending of machine members with plastic flow; thermal stresses in shells, rotating disks and plates. Prerequisite, 551 or permission.

#### Applied Viscoelasticity (3) Sp 553

EMERY, KOBAYASHI, OSBORN, SHERRER Time-dependent aspects of stress and strain, and stability in mechanical engineering design. Stress analysis in the presence of creep and stress relaxation. Uniaxial loading, pressure vessels, rotating disks, plates, columns. Cyclic variation of load and temperature. Prerequisite, 551 or permission.

#### Advanced Theory of Plasticity (3) Sp 554 KOBAYASHI

Basic equations for three-dimensional problems of perfectly plastic solid, general consideration of discontinuous solutions, problems in plane strain and plane stress, problems in elastic-plastic solids and rigid-plastic solids. Prerequisites, 552 and CESM 592, or permission. Offered even-numbered years.

### 555 Thermoelasticity (3) W 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. Offered evennumbered years.

## 556 Experimental Stress Analysis (3) A

DAY

Studies of stress and strain relationships under static and dynamic loading. Analytical methods for determination of stress and strains in irregular members. Theory and practice of the photoelastic method. Brittle lacquer method for study of strain. Application of resistance wire strain gauges to measurement of dynamic and static strain. Interferometry as a tool in stress analysis. Prin-ciples and application of mechanical strain gauges. Lecture and laboratory. Prerequisite, graduate standing in mechanical engineering or permission.

### 557 Experimental Stress Analysis (3) W DAY

Study of structural similitude, dimensional analysis, and brittle models as they apply to experimental stress analysis. Use of nomographs with electric strain-rosettes, study of principles and application of instrumentation available for strain-sensitive pickups. Nondestructive methods of testing and inspecting structures and machine parts. Calibration of stress-analysis instruments. Prerequisite, 556.

### 558 Experimental Stress Analysis (3) Sp DAY

Seminar and individual research on special problems in experimental stress analysis. Prerequisite, 557 or permission. Offered oddnumbered years.

### 559 Fracture Mechanics (3) A KOBAYASHI

Linear fracture mechanics based on the Griffith-Irwin theory; crack extension force and stress intensity factors in two- and threedimensional solids, fracture toughness of engineering materials; ductile fracture, fracture dynamics, and crack growth rate. Prerequisite, 551 or permission. Offered even-numbered years.

### 564 Mechanical Engineering Analysis I (3) A BALISE, GALLE, JORGENSEN, OSBORN

Application of Fourier series and integral transforms, the Laplace transform, the complex variable theory to the description and analysis of linear systems in mechanical engineering. Analogies in heat transfer, fluid flow, stress distribution, dynamics, and feedback control. Prerequisite, graduate standing in mechanical engineering or permission.

### 565 Mechanical Engineering Analysis II (3) W

BALISE, GALLE, JORGENSEN, OSBORN

A continuation of 564 into the representation of systems by vectors, matrices, tensors, and partial differential equations. Emphasis is on physical interpretations of the mathematical representations and on analogies. Prerequisite, 564 or permission.

### 567 Advanced Dynamics (3) A

CHALUPNIK, MERCHANT, SHERRER Dynamics of particles and of rigid bodies, with emphasis upon applications involving machine, parts and other engineering components. Generalized coordinates, Lagrange's equations, Hamilton's principle. Prerequisite, graduate standing in mechanical engineering or permission.

## 568 Analytic Methods in Vibrations (3) A

BALISE, CHALUPNIK, MERCHANT, SHERRER Analysis of vibration phenomena in multidegree-of-freedom and continuous systems. Prerequisite, graduate standing in mechanical engineering or permission.

## 571 Servomechanisms I (3) W

BALISE, GALLE, JORGENSEN Linear and introductory nonlinear closed-loop system analysis and design on the complex plane and by frequency response; application to mechanical components; analogs. Prerequisite, 471 or permission.

## 572 Servomechanisms II (3) Sp

BALISE, GALLE, JOROBNSEN Continuation of 571 to include topics of current importance. Further study of nonlinear control, statistical analysis of feedback systems, sampled-data methods, self-adaptive systems. Prerequisite, 571 or permission.

### 575 Systems Theory (3) Sp BALISE, GALLE

A study of the state variable approach as applied to the analysis and synthesis of systems. System state vectors, response matrices, simulation diagrams, controllability and observability. Geometrical and physical interpretations of the mathematical methods. Prerequisite, 565 or permission.

## 579 Fluid Power Control (3) W

BALISE, GALLE, JORGENSEN An analytical treatment of hydraulic and pneumatic power applied in control systems. Valve actuators, hydraulic transmissions, block diagram representation, steady-state and dynamic

analysis, applications, recent developments.

Prerequisite, graduate standing in mechanical engineering or permission.

### 584 Gas Turbines (3) A

engineering or permission.

BODOIA, GUIDON Applications of the gas turbine; gas turbine cycles (theoretical Brayton, simple open, regenerative, reheat, intercooling, and closed cycles); axial-flow compressors; centrifugal compressors; turbines; combustion systems; gas turbine power plant materials; plant performance. Prerequisite, graduate standing in

### 589 Nonlinear Mechanical Vibrations (3) W CHALUPNIK, MERCHANT, SHERRER

Study of systems with nonlinear damping and restoring forces, applications of the phaseplane delta and the Ritz averaging method, and stability of nonlinear oscillations. Prerequisite, 568 or permission.

### 590 Random Mechanical Vibrations (3) Sp CHALUPNIK, MERCHANT, SHERRER

The study of the problems in measuring random vibrations, in designing simulation equipment, and in mechanical design for random vibration in aircraft and missiles. Prerequisite, 568 or permission.

599 Special Projects (1-5, max. 9) AWSpS Prerequisite, permission of department chairman.

600 Independent/Study or Research (\*) AWSpS

700 Master's Thesis (\*) AWSpS

800 Doctoral Dissertation (\*)

## MINING, METALLURGICAL, CERAMIC ENGINEERING

### CERAMIC ENGINEERING

**Courses for Undergraduates** 

## 198 Career Planning II (1) WSp

MUELLER

Career opportunities in ceramic engineering and the required educational curricular planning.

### 199 Materials Analysis (1) AWSpS MUELLER

Practical use of optical and electron microscopy, X-ray diffraction, X-ray spectroscopy, electron microprobe, and scanning electron microscope in the analysis of common engineering materials.

#### 202 Ceramic Engineering I (2) W MUELLER

Scope of ceramic materials and ceramic industries; use of ceramics as engineering materials; economic importance.

## 203 Ceramic Engineering II (2) Sp

CAMPBELL Theory and methods used in measuring properties of ceramic materials; control of ceramic processes.

### 300 Introduction to Ceramic Engineering (5) A

MUELLER

An introduction to ceramic engineering materials and processes; standards, testing, and evaluation; types of industry and employment; career and curricular planning. Not open to students who have received credit in 202-203.

### 301 Ceramic Raw Materials (4) A MILLER

Natural and synthetic materials used in ceramic products; their mineralogy, physical properties, compositions, and sources.

### 302 Ceramic Processing I: Transport (4) W MILLER

Transport in ceramic processing systems; fluid flow, heat flow, mixing, and applications of drying, firing, and pyrometry.

### 303 Ceramic Processing II: Methods (5) Sp WHITTEMORE

Technology of ceramic fabrication processes. Material characterization at processing stages for control. Laboratory study of all operations in the manufacture of selected ceramic products.

#### 306 Ceramic Engineering Excursion (1) A CAMPBELL

Plant inspection trip. Prerequisite, junior standing.

### 307 Ceramic Engineering Excursion (1) A CAMPBELL

Plant inspection trip. Prerequisite, senior standing.

### 311 Physical Ceramics I: Equilibria (3) W SCOTT

Phase diagrams, thermodynamics of heterogeneous equilibrium, nonequilibrium processes, and the interpretation of three component diagrams.

### 312 Physical Ceramics II: Microstructure and Kinetics (4) W FISCHBACH

Crystalline and glassy state; defects, diffusion, and physical-chemical reactions in ceramic materials.

### 313 Physical Ceramics III: Properties of Ceramic Solids (4) Sp MILLER

Thermal and optical properties; plastic deformation; elasticity and strength; electrical conductivity; dielectric and magnetic properties.

### 322 Microscopy of Ceramics (3) W SCOTT

The use of optical and electron microscopes in the interpretation of ceramic microstructures; thin-section petrography, polished sections, quantitative microscopy, and the use of replicas in the electron microscope.

#### 323 Instrumental Analysis (3) Sp MURLLER

Theory and application of X-ray diffraction and spectroscopic techniques.

## 400 Ceramic Materials (3) A

SCOTT

The nature and properties of ceramic materials and their relation to ceramics in engineering design. The atomic, micro- and macro-structure of ceramics related to their stability in electrical, mechanical, and thermal environments. For nonmajors only.

### 401 Equipment and Plant Design (3) A WHITTEMORE

The design process and its application in coramic engineering. Design projects.

### 402 Equipment and Plant Design (2) W

Calculation and design of processing equipment.

### 403 Ceramic Process Analysis (3) Sp WHITTEMORE

Case histories of ceramic industrial facilities. Plant visits. Economic factors and overall ENGINEERING

process integration, including raw materials, processes, fuels, personnel, distribution.

409 Ceramic Materials Laboratory (1) A SCOTT

Concurrent registration in 400 required.

#### 410 Physical Ceramics: Ceramic Equilibria II (3) A CAMPBELL

Derivation of phase equilibria relations, phase transformations, solid and liquid solutions, and non-equilibrium systems. Prerequisite, 314 or permission.

### 411 Vitreous State (4) A FISCHBACH

Chemistry and physics of glass, glazes, and porcelain enamels; structure and properties of vitreous materials. Prerequisite, 312 or permission.

## 420 Colloidal Ceramics (3)

WHITTEMORE 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.

### 422 Electronic Ceramics (3) / CAMPBELL

Principles and theory of conductive, ferromagnetic, piezoelectric, thermoelectric, and electroluminescent materials.

### 430 Nuclear Ceramics (3) W

MILLER Uses and properties of ceramic materials for nuclear reactors; radiation effects.

#### 441 Undergraduate Seminar (1) A MILLER

Employment selection. Resume writing and correspondence, personnel contacts, interview planning and job selection campaign.

### 442 Experience in the Arts (1) W LEAHY, MUELLER

Informal experiences with the arts through attendance at theatres, concerts, art exhibits, etc.; through discussions with creative artists; and through personal attempts at producing a work of art. Offered jointly with the Department of Humanistic-Social Studies as Humanistic-Social Studies 461.

#### 443 Undergraduate Seminar (1) Sp CAMPBELL

Discussion of research and problems.

### 450 Introduction to Carbon Materials (3) Sp FISCHBACH

Nature and capabilities of crystalline and disordered forms of pure carbon as engineering materials. Influence of structure on behavior. Preparation methods, structure and properties of diamond; synthetic and natural graphites; glassy, coke, pyrolytic, black, and fiber carbons.

#### 460 Ceramic-Metal Systems (3) W CAMPBELL

Vitreous and crystalline coatings for metals; ceramic-metal composites.

### 470 Refractories (3) W

WHITTEMORE

Chemical and mineralogical composition; processing methods; thermal, physical, and chemical properties and tests; application. **498** Special Topics (1-5, max. 6) AWSpS Special topics in ceramic engineering offered as a course with lectures, conferences, or laboratory. Prerequisite, permission of division head.

499 Special Projects (\*, max. 5) AWSp Problems in ceramics; laboratory investigations and bibliographic research. A total of 5 credits is required.

### **Courses for Graduates Only**

501 Process Ceramics I (3) W WHITTEMORE Technology of ceramic fabrication processes.

Characterization of ceramic materials at stages of processing.

#### 502 Process Ceramics II (3) A CAMPBELL

Principles of process control as applied to the ceramic industry; methods of measurement and evaluation of data and its application to industrial production.

## 503 Research Techniques (3) A

FISCHBACH

Philosophy of experimentation; error analysis; vacuum technique; production and measurement of high temperatures; selected topics in advanced experimental techniques.

### 511 Advanced Physical Ceramics I (3) A FISCHBACH

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.

### 512 X-ray Diffraction Analysis (3) W MUELLER

Application of X-ray diffraction and spectroscopic techniques and their evaluation in the structure and properties of materials. Laboratory practice in analysis, line broadening and displacement phenomena; structural effects on intensity. Prerequisite, 412 or equivalent,

### 513 Advanced Physical Ceramics II (3) Sp MILLER

Physical and thermal properties of multiphase materials. Simple and complex mixture rules. Mechanical properties of multiphase materials. Enhancement of properties by material design. Production of preferred microstructure by special processing. Composite materials including cermets and oriented composites involving ceramics.

### 514 Thermodynamic Topics in Ceramics (3) SCOTT

Applications of thermodynamics to predict behavior of materials at high temperature. Techniques of measurement and estimation of high temperature thermodynamic properties, use of estimated values for thermodynamic calculations.

# 520 Seminar (1, max. 6) AWSp Required for all graduate students.

# 521 Mechanical Behavior of Ceramics

(3) Sp SCOTT

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.

### 590 Industrial Minerals Research (\*) AWSp

- 599 Special Topics in Ceramics (\*) AWSp
- 600 Independent Study or Research (\*) AWSp
- 700 Master's Thesis (\*) AWSp
- 800 Doctoral Dissertation (\*)

## METALLURGICAL ENGINEERING

### **Courses for Undergraduates**

### 198 Career Planning in Metallurgy (1) WSp STOEBE, ZUPP

Introduction to the field of metallurgical engineering. Includes interdisciplinary aspects of the field, lecture-demonstrations, introduction to laboratory tools and techniques, and discussions on curriculum and career opportunities with current students.

### 201 Modern Metallurgy (2) ASp

DAWSON, JONES

Lectures on topics of current interest in metallurgical engineering, followed by individual or group projects related to the topics of interest. The projects may consist of laboratory, library, or field work, or a combination of these. Projects can be continued into subsequent quarters in 202.

#### 202 Special Projects (1-3) AWSpS JONES

Continuation of projects started in 201. Prerequisites, 201 and permission.

## 301 Metallurgical Systems and Instrumentation (3) A

ARCHBOLD, ZUPP

Instrumentation, equipment, and laboratory techniques in metallurgical engineering. Metallographic laboratory practice, mechanical property measurements, X-ray generation and detection, heat generation and control, vacuum methods. Laboratory experiments designed to illustrate basic metallurgical principles.

306 Metallurgy Excursion (1, max. 2) Sp Plant inspection trip junior and senior year. Required of all majors.

### 322 Metallurgical Thermodynamics (3) A JONES

The quantitative application of thermodynamics to systems of interest to metallurgists. A detailed review of thermodynamic quantities and equations of state.

### 323 Metallurgical Transport Phenomena (3) W JONES, ZUPP

Introduction to the principles of momentum, heat, and mass transfer. Review of the principles of chemical kinetics. Application of transport phenomena to systems of metallurgical interest. Prerequisite, 322.

### 325 Extractive Metallurgy I (4) W

BRIEN

Physical and chemical principles of mineral preparation and concentration. Comminution; classification, thickening, filtering of mineral suspensions; sampling; transport; and related physical processes. Physical and chemical theory applied to concentration processes; surface phenomena, electromagnetic, electrostatic, phase change, solution, and precipitation. Laboratory illustrates fundamental principles.

### 326 Extractive Metallurgy II (4) Sp JONES

Application of physical and chemical principles to high-temperature and electrolytic extraction and refining of metals. Descriptions of processes and unit operations, with emphasis on the thermodynamic and kinetic aspects involved. Prerequisites, 322, 323.

### 361 Structure of Solids (4) A ARCHBOLD

Elements of crystallography and the structure of metals and alloys, intermediate phases, superlattices. Theory and application of Xray and electron diffraction for the determination of crystal structure. Laboratory experiments related to these principles.

### 362 Properties of Solids (4) W DAWSON

The physical, mechanical, and transport properties of solids: crystal defects and their influence on physical and mechanical properties. Introduction to transport properties and the theory of atomic diffusion. Laboratory experiments related to the measurement of the properties of engineering solids. Prerequisite, 361.

### 363 Reactions in Solids (4) Sp POLONIS

The application of elementary kinetics and thermodynamics to solid state reactions. Theories of nucleation and growth and their application to diffusional and diffusionless transformations. Recovery and recrystallization. Heat treatment of alloy systems and relations between properties and microstructure. Laboratory experiments related to these topics. Prerequisite, 362.

#### 400 **Applied Materials Science for** Teachers I (3) A

JONES, STOEBE

Designed to give junior high school and high school science teachers and science consultants a broad background in the structure and properties of solids, solid-state reactions, and phase equilibria, and in typical engineering applications of these principles. Laboratory and discussion sections on the educational implications and applications of this material in the classroom. Prerequisite, knowledge of freshman chemistry.

#### 401 **Applied Materials Science for Teachers** II (3) W

JONES, STOEBE

Continuation of 400, with more information on engineering applications of materials. Discussion sessions and special curriculum proj-ects in place of laboratories; special seminars and field trips on arrangement. Prerequisite, 400 or equivalent.

### 402 Educational Projects in Materials Science (1-5) AWSp

In-depth study of special topics in materials science with special seminars and lectures; participation in materials science research projects or curriculum development projects involving science or industrial arts classes. May be repeated for credit. Prerequisite, 400 or equivalent.

#### 421 Thermodynamics of Solids (3) W ZUPP

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.

#### 422 Process Metallurgy (3) Sp JONES

Application of physical chemistry and transport theory to metal process engineering. Prerequisite, permission.

#### 423 Corrosion of Engineering Materials (3) Sp ZUPP

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 including chemical process industries, nuclear engineering, and marine environments.

Metallurgical Experimental 455 Techniques (3) A

ZUPP

Modern research techniques in physical metallurgy. Design and execution of experiments and the analysis of data. Laboratory experiments to illustrate solid-state phenomena. Prerequisite, 363.

460 Advanced Physical Metallurgy (3) Current engineering topics in physical metallurgy. May be repeated for credit.

#### 461 Deformation and Mechanical Behavior of Metallic Systems (3) A DAWSON

Theories of elastic and plastic behavior of solids. Role of imperfections in mechanical behavior. Yielding, work hardening, strength-ening mechanisms, creep, and fatigue. Prerequisite, 362.

### 462 Engineering Physical Metallurgy (3) W POLONIS

Structure and properties of steels. Analysis of states of stress and strain, fracture mechanics, microstructural aspects of deformation. Casting and solidification of metals and alloys. For majors and nonmajors. Prerequisite, 363 or Mechanical Engineering 340.

#### 463 **Reliability and Design in Metallurgical** Systems (3) Sp

ARCHBOLD

Properties of commercially important engi-neering alloys. Metallurgical design problems and failure analysis. Prerequisite, 363.

#### 466 Theory of Metals (3) A

STOEBE

Application of wave mechanical concepts to assemblies of atoms. Atomic bonding, sta-tistical mechanics, free electron and band theories. Application of principles to con-duction in metals, insulators, semiconduc-tors, and to magnetic and optical processes.

Undergraduate Seminar (1, max. 3) 468 AWSp

Minerals Processing: Flotation (3) A 470 BRIEN

Theory and practice; applied surface chemistry, adsorption, surface tension, flocculation and dispersion and related fundamentals. Laboratory illustrates basic phenomena, practical testing and flotation variables. Prerequisite, 325.

#### 471 Hydrometallurgy (3) Sp BRIEN

Physical-chemical principles of solution processes; fundamental theory applied to effects of pressure, temperature, diffusion rates, pyrometallurgical pretreatment, activities, oxidation and reducing conditions, impurities, contact time, interphase areas and associated variables. Ion exchange and solvent extraction principles. Laboratory. Prerequisite, 325.

#### 472 Mineral Processing Practices (3) A BRIEN

Methods of laboratory investigations and re-

cent plant and process innovations reported in the current literature. Prerequisite, 325.

### Mineral Process Plant Design (2) W BRIRN

General arrangement planning and design calculations on a project basis. Prerequisite, 325.

### **Opaque Minerals Microscopy (2) Sp** BRIEN

Microscopic determination of the ore minerals; physical and optical properties, etch reactions; microchemical testing of polished sections; mineral associations, liberation, grain counting.

499 Special Projects (\*, max. 5) AWSpS Laboratory investigation of a metallurgical problem on an independent basis. Maximum of 5 credits may be counted toward graduation.

## **Courses for Graduates Only**

## 511 Advanced Theory of X-ray Diffractions (3) W

ARCHBOLD

The use of the reciprocal lattice concept and Fourier analysis in the study of atomic arrangements in crystals. Line shape and diffuse scattering analysis. Analytical interpre-tation of diffraction patterns. Prerequisite, 361 or equivalent.

### 512 Transmission Electron Microscopy (3) Sp ARCHBOLD

Fundamentals of electron optics as applied to microscopy. Applications of contrast theory and electron diffraction with emphasis on defect and multiphase structures in crystalline solids. Prerequisite, 511 or equivalent.

### 520 Seminar (0) AWSp

Review of research problems and recent literature. Required for all graduate students.

#### 525 Thermodynamic Topics in Metallurgy (3) Sp

JONES, ZUPP

Selected topics in application of classical and statistical thermodynamics to systems of current metallurgical interest.

### 531 Advanced Metallurgy (\*) AWSp

Study of selected problems, with particular attention to recent publications and scientific applications in physical or extractive metallurgy.

### 541 Theoretical Structural Metallurgy I (3) A DAWSON

Detailed study of the general properties of dislocations: elastic theory; glide motion of dislocations; vacancies, interstitial atoms, and dislocation climb; imperfect dislocations. Prerequisite, 363.

### 542 Theoretical Structural Metallurgy II (3) W

DAWSON

Dislocation arrays in crystals and their plastic properties: the elastic and plastic properties of real crystals; cold work, annealing, polygonization, recrystallization and grain boundaries; creep; cleavage. Prerequisite, 541.

#### 543 Theoretical Structural Metallurgy III (3) W

DAWSON, STOEBE The nature of the interactions of dislocations with impurities. Influence of impurities and precipitates on the mechanical properties of crystals. Prerequisite, 541.

## ENGINEERING

551 Special Topics in Advanced Physical Metallurgy (\*, max. 6) AW Prerequisite, 363 or equivalent.

561 Phase Transformations in Metals and Alloys I (3) A

POLONIS

Thermodynamics and kinetics of solid-state reactions in metals, phase stability, theories of nucleation and growth, precipitation from solid solutions, applications to specific metal and alloy transformations.

#### 562 Phase Transformations in Metals and Alloys II (3) POLONIS

Theory of transformation processes in solids, with emphasis on energetics and structural mechanisms; melting and freezing, role of imperfections in solid-state reactions, martensite transformation, eutectoid decomposition, cellular precipitation.

#### Phase Transformations in Metals and 563 Alloys III (3) STORBE

Theory of diffusion; application of diffusion theory to solid state reactions; thermodynamics of irreversible processes. Prerequisite, 561.

#### Magnetic Materials and Phenomena (3) W 566 STOEBE

Theories of magnetic phenomena, including diamagnetism, paramagnetism, ferromagnetism, and ferrimagnetism. Details of magnetization processes in materials; anisotropy, magnetostriction; domain energies and configurations; applications to magnetic materials. Prerequisite, 466.

#### 567 Electronic Processes in Materials (3) W DE WERD, STOEBE

Lattice dynamics, including vibrational modes and phonon effects. Brillouin zone theory, and fermi surfaces with applications in the theory of electrical conduction and in the semiconduction theory. Optical properties of solids, including color centers and luminescence. Prerequisite, 466.

#### 568 Advanced Topics in the Physical Properties of Materials (1, max. 6) AWSp STOEBE

Advanced topics and recent research related to electrical, magnetic, and optical properties of solids. Prerequisites, 466 and 566 or 567, or permission.

#### 570 **Topics in Advanced Mineral Processing** (\*) A

BRIEN

Special topics of current interest in the preparation and concentration of minerals; the application of physical and surface-chemical fundamentals in investigative research, ratecontrolling mechanisms in hydrometallurgy.

#### 571 Advanced Mineral Processing Theory I (3) W BRIEN

Thermodynamics and electrochemistry of surfaces. Potential differences across interfaces; electrical double layer, surface tension; Gibb's adsorption equation in three-phase flotation systems; anionic and cationic selectivity; ion exchange and solvent extraction.

## 572 Advanced Mineral Processing Laboratory (\*) S

BRIEN

Experimental study of theoretical principles in preparation, concentration, and hydrometallurgy.

- Special topics in Metallurgy (\*) AWSpS 599
- Independent Study or Research (\*) 600 AWŠpS
- Master's Thesis (\*) AWSpS 700
- Doctoral Dissertation (\*) AWSpS 800

### MINING ENGINEERING

### **Courses for Undergraduates**

### 221 Explosives and Rock Drilling (2) W ANDERSON

Principles of rock breaking and characteristics of explosives. Theory of fragmentation; design of blast and explosive loading patterns; nu-clear explosives in industry; safe practices, and elements of costs. Applications in tunneling and surface work.

306 Mine Excursion (1, max. 2) Sp Five-day trip to a neighboring mining region. Required in junior and senior years during spring vacation, or as scheduled.

### 322 Principles of Mine Production (4) A ANDERSON

Working of open pit and underground mines. Delineation of ore bodies; shafts and development; level planning and underground stoping methods; characteristics of mine rocks; support systems; introduction to transport, drainage, ventilation, hoisting, and mine organiza-tion. Emphasis on labor and equipment, productivity, and costs.

### 325 Mineral Land Valuation (2) W ANDERSON

Sampling methods in mines and placers; drill hole and coring methods; geological aspects; estimation of deposits and reserves; use of computers in ore reserve calculations; metallic and nonmetalic depletion and financial calculations; reports. Prerequisite, 322 or permission.

### 330 Mine Surveying (3) Sp ANDERSON

Practice in underground methods, use of special instruments, stope measurements, shaft surveying, solar observations, and carrying of meridian underground; production of working and geologic maps and sections.

#### **Exploration and Development of** 426 Mineral Deposits (4) Sp ANDERSON

Mining geology; procurement of data by geologic mapping and drilling; solution of mine structural and fault problems; physiographic, mineralogical, and structural guides to ore applied to mine exploration; exploration and development programs; evaluation of prospects. A feasibility report is required after field study of a mineral deposit.

### 432 Mine Plant Design (5) Sp

ANDERSON Principles and application; design of transport systems; air compression practice and distri-bution; pumping plant and mine water handling; electrical equipment and distribution systems in mines; plant design and construc-tion. Prerequisites, 322 and Electrical Engineering 306.

### 433 Environmental Control in Mines (3) A ANDERSON

Principles and practices. Physical and chem-ical aspects of mine atmosphere, gases, and dusts; physiological considerations; air flow and measurement; mechanical ventilation,

and air conditioning equipment and systems. Prerequisite, 322.

### 481 Mineral Industry Economics (3) W ANDERSON

World mineral resources, their distribution, exploitation, and depletion; social, economic, and political effects; international control and trade, industrial organization, government policies, taxation, tariffs, marketing, and pricing; elements of production costs. Prerequisite, Economics 211.

### 499 Special Projects (\*, max. 5) AWSp

Problems in mining or mineral processing; field or laboratory investigations on an independent basis.

## **Courses for Graduates Only**

### 520 Seminar (1, max. 6) AWSp

Lectures and discussions; review of research problems and recent literature. Required for all graduate students.

### 521 Mining Systems (\*) AWSp

ANDERSON

Production methods; mining control; support; applied efficiency methods; administration; equipment and machinery; health and safety; special problems. Arranged in accordance with student's major interest.

### 522 Mine Shafts (3) A

ANDERSON

Location and design, surface plant, collar preparation; sinking, mechanization, and or-ganization, support, concrete lining, stations and bottoms, equipment and maintenance, safety and costs; special attention to modern circular shafts.

### 551 Special Topics (3-5, max. 15) AWSp Topics of current interest and importance in the mineral industries or individual study on

a subject of special interest.

## 600 Independent Study or Research (\*) AWSp

700, Master's Thesis (\*) AWSp

## NUCLEAR ENGINEERING

#### Introduction to Nuclear Reactor 400 Analysis (4) A

ALBRECHT

A course in fission reactor theory covering interactions of neutrons with matter; neutron diffusion and slowing down; solution methods of boundary-value problems in elementary nuclear reactor theory. Prerequisites, Physics 327 and Mathematics 238.

### 444 Nuclear Materials (3) W

DAWSON A lecture course covering the structure, prop-erties, and performance of materials in nuclear reactor applications; engineering requirements and selection of materials for reactors; technology of materials for reactor fuels, moderators, shields, control elements, and structural components; corrosion and oxidation; effects of radiation on the structure and properties of materials. Prerequisites, Physics 320, and Engineering 170 or equivalent.

### 477 Introduction to Radioactive Tracer Techniques (2) A

ROBKIN

Introduces the student to the basic concepts of the use of radioactive tracers to measure the transfer between the compartments of a biological system. The theoretical analysis will be restricted to systems with no more than three compartments. The experiments are designed to permit the student to utilize the theory discussed and to make actual determinations of transfer coefficients. Offered jointly with the Department of Radiology in the School of Medicine as Radiology 477.

#### 484 Introduction to Nuclear Engineering (4) A BABB

An introductory course in nuclear engineering for seniors, graduate students, and practicing engineers. The course is designed to demonstrate the application of the principles of nuclear science to the processes associated with the release, control, and utilization of all forms of energy from nuclear sources, including nuclear reactors; elementary nuclear reactor theory; control of nuclear reactors; thermonuclear reactions. Prerequisite, Mathematics 238, or permission.

### 485 Nuclear Instruments (3) W

### ROBKIN, WOODRUFF

A lecture and laboratory course devoted to the principles of measurement and detection of various types of radiations encountered in nuclear energy systems. Laboratory demonstrations will include the use of Geiger, proportional and scintillation detectors; ionization chambers; analog-digital data logging equipment; and multi-channel gamma ray spectrometers. Sources of radiation will include the 100 KW UW Nuclear Reactor and pulsed neutron generators. Typical applications of neutron activation analysis and various radioactive tracer techniques in medicine, oceanography, forensic science, and engineering will also be presented. Prerequisite, junior or senior standing.

### 486 Nuclear Power Plants (3) Sp

BABB

A course for students interested in applications of nuclear energy to power generation. Discussions of various types of nuclear reactor systems will include pressurized water, boiling water, high temperature gas cooled, sodium graphite, as well as advanced converter and breeder reactors. Particular attention will be given to the problem of world energy resources and the United States and world views of the availability and consumption of nuclear fuels. The use of nuclear energy in land, sea, air, and space transportation will be described, and various design concepts including radiation shielding and materials selection will be considered. The economics of nuclear power will be emphasized throughout the course. Prerequisite, senior standing; 484 recommended.

#### 487 Radioactive Tracer Techniques (2) A ROBKIN

The use and behavior of radioactive tracers are studied; attention is given to the dynamics of the distribution of trace elements after their introduction into the system. Analysis of current models and application to examples from both living and nonliving systems. Offered jointly with the Department of Radiology 487. Prerequisite, permission.

#### 500 Nuclear Reactor Theory (4) A. GARLID

Covers the angle-independent transport equation and reduction to specialized forms; multigroup, multiregion diffusion theory; calculations of eta, thermal utilization, and resonance escape probability; reactor kinetics; perturbation theory. Prerequisite, 400, which may be taken concurrently with permission.

### 506 Nuclear Engineering Laboratory (4) Sp WOODRUFF

Advanced laboratory course in which experimental research is conducted. Selected experiments are performed which involve the use of such equipment as the reactor as a neutron and gamma ray source, pulsed neutron generator, helical neutron monochrometer, neutron diffraction spectrometer, pile oscillator, pile-noise analysis equipment, timeof-flight equipment, and analog and digital computers. Prerequisite, 485 or permission.

### 510 Nuclear Reactor Engineering (3) A BABB

Advanced course in engineering analysis of nuclear reactor systems. The course covers core design methods; heat generation and distribution in nuclear reactor systems; the removal and utilization of heat for power production; fuel cycles; shielding of nuclear radiations. Prerequisite, 500.

### 512 Nuclear Reactor Design (4) W

Design laboratory involving the synthesis of reactor theory, engineering analysis, material specifications, and economics to meet the design specifications for a complete nuclear reactor facility. Emphasis upon cycle analysis, hazards, arrangements, and requirements peculiar to nuclear reactor plants. Prerequisite, 510.

### 521, 522, 523 Graduate Seminar (0,0,1) A,W,Sp

### 524 Seminar in Nuclear Systems Analysis (1-2, max. 12) AWSp

Studies of recent advances in nuclear systems analysis with students, faculty, and visiting scientists and engineers reporting on recent research and publications. Only open to students having a master's degree or equivalent.

### 530 Nuclear Reactor Statics I (4) W

MC CORMICK

Covers the Boltzmann equation for neutrons and offers an introduction to the solution of one-speed model problems. Emphasis is placed upon the multigroup spherical harmonics and the discrete ordinate techniques. Prerequisite, 500.

#### 531 Nuclear Reactor Statics II (3) Sp MC CORMICK

Adjoint equation, perturbation theory, and variational methods are considered; other topics include neutron thermalization, resonance absorption, applications of theory to practical problems. Prerequisite, 530.

### 532 Advanced Reactor Technology (3) A WIRTZ

Considers the advanced technology required for modern nuclear power reactor systems. Both thermal and fast reactor technology will be evaluated from theoretical and engineering points of view.

### 540, 541 Topics in Bionuclear Engineering I, II (4,3) W,Sp

#### ROBKIN

1

Investigations into various aspects of the interaction of radiation with biological material. Included may be topics in the analysis of radiation fields, dosimetry, shielding, biological response to radiation, mathematical modeling, etc. Some experiments may be designed and carried out as part of the course. The course will be conducted on a seminar basis with the discussion not limited to material which is already described in the literature. Original research is not excluded. Offered jointly with the Department of Radiology in the School of Medicine as Radiology 540, 541.

### 550 Neutron Transport Theory (3) A MC CORMICK

Exact solutions of specialized neutron transport problems and relationship of the results to those obtained by approximate techniques are considered; additional topics include synthesis methods and Monte Carlo techniques. Prerequisite, 531.

### 556 Introduction to Plasma Theory (4) W VLASES

Introduces plasma theory and lays the foundation for application to a variety of research and development areas. Topics covered include dynamics of charged particles in electromagnetic fields, plasma kinetic theory, transport phenomena, development of various fluid models, and waves in plasmas. The electromagnetic theory required will be reviewed briefly at the beginning of the course.

### 557 Plasmas and Controlled Fusion (3) Sp VLASES

Emphasis is on the problem of controlled thermonuclear fusion. After an introduction to the general problem, the basic principles of magnetic confinement, stability, and plasma heating are discussed. Final section deals with a review of current research in this field, including status of currently promising fusion devices. Prerequisite, 556.

### 560 Nuclear Reactor Dynamics I (4) W ALBRECHT

Nuclear reactor dynamic equations, delayed neutron representations, response of reactors to various perturbations, operational techniques of system analysis, feedback mechanisms, stability criteria, power coefficients. Prerequisites, 500, Mathematics 427, 428.

#### 561 Nuclear Reactor Dynamics II (3) Sp ALBRECHT

Experimental nuclear reactor dynamics, oscillators, pulsed neutrons, stochastic processes; dynamics of heat removal system components, analysis of closed loop system, space-dependent dynamics. Prerequisite, 560.

## 570 Neutron Thermalization (3) A

MC CORMICK Detailed study of the energy distribution of neutrons at energies below 1 ev. Topics include kinematics of scattering of intermediate and slow neutrons, scattering data and the scattering law, scattering kernels, calculation of stationary neutron spectra, variational methods. Prerequisite, 530.

# 588 Nuclear Fuel Management (2) W

Technical and economic principles for management of nuclear fuels including: energy resources, fuel cycle schemes, fuel cycle neutronics, fuel cycle economics, irradiated fuel processing, isotopic separations, utilization of fission products and other radioactive isotopes. Offered jointly with the Department of Chemical Engineering as Chemical Engineering 588. Prerequisites, 484, Chemical Engineering 530, or permission.

599 Special Topics in Nuclear Engineering (\*) AWSp

Discussions and readings of topics of current

## **FISHERIES**

interest in the field of nuclear engineering research. Subject matter may include reactor fuels and materials, reactor dynamics and control, instrumentation, thermonuclear processes, direct conversion problems. Prerequisite, permission of department chairman.

600 Independent Study or Research (\*) AWSpS

700 Master's Thesis (\*) AWSpS

800 Doctoral Dissertation (\*) AWSpS

## COLLEGE OF **FISHERIES**

### FISHERIES

### **Courses for Undergraduates**

101 Introduction to Fisheries Science (5) AS 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. Recommended for both majors and nonmajors.

#### 240 **Applications of Digital Computers to Biological Problems (4) W** BEVAN

Methods and procedure for processing biological data by means of digital computers; problem analysis, elementary programming, use of package programs for statistical analysis. Prerequisite, Quantitative Science 281.

### 311 Biology of Fishes (3) A

Diversity in the structure, function, and habits of fishes viewed as an expression of variations in their biological and physical environment. Prerequisite, 10 credits in biology.

### 314 Methods and Instruments for Fishery **Investigations (3) WSp** SALO

Theory and practice of instrumentation and sampling in Fisheries; shipboard experience with equipment, collecting and recording data from biological samples, and the physical environment. Prerequisites, 5 credits in Fisheries.

### 379 Fisheries of the World (3) A

KASAHARA

Review of aquatic living resources; other re-sources of the sea; present and future of world's fisheries; estimation of potential harvest and problems of development; law of the sea and international arrangements for fisheries; status of the U.S. fishing industry; prospects of aquaculture.

**Classification of Economically Important** 401 Fishes (5) ASpS WELANDER

Classification, identification, and distribution of fishes. Prerequisite, 10 credits in biology.

#### 405 Economically Important Mollusca (5) A CHEW

Classification, life histories, distribution, methods of cultivation, and economic importance of oysters, clams, scallops, abalones, cephalo-pods, and other Mollusca. Prerequisite, 10 credits in biology.

#### Economically Important Crustacea (5) W 406 CHEW

Classifications, life histories, distribution, methods of capture, and economic importance of crabs, shrimps, lobsters, crayfish, and the smaller Crustacea. Prerequisite, 10 credits in biology.

#### 425 Life History of Marine Fishes (5) W DELACY

Fecundity, spawning, incubation, and hatching of marine fishes; identification and survival of larvae and juveniles; food and feeding of adults; migration; recognition of subpopulations. Prerequisite, 401.

#### 444 Fisheries Genetics (3) W

HERSHBERGER

Survey of principles and practices in the field of genetics that can be applied to fisheries biology, with emphasis placed on the qualitative and quantitative aspects of variability in aquatic species, natural and artificial selection, and genetic analysis of fish populations. Pre-requisite, Genetics 451 or equivalent.

### 451 Reproduction of Salmonoid Fishes (5) A

### DONALDSON

Spawning and incubation; natural and artificial methods of hatching and rearing, rates of development; racial strains and selection; evaluation of procedures; design, structure, and maintenance of facilities. Prerequisites, 401 and 10 credits in chemistry.

### 452 Nutrition and Care of Fishes (5) W DONALDSON

Basic nutritional requirements of fish in natural and artificial environments; feeding and efficiency of diets; nutritional diseases; stocking policies; quality evaluation. Prerequisites, 401 and 10 credits in chemistry.

#### 454 Communicable Diseases of Fishes (5) Sp CHEW

Organisms causing diseases in fishes; prevention and known treatments of fish diseases. Prerequisites, 401 and Microbiology 301.

#### 459 Aquatic Food Chains (5) WS TAUB

A survey of the sources and nutritional values of foods for fisheries resources. Efficiencies, rates of transfer through the food chain, pollution effects and the potential for using pollution will be considered. Prerequisite, upperclass standing in a biology program.

#### 460 Water Management and Pollution Studies (5) ASp

### M. C. BELL

Stream flows and mechanics of freshwater environment, and other problems such as natural propagation; water flow measurement in streams and pipes; use of weirs; hatchery water requirements; screening of water diversions for protection of downstream migrants; nomenclature, water rights, and protective laws. Prerequisites, 401, Mathematics 105, and physics, or permission.

465 Problems in Fish Biology (6) S Taxonomy, ecology, and life history of the fishes of the San Juan Islands and Northeast Pacific. (Offered at Friday Harbor Laboratories Summer Quarter only.) Prerequisite, permission.

#### 467 Fisheries Management (5) Sp WHITNEY

Principles and practice of the management of commercial and recreational fisheries. Emphasis is on concepts. A field exercise provides practical experience. Guest lecturers from international, federal, and state agencies discuss the need to take into account factors other than biological in making management decisions. (Students interested in a more quantitative emphasis should take Quantitative Science 456.) Prerequisite, Quantitative Science 281; Fisheries 240 recommended.

### 471 Principles of Aquatic Radioecology (3) A SEYMOUR

The nature, detection, measurement, differential biological effects, and evaluation of the hazards of ionizing radiations. Prerequisites, 15 credits in chemistry and 10 credits in zoology.

### 472 Methods of Aquatic Radioecology (3) W SEYMOUR

Methods of radiobiological analyses, of accumulation and loss of radionuclides, and of radionuclides as tracers in aquatic organisms. Prerequisites, 15 credits in chemistry, 10 credits in zoology.

#### 473 Radionuclides in the Aquatic Environments (3) Sp SEYMOUR

The distribution of natural and artificial radionuclides, the allowable concentrations and the biological cost of introducing radionuclides in aquatic environments. Prerequisites, 15 credits in chemistry and 10 credits in zoology.

#### 495 Introduction to Fisheries and Food

# Science Literature (2, max. 4) AWSp Directed training in searching bibliographic sources. Prerequisite, 15 credits in fisheries.

#### 499 Undergraduate Research (1-3, max. 9) AWSpŠ

Individual research within the College of Fisheries or on-the-job training in govern-mental or industrial fisheries organizations. Prerequisite, permission.

### **Courses for Graduates Only**

#### **On-the-Job Training** 501 (1-3, max. 3 for M.S., max. 9 for Ph.D.)

### AWSp

Guided on-the-job training in governmental or industrial fisheries organizations. Prerequisite, permission.

#### 503 Systematic Ichthyology (5) W

#### WELANDER

Concepts of taxonomy and organic evolution as applied to the higher categories of fishes and as related to classical and current problems in the phylogeny of fishes. Prerequisite, 401 or equivalent.

### 504 Invertebrate Pathology (5) A

Pathological effects and response to injury in invertebrates. The approach is topical, e.g., inflammation, tumors, physical and chemical trauma, and parasitic diseases, rather than phylogenetic. Under each topic, the discussion is phylogenetic and comparative. Prerequisite, permission.

### 505 Research Techniques in Shellfish Biology (5) W

CHEW

Study of research methods in field surveys of invertebrates and of research techniques in-volved with the studies of reproduction, growth, and mortality of oysters and clams. Prerequisite, permission.

### 506 Shellfish Sanitation (5) Sp MATCHES

Problems of the shellfish industry with emphasis on chemical and microbiological contamination and control during culture, har-vest, and processing. Prerequisite, permission. 507 Topics in Fish Ecology (1-5, max. 15) AWSp

Selected topics in the ecology of marine and freshwater fish and shellfish; factors affecting survival and migration; definition and distribution of fish populations. Prerequisite, permission.

515 Fish Physiology (3) W

A survey of the functions of the organic system of teleost fishes. Prerequisite, 5 credits in zoophysiology or biochemistry.

### 516 Fish Physiology Laboratory(2) W SMITH

Selected experimental techniques in fish physiology. Prerequisite, 515 or concurrent registration.

520 Graduate Seminar (2, max. 6) AWSp Training in methods of searching fisheries literature.

530 Biological Problems in Water Pollution (3) W

KATZ

Biological and ecological changes in the aquatic environment resulting from domestic, industrial, radioactive, and agricultural wastes and methods for their evaluation. Prerequisite, permission.

531 Seminar in Water Pollution \_ Problems (3) Sp

Analysis of current problems in biology of water pollution in freshwater and marine habitats; critical review of current scientific literature. Integration of biological parameters into social and political systems. Philosophy of water pollution control procedures. Prerequisite, 530 or permission.

#### 535 Metabolic Effects of Chemical Pollutants (4) Sp BROWN

Physiological and biochemical effects of industrial, urban, and agricultural chemicals on aquatic biota; specific metabolic effects of various poisonous and inhibitory substances; modes of inhibition of enzymes systems of aquatic organisms. Prerequisites, upper-division or graduate standing, organic chemistry, general physiology, biochemistry, or cell physiology, or equivalent.

### 540 Application of Digital Computers to Problems in Aquatic Ecology (3) W BEVAN, PAULIK

Laboratory problems adapted to special interests of the student. Consideration of the simultation of aquatic communities, analysis of aquatic populations, and ecological changes. Prerequisite, permission.

### 545 Speciation (3) W

Initraspecific variation, mechanisms of speciation, and interspecific interactions, with special emphasis on fishes. Prerequisite, Genetics 451 or equivalent.

### 556 Introduction to Quantitative Population Dynamics (3) A PAULIK

Simple analytic approaches to population management; applications of parent-progeny models and logistic models; biological and economic yields of natural populations; analysis of population data on high-speed digital computers. Prerequisites; Quantitative Science 291, 292, 383, 457 or permission.

### 557 Theoretical Models of Exploited Animal Populations (3) W PAULIK

Mathematical representation of basic population processes such as growth, mortality, natality, and mobility; application of optimization technique to yield models. Laboratory work on digital computer. Prerequisite, 556 or permission.

#### 558 Estimation of Population Parameters (3) Sp PAULIK

Statistical analysis of population data; design and analysis of mark-recapture experiments on natural populations; laboratory work on digital computer. Prerequisite, 557 or permission.

- 600 Independent Study or Research (\*) AWSpS
- 700 Master's Thesis (\*) AWSpS
- 800 Doctoral Dissertation (\*)

### FOOD SCIENCE

### **Courses for Undergraduates**

378 Principles of Fishing Gear and Vessel Development (3) A JONES

Principles of fishing techniques used in the major commercial fisheries related to vessel design and instrumentation required in the operation and handling of specialized fishing gear, together with shopboard experience.

# 380 Principles of Fisheries Technology (3) W JONES

Composition of fish; biochemical and microbiological changes in fish post-mortem; nature and effects of processing procedures, analytical control procedures; current technological developments. Prerequisite, Chemistry 102 or 160.

### 381 Environment, Food, and Technology

JONES, LISTON Principles of process operations for seafood production and consideration of pollution problems arising from food processing wastes.

#### 481 Introduction to Food Technology (5) Sp LISTON

Chemical and biological properties of foods; principles of processing, storage, distribution, and spoilage. Prerequisite, permission.

### 482 Principles of Food Analysis I (5) A

RIDDLE Acidity and pH in foods. Methods of proximate analysis. Quantitative analysis of inorganics, lipids, and nitrogeneous substances by physical and chemical methods. Quality assessments and rancidity methods. Prerequisite, Biochemistry 408 or permission.

### 483 Principles of Food Analysis II (5) W RIDDLE

Quantitative analyses of carbohydrates, vitamins, pectins, organic acids, food additives, and chemical contaminants by physical, chemical, enzymic, and microbiological methods. Prerequisite, 482.

### 484 Principles of Food Processing I (5) A LISTON, MATCHES

Unprocessed foods, their composition, nutritional availibility, associated microorganisms, storage, and distribution. Prerequisite, 481 or permission. 485 Principles of Food Processing II (5) W PIGOTT

Unit operations in food processing, engineering, and technological bases of food operations. Prerequisite, 484 or permission.

486 Deteriorative Processes in Foods (5) Sp RIDDLE, MATCHES, LISTON

### Biochemical, microbiological, physical, and chemical changes occurring in foods. Prerequisites, 483, 485, or permission.

## 498 Undergraduate Thesis (2-6, max. 6)

AWSpŠ Prerequisite, permission.

### **Courses for Graduates Only**

504 Principles of Technological Research in Food (3, max. 6) AWSp

A lecture and laboratory course designed to familiarize graduate students with the methods used in technological research. Prerequisite, permission.

### 521 Graduate Seminar in Food Science (2, max. 6) AWSp

Lectures and discussions of current problems and current research in food science. Prerequisite, permission.

### 522 Biological and Chemical Origins of Foods and Food Components and Their Functional Characteristics (3) W RIDDLE

Primary sources of natural food materials with emphasis on living plant, animal, and microbial cells. Natural and synthetic food adjuncts such as flavorings, coloring agents, preservatives, and conditioning agents. Prerequisite, graduate standing in Food Science or equivalent.

### 523 Advanced Marine Food Processes (5) S LISTON, JONES, PIGOTT

Principles and laboratory studies of advanced processes used in the extraction, concentration, and preservation of food from fish and other marine animals. Prerequisite, graduate standing in Food Science or equivalent.

### 524 Microorganisms in Foods (4) W LISTON, MATCHES

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. Prerequisite, graduate standing in Food Science or equivalent.

### 525 Advanced Unit Operations in Food Processing (3) Sp

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.

### 526 Advanced Unit Operations in Food Processing Laboratory (3) Sp PIGOTT

Laboratory investigations concerned with the engineering of food processes and processing facilities. To be taken concurrently with Food Science 525.

- 600 Independent Study or Research (\*) AWSpS
- 700 Master's Thesis (\*) AWSpS

## QUANTITATIVE SCIENCE

See Interschool or Intercollege Programs.

## FOREST RESOURCES

## WILDLIFE SCIENCES

See Interschool or Intercollege Programs.

# COLLEGE OF FOREST RESOURCES

## **Courses for Undergraduates**

### 100 Introduction to Forest Resources Management (5) ASp DOWDLE, WAGGENER

Survey of man's use of forest resources and the impact of social and cultural institutions on resource management. The history and the development of forest conservation and forest utilization practices and policies in the United States. Changing patterns of resource use and methods of resolving conflicts among management alternatives.

### 101 Introduction to Wood and Paper (1) W GARDNER .

Orientation course for freshmen entering curricula in pulp and paper technology and wood and fiber science. The nature of the forest products industries and the role of the two curricula in training for industry and research.

### 201 Conflicts in Forest Resource Use (2) A WAGGENER

Analysis of resource management policies, with particular emphasis on the social, political, economic, and resource implications of conflicting resource uses. Examination of major policies and practices designed to deal with conflicting uses, including critical review of operational criteria for resource allocation.

### 202 The Conservation Movement-Past. Present, and Future (2) W SCOTT

Origins of the conservation movement, factors that have shifted its direction, and directions it may take in the near future. Principles relating conservation to society are discussed.

### 203 Crisis in the Quality of the Forest Environment (2) W

COLB

The forest is an essential component of the total environment in a number of essential ways. The facts and fallacies of this relationship are discussed, both in terms of natural processes and of those processes initiated by man.

### 204 The Public Land Law Review Commission: Resource Policy in Transition (2) Sp WAGGENER

Overview of the background, objectives, and recommendations of the Public Land Law Review Commission, with emphasis on the implications for future public land manage-ment. Consideration of the major premises established for resource policy, with a critical interpretation of management objectives.

### 205 Pollution Problems in the Forest Industries (2) A HRUTFIORD

Considers the causes and the control of pollution problems associated with the forest industries. Air, water, and solid-waste problems will be identified during the forest's growth, harvesting, and conversion into the many forest products. The state of the art in controlling these problems will be reviewed, and future trends will be indicated.

### 206 Biocides in the Forest Environment (2) Sp

GARA Analysis of short-term benefits and costs to the forest ecosystem through use of pesticides. Considerations of control alternatives and their consequences to management objectives. A presentation of new trends in forest insect manipulation.

### 300 Dendrology (5) AS HATHEWAY, STETTLER

Concepts of taxonomy, genetics, and organic evolution as applied to the classification of major tree genera of North America; lectures, laboratory demonstrations, and field exercises. Prerequisite, introductory biology or permission.

### 301 Forests in the Life of Man (3) W GESSEL

The forest ecosystem-forests throughout the world. History of forest use by man. Eco-logical principles and forest land use. Forest conservation. For. nonmajors.

#### Wood: Properties and Best Use (3) WSp 304 BRYANT, ERICKSON

A service course for the nonspecialist. Description of wood as a fibrous material, its properties and variability as influenced by species differences and growth conditions. Causes and preventions of wood deterioration in service; physical and strength properties important in common uses. Types of solid wood and fiber products. Role of wood in man's physical and economic environment.

### 305 Wood: Properties and Best Use Laboratory (1) WSp BRYANT, ERICKSON

Demonstrations and laboratory experiments on topics presented in 304 that should precede or be taken concurrently.

### 306 Wood Anatomy (3) A ERICKSON

Familiarization with the development of wood as a plant tissue, and the relationship between wood structure and wood properties. Pre-requisite, Biology 210 or equivalent.

### 310 Forest Soils (3 or 5) A

COLE

Physical, chemical, and biological properties of forest soils; soil development and classification; and soils in relation to use of forest resources. Prerequisite, Geological Sciences 205.

#### 311 Soils and Land Use (3) W COLE

Intended for students who are concerned with environmental problems in the Puget Sound basin, as well as those who intend to become professionally involved in land-planning decisions. Focus will be on the significance of soils in understanding environmental prob-lems and in promoting intelligent land-use decisions. Basic concepts of soil systems will be presented, stressing those aspects important in making land-planning decisions. Prerequisite, permission.

### 320 Forest Ecology (5) AS SCOTT

Introductory course in ecology for those with particular interest in forest ecosystems. Organismal interactions as related to environment; ecological characteristics of trees; structure pattern and successional dynamics of forest communities, productivity of forests;

and applications of forest ecology. Lectures and field exercises. Prerequisite, 10 credits in biology or permission.

### 322 Silvicultural Methods (3) Sp

SCOTT The theory and technique of applying silvical knowledge in controlling establishment, com-position, and growth of forest stands. Includes reproduction methods and intermediate cut-tings. Prerequisites, 320, 360.

### 323 Forest Biology I (3) A

GARA

Systematics, genetics, evolution, and identification of forest trees as related to structure and environment.

## 324 Forest Biology II (3) W

GARA

Consideration of environmental parameters and specific forest ecology, after an initial exposure to plant ecology and physiology.

### 325 Applied Forest Biology (3) Sp

GARA Basic concepts and possibilities in the biological manipulation of forests. Includes popula-

tion, genetic, and environmental manipulation. One field trip required. Prerequisite, 324.

### 326 Range Ecology (3) SpS DRIVER

Interrelations of plants, animals, and men on range lands. History of rangeland use. One Saturday field trip required. Prerequisite, permission.

### 329 Microclimatology (3) A

FRITSCHEN A study of the interaction of biological and. meteorological processes with applications to forestry, recreation, wildlife, landscape design, and architecture. Surface energy balances in terms of evaporation, radiation exchange, air and soil temperature, wind speed, and humidity in the lower layer of the at-mosphere. Effects of plane, concave, and convex surfaces, vegetal coverings, temperature and wind distribution. Offered jointly with the Department of Atmospheric Sciences as At-

## pheric Sciences 101 or 201 or permission. 331 Introductory Forest Pathology (3) Sp

mospheric Sciences 329. Prerequisite, Atmos-

DRIVER The study of typical forest diseases stressing significance of forest ecology on disease oc-currence and control. Prerequisites, 310, 320, Botany 220.

### 333 Forest Protection (3) W

Introduction to biological aspects of forest protection, with emphasis on insect, disease, and animal damage related to Western forests and forest products. (For non-forest-management majors only.)

### 335 Forest Entomology (3) W

GARA Introduction to general entomology, characteristics, life histories, ecological relations, pre-vention and control of forest insects. Prerequisite, permission.

## 336 Laboratory in Forest Entomology

(1) W GARA

Introduction to the insect orders; identification of forest insects and their damage, One field trip to study insect problems will be required. Prerequisite, 335, which may be taken concurrently.

## 340 Forest Surveying (5) ASp

### SCHAEFFER, SCHREUDER

Basic elements of forest surveying and of photographic \_interpretation. Emphasis on plane surveying techniques, as related to forest areas. Photographic interpretation techniques appropriate to forest inventory and management.

### 341 Timber Harvesting (4) Sp

Forest road engineering; timber harvesting methods and planning procedures; elements of CPL and mathematical programming. Emphasis on quantitative methods in decision making. Prerequisites, 320, 340, 360, Mathematics 124.

### 350 Field Studies in Outdoor Recreation (3) A

SHARPE

Studies of outdoor recreation in action. An introduction to the problems of managing large recreation complexes or private, county, state, and federal lands during the period of maximum visitor use. Field trips. Prerequisite, permission.

### 351 Introduction to Outdoor Recreation (5) A

SHARPE

History and philosophy of outdoor recreation development as it pertains to the natural environment. A survey of visitor needs and preferences, trends in use, and objectives of outdoor recreation in a modern society. Emphasis on county, state, and national levels. One field trip.

### 353 Principles of Natural History Interpretation (3) W SHARPE

A consideration of the interpretive specialist in outdoor recreation. Increasing visitor enjoyment and manipulating visitor impact through interpretation. Special emphasis on promoting visitor interest and an ecological understanding through information progress. Prerequisite, permission.

#### Introduction to Management of 354 Recreation Areas (3) A SHARPE

Acquaints the student with the problems of administration and management of large recreational land areas. Includes control of public use, protection of environmental quality, determining carrying capacity, organization structure, and other administrative details.

#### 355 Introduction to Planning and Design of Recreation Areas (3) Sp SHARPE

The physical planning process in resourceoriented recreation and urban development. Relates both the general influences of sun, climate, access, and urban proximity with specific site influences of topography, vegetation, soil, and water in recreation design. The laboratory includes graphic methods of communication and field trips.

### 360 Forest Measurements (5) A

TURNBULL Evaluation of information needs for decision making by forest manager. Study of geometry, sampling design, and estimation processes applied to forestry. Measuring instruments and procedures. Inventory management. Laboratory and field exercises to study contents and growth of tree and forest stand.

#### 374 Wood Utilization (3) A BRYANT

Nature of wood products industry; processing;

demand and specifications for raw material and end products.

### 375 Wood Utilization Laboratory (2) A

BRYANT Nature of wood products industry; processing; demand and specifications for raw material and end products.

#### 377 Elements of Timber Design (4) A BRYANT

The mechanical behavior of wood: its structural utilization as beams, columns, and panels; derivation of working stresses for wood. Prerequisite, junior standing.

#### Wood and Fiber Structure (5) A 400

LENEY

Woody plants. Growth of the tree stem. Development of the woody cell and the structure of coniferous woods including fiber characteristics. Structure of hardwoods, including fibery relationship of wood structure to its total physical properties. Natural defects in wood and fiber. Prerequisite, Biology 110 or equivalent.

#### 401 The Physics of Wood and Fiber Composites (4) W JAYNE

Equilibrium physical properties of composite systems. Structure and models, mass density, equilibrium moisture properties and equilibrium thermal properties. Stress, strain, Hooke's law for orthotropic materials. Electrical polarization, axial and bending stress, dielectric heating. Prerequisites, Mathematics 126, Physics 116.

#### 402 The Physics of Wood and Fiber Composites (4) Sp JAYNE

Nonequilibrium properties, mass and energy transport, time-dependent electrical behavior, inelastic behavior and vibration. Prerequisite, 401

#### 403 Fibrous Structure and Rheology I (3) W ALLAN

A review of the synthetic and natural fibers and their chemical, physical, microscopic, and

#### 404 **Fibrous Structure and Rheology II** (3) Sp

ALLAN

Fluid flow, sedimentation, and other properties of fiber suspension, structure and rhe-ology of paper board and textile webs; modification of these webs by plastic additives. Prerequisite, 403.

### 405 Microtechnique (3) W

submicroscopic properties.

LENĖY

The technique of preparing, sectioning, staining, and mounting woody tissues and fibers for microscopic study. Prerequisite, permission.

#### Wood Chemistry I (3) A 406

SARKANEN

Chemical and physical properties of cellulose, lignin, hemicellulose and extractives. Wood as a raw material for the chemical industry. Prerequisite, permission.

Wood Chemistry Laboratory (2) W 407

SARKANEN

# Laboratory to supplement 406.

Wood Chemistry II (3) W 408 SARKANEN

A fundamental review of the chemistry and properties of wood and other plant lignins. Prerequisite, 406.

### 409 Wood Extractives Chemistry (2) Sp HRUTFIORD

The nature, origin, and occurrence of the extraneous components of wood, their influence on pulp and paper preparation, and their utilization.

#### 411 Soil and the Forest Ecosystem (3) Sp COLE

A study of soil in the field with emphasis on measurement of properties. Relationship of soils to forest vegetation. Prerequisite, 310.

### 412 Soil Genesis (4) W

UGOLINI

Soil, the excited skin of the earth. Processes of soil formation and weathering distribution of major soils in the world.

### 413 The Geography of Soil (4) Sp UGOLINI

Study of the distribution and morphology of soils in relation to environmental factors. Lectures and field trips to illustrate the properties and the processes of the soils throughout the unique terrestrial ecosystems of the state of Washington.

### 415 Applied Forest Hydrology (4) A WOOLDRIDGE

Study of fundamental aspects of hydrology as influenced by silvicultural and timber harvest methods. Includes soil erosion, water quality, and manipulation of the forest stands for altered water yield. Prerequisite, senior standing or permission.

#### 416 Micrometeorological Measurements and Instrumentation (5) W FRITSCHEN

Principles and theories of biometeorological instrumentation. Accuracy, measuring solar and thermal radiation, heat flux, air and soil temperature, atmospheric moisture content, wind. Prerequisites, Mathematics 126, Physics 123, or permission.

### 422 Forest Regeneration Operations (3) W KENADY

Procedures and problems of regenerating forest lands, including cone collection and processing, seed processing and treatment, seed orchard and nursery management, and field techniques for establishing forest plantations. Three field trips required. Prerequisite, major in Forest Resources.

#### 423 Advanced Forest Ecology (3) AW SCOTT

A course intended for students with some previous training in ecology. Discussion centered around primary processes and growth, patterns in forest tree species and forest community dynamics and productivity as affected by environment. Several one- to three-day trips throughout the Pacific Northwest. Prerequisite, permission.

### 424 Selected Topics in Silviculture (3) AW SCOTT

A detailed discussion of special problems or subjects in silviculture of interest to advanced students. Prerequisite, permission.

#### Forest Genetics (3) W 427

STETTLER

Genetic theory as applied to the biological manipulation of forest trees. Principles of genetics and organic evolution are discussed and related to management strategy and silvicultural practice. Prerequisite, two courses in biological sciences or permission. (Offered alternate years; not offered 1972-73.)

## FOREST RESOURCES

### 430 Elementary Forest Fire Science and Technology (3) W

Forest fire behavior; fire and ecology; organization and management of forest fire control systems; economics of fire control; use of fire in forest land management. Emphasis is on the meteorological and thermophysical bases for forest fire behavior and the organization and management of technically and economically efficient forest fire control systems.

### 433 Biology of Forest Diseases (5) W DRIVER

Detailed studies on the biology of host-pathogen relationships exhibited by certain forest diseases. Prerequisite, 331. (Offered alternate years; not offered 1972-73.)

### 436 Ecology of Forest Insects (4) A

GARA Host-insect interactions, introduction to population dynamics, research technique, and pertinent forest entomological literature. One field trip required. Prerequisite, permission.

### 440 Construction (4) W

STENZEL

Design and construction of forest roads; earthmoving methods and costs, explosives, surfacing, drainage facilities. Laboratory: design of timber bridges. Prerequisite, 377 or permission.

### 441 Forest Engineering (5) A

STENZEL

Planning the logging operation: logging methods, route projection, selection of landings and settings, logging cost control. Prerequisite, CETC 310.

## 442 Financial Analysis of Logging Equipment and Operations (4) W

Business investment management in logging industry with particular emphasis on equipment replacement. Engineering performance of various types of logging equipment. Individual student project includes some field work. Prerequisite, 441 or permission.

### 443 Safety Practices in Forest Industries (1) A

STENZEL

Accident costs and frequency rates; accident investigations; safety inspection; safety organization and program. Prerequisite, forest engineering major or permission.

### 446, 447, 448, 449 Senior Forest Engineering Field Studies (2,5,5,3) Sp STENZEL

446: toute projection and logging planning. 447: reconnaissance and preliminary surveys. 448: road location and construction surveys. 449: cost estimates and reports. Development of a complete logging plan for a timber tract. Courses given consecutively in Spring Quarter. Prerequisite, 441.

### 451 Outdoor Recreation Economics (3) Sp WAGGENER

The application of economic principles to outdoor recreation problems. The elements of demand for outdoor recreation opportunities, the evaluation of recreation alternatives, and the allocation of resources for recreational use on public and private lands. Prerequisite, Economics, 200.

## 452. Sociology of Leisure and Outdoor Recreation (2) W

Seminar focusing upon understanding human behavior in leisure settings. An examination of basic sociological concepts as well as contemporary theories concerning leisure behavior; research techniques and problems of measurement in leisure research. Implications for the management of recreational areas will provide an applied orientation and integration of substantive material. Prerequisite, Sociology 110.

### 453 Advanced Natural History Interpretation (1-5, max. 5) Sp SHARPE

Independent study projects dealing with the interpretation of physical and natural phenomena for the enjoyment of recreational visitors. Practical experience in the design and the use of interpretative materials for better understanding of the outdoor recreation activity. Prerequisite, 353 or permission.

### 455 Advanced Planning and Design of Outdoor Recreation Areas (1-5, max. 5) W MALBON, SHARPE

Independent study projects in the planning and the design of outdoor recreation areas and facilities. Integrated consideration of the resource base, social factors, and management objectives in recreation area planning. Selected case studies in area planning and design. Prerequisite, 355.

#### 456 Wilderness Preservation and Management (3) A HENDER

A 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.

### 459 Case Studies in Outdoor Recreation (5) Sp

SHARPE

An investigation of the problems, the policies, and the procedures of selected public and private lands used for outdoor recreation, using the comprehensive master planning approach. Extensive field trips. Prerequisites, 351, 353, 354, 355.

### 460 Forest Resources Management I (5) ASp

BARE, WAGGENER

Analytical techniques from economics, management, and operations research applied to the planning and the control of the production of goods and services from forested lands. Forestry principles are interfaced with modern management techniques within a decision-making framework to provide a basis for the efficient allocation of forest and land resources.

### 461 Advanced Forest Mensuration (3) W TURNBULL

Forest tree and stand models. Studies of forest tree and stand parameters. Estimation processes. Growth and yield analysis. Prerequisite, 360, Mathematics 281, or permission.

### 463 Contemporary Problems in Forest Land Use (3) W

DOWDLE, WAGGENER

Current conflicts among competing uses for forest land; trends in forest land use; impact of public policy on growth and development of forest products industries. Prerequisite, permission.

### 464 Economics of the Forest Products Industries (3) W WAGGENER

Market structure of major forest-related industries. Changing pattern of forest-land use and impact on forest industries. Economic factors affecting distribution and marketing of forest products, including international, interregional, and intraregional competition. Prerequisite, Economics 200.

### 465 Public Forest Administration (3) W WAGGENER

Analysis of timber management activities on public lands. Application of economic and management principles to problems of timber regulation, timber sales activities, and land allocation decisions. Program planning and budgetary systems for public resource administration.

### 466 Economics of Timber Production (3) Sp SCHREUDER

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.

## 467 Sociology of Natural Resources (2) W

FIELD Exploratory examination of the interrelationships between man and natural resources. Application of sociological concepts and theories for understanding natural resource utilization and conservation will be a common thread throughout the course. The importance of social structures, social groups, culture, and norms as factors affecting the ultimate resolution of natural resource issues. Prerequisite, Sociology 110.

### 468 Forest Resource Management II (5) W BARE

Economic, administrative, and biological principles applied to the evaluation of alternative land-management goals and policies. Application of case-study methodology to selected problems of forest land management, with particular emphasis on long-term planning, Prerequisite, 460.

### 469 Forest Resources Management III (5) Sp

SCHREUDER

Application of biological, financial, and operations research principles to formulation and solution of short-term forest resource planning problems. Application of case-study methodology to selected forest lands management problems involving the evaluation of alternative solutions to contemporary management problems. Prerequisite, 460.

### 470 Wood Deterioration and Control (4) A ERICKSON

Wood and fiber destroying agencies, biological and physical, classification and manner of attack. Theory of toxicity and the important preservatives; pressure and nonpressure treatments. Fire retardant chemicals and treatments, coatings and impregnation.

### 472 Plywood and Laminating Processes (3) W BRYANT

Theory of wood adhesion, chemical nature of wood adhesives, requirements of an adhesive relative to important wood and process variables. Prerequisite, senior standing in Wood and Paper Division or permission.

### 473 Gluing Process Technology (4) Sp BRYANT

Gluing technology as it relates to the im-

portant variable that affect the properties of plywood, particle board, hardboard, insula-tion board, and lumber laminates. Prerequisite, 472

### 475 Wood Drying Technology (3) Sp THOMAS

Analysis of wood drying; practical and experimental studies in the drying of processed wood in the form of lumber, veneer, particle, and fiber. Prerequisite, senior standing in Wood and Paper Division or permission.

### 476 Pulp and Paper Technology (3) W GARDNER

Chemical and technological aspects of the manufacture of mechanical and chemical pulps and of paper and paper products. Prerequisite, Chemistry 102 or 232 or permission.

### 477 Pulp and Paper Laboratory (2) Sp GARDNER

Laboratory experiments in the pulping of wood, fiber technology, and physical and chemical characteristics of paper and pulp. Prerequisite, 476.

### 479 Analysis of Wood Processing Facilities (3) W

BETHEL

Application of wood science and technology to analysis of the effectiveness of wood processing facilities. Production control and quality control related to materials and processes. Procurement control problems. Decision making with respect to product mix, equipment modification, analysis of inventory control, and material movement.

#### 480 Wood Process Development and Design (3) Sp BETHEL

Study of the factors influencing feasibility judgments with respect to industrial development and factory design. Feasibility of new forest products manufacturing installations with reference to raw material supply, markets, transportation, and labor supply. Analysis of case histories of forest products manufacturing and facility development. Use of operations research methods in feasibility studies. Prerequisite, permission.

### 481 Pulp and Paper Unit Operations (4) Sp GARDNER

Unit operations of particular interest in the pulp and paper industry in addition to those covered in Chemical Engineering 340 and 435. Prerequisite, Chemical Engineering 435.

### 485 Undergraduate Research (1-3, max. 3) AWSD

Undergraduate research or independent study project under the supervision of the faculty; usually one credit per quarter. Prerequisite, senior standing in Wood and Paper Division.

#### 487 Introduction to Wood Biochemistry (3) A

HRUTFIORD

Basic biochemical concepts; emphasis on the chemistry of photosynthesis, plant metabolism, and protein biosynthesis.

#### 488 Polymer Chemistry (3) Sp

ALLAN

A fundamental review of synthetic and natural polymers, including kinetics of formation, molecular weight distributions, and solid-state and solution properties.

#### Wood Biosynthesis (3) W 489 HRUTFIORD

Biosynthesis of carbohydrates, phenolic and

terperoid compounds in forest trees, and biochemistry of wood degradation. Prerequisite, 487 or Biochemistry 405.

### 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. The courses are offered in all quarters, and credits can vary from 1 to 5, and, with the permission of the instructor, each course may be repeated for credit. Credits are individually arranged for each course. Prerequisite, permission.

#### 493 Ecology of the Northwest I (2) W GARA, UGOLINI

Interdisciplinary seminar series. Topics of discussion emphasize the environmental history of the Northwest; ecological relationships associated with present-day environmental conditions; interaction of past and present social systems; and aspects of resource management.

### 494 Ecology of the Northwest II (2) Sp GARA, UGOLINI

Interdisciplinary seminar series. Topics of discussion emphasize the environmental history of the Northwest; ecological relationships associated with present-day environmental conditions; interaction of past and present social systems; and aspects of resource management.

### **Courses for Graduates Only**

500 Graduate Seminar (2) A

GESSEL

Discussion of current issues and problems in forestry and forestry research.

#### Elasticity of Wood and Fiber 501 Composite (4) W JAYNE

The concept of stress, strain, and Hooke's law for the orthotropic continuum. Tensor transforms of stress, strain, and the elastic coefficients. The compliance and stiffness tensors. Strain energy. Distribution functions of descriptions of internal geometry of composites. Orthotropic elasticity of the fiber wall. Elasticity and two- and three-dimensional fiber networks. Elasticity of particle composite and laminates. Prerequisites, 401 and 402.

#### 502 **Transport Processes in Composite** Systems (4) Sp JAYNE

Time-dependent and time-independent diffusion of moisture and energy in composite materials. Coupled moisture and thermal diffusion. Mechanisms of moisture and thermal transport. Diffusion in the fiber and fiber network. Diffusion in particle composites. Solution of the diffusion equation by separation of variables and finite difference methods. Prerequisites, 401 and 402.

### 511 Forest Soils Seminar (2) W

GESSEL

Discussion of current topics in forest soils research and management. Prerequisite, permission.

### 512 Soil Chemistry (4) W

UGOLINI

Topics in soil chemistry and physical chemistry: organic fraction, exchangeable process, clay mineralogy, and short range order minerals.

### 513 Soil Formation and Classification (3) Sp GESSEL

A study of soil-forming factors and processes,

FOREST RESOURCES

## 514 Forest Influences (4) Sp

WOOLDRIDGE Study of the interacting effects of climate, soil, and plants as a basis for understanding the hydrologic cycle. Places special emphasis on disposition and movement of water in forest ecosystems. Prerequisite, graduate standing or permission.

### 517 Soil Plant-Atmospheric Relations (3) W FRITSCHEN

Principles of mass and energy exchange between the earth and the atmosphere with special emphasis upon the state and movement of water in soils, energy balance of the vegetated surface and individual leaves, and methods of evapotranspiration determination. Prerequisites, Mathematics 126, Physics 123, Atmospheric Science 329. (Offered alternate years; not offered 1973-74.)

### 518, 519 Mass and Energy Transport in Living Systems I and II (4,4) W,Sp JAYNE

518: Equilibrium concepts, first and second laws of thermodynamics and their applica-tions to living systems, including osmosis, capillarity, and photosynthesis. 519: Thermodynamics of irreversible flow processes. Mass and energy transport. The diffusion equation with emphasis on diffusion in living systems. Secondary flow processes including thermodiffusion and thermo-osmosis. Introductory statistical physics with applications to life Prerequisites, Mathematics 126, processes. Physics 116.

#### 521 **Current Problems in Forest Ecology** (3) W

SCOTT

A consideration of current literature and topics in forest ecology and tree physiology. Prerequisite, permission.

### 522 Current Problems in Silviculture (3) Sp SCOTT

A detailed study of the literature dealing with recent applications of silviculture in world forestry. Prerequisite, permission.

### 524 Tropical Forests (3) W

BETHEL

A comparative study of the forests of temperate and tropical regions. Diversity in tropical ecosystems. Comparisons among tropical forest biomes. The structure and properties of tropical forest trees and woods. Problems in the utilization of tropical woods basic to the development of tropical forestry management practice. Forest land-use practices and problems in the tropical regions of the world. Prerequisite, permission.

### 527 Advanced Forest Genetics (3) W STETTLER

Discussion course relating concepts of quantitative and population genetics to forest-tree populations, both natural and artificial. Prerequisite, Genetics 451, or equivalent. (Offered alternate years; offered 1972-73.)

### 531 Forest Fire Science Seminar (2) W MARTIN

Presentation and discussion of current issues in forest fire prevention, control, use, and discussion of ongoing fire research. Prerequisite, permission.

### 532 Planning Management, and Analysis of Forest Fire Control Systems (3) Sp MARTIN

The Forest Fire Control System. Study of

## FOREST RESOURCES

plans, service, finance, line, and command functions. Forest fire control and production economics, techniques of operations research and computer sciences applicable to planning and analyzing forest fire control systems. Prerequisites, Administrative Theory and Organizational Behavior 550, Quantitative Methods 510.

### 533 Investigations of Forest Diseases (5) W DRIVER

Studies on concepts and experimental procedures used in forest microbiological research. Prerequisites, 433 and permission. (Offered alternate years; offered 1972-73.)

### 537 Forest Fire Behavior (3) Sp MARTIN

Basic combustion and heat transfer processes related to behavior of free burning fires. Forest fuels. Effect of fuel, weather, and topography on the spread, intensity, and difficulty of control of forest fires. Prediction of fire behavior. Prerequisites, 538, Atmospheric Sciences 301, 329.

### 538 Forest Fire Thermophysics (3) W CORLETT

Principles of combustion and heat transfer. Basic processes of ignition and flame spread; high intensity fires. Emphasis is on freeburning fires in cellulose fuels. Prerequisites, Mathematics 105, Physics 114, 115.

### 541 Advanced Forest Engineering (5) AW STENZEL

Logging organization and management; logging cost analysis and budgeting. Prerequisite, permission.

### 542 Advanced Logging Engineering (3) AW STENZEL

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 logging truck roads. Prerequisite, permission.

#### 551 Current Problems in Recreational Management of Wildlands (3) Sp SHARPE

An investigation, examination, and discussion of current problems of recreational management of wild lands. Prerequisite, graduate standing.

### 552 Outdoor Recreation Research Methods (3) W

WAGAR

The application of scientific method to the study of outdoor recreation problems. The procedures and techniques used in conducting recreation research, such as preparation of problem analyses, research proposals, and study plans; the collection, analysis, and interpretation of data normally used in recreation studies. Prerequisite, graduate standing.

### 557 Topics in Forest Zoology (3) W WEISBROD

Graduate seminar considering applied and basic zoological topics relating to the forest environment. Different topics will be selected each year. May be repeated for credit. Participants submit short papers and give oral presentations. Prerequisite, permission.

### 562 Advanced Forest Resources Management (3) A

BARE

Application of techniques of management science and financial management to planning and control of forest production processes. Emphasis on the design of information systems, the optimal allocation of resources over time, the construction and experimentation with total system simulators, and the application and evaluation of selected financial control techniques. Prerequisites, 460, and Quantitative Science 396 and 496.

### 564 Advanced Forest Blometry (3 or 5) W TURNBULL

Classical problems in analysis of forest populations and growth theory, and principles of parametric analysis and estimation processes in forest biometry. Prerequisite, permission.

# 571 Advanced Wood Preservation (3) W

Permeability of wood; theory and factors affecting penetration, liquid movement in wood, chemical effects on wood. Prerequisite, permission.

### 572 Wood Chemistry and Analysis (3-5) WSp HRUTFIORD

Application of instrumental methods of analysis to wood, wood products, and forest products processing effluents. Emphasis on separation systems, including gas and liquid computerized gas chromatography/mass spectrometer combination. Prerequisite, permission.

### 573 Wood-Moisture Relations (3) W ERICKSON

Theories and practice on relationships between wood and moisture over a range of moisture contents; effects of other polar and nonpolar compounds; capillarity, adsorption, and diffusion in wood. Prerequisite, permission.

### 574 Wood-Resin Relations (3) Sp BRYANT

The technology of synthetic resins as wood adhesives, wood impregnants, binders, overlays, and surface coatings. Prerequisite, permission.

### 575 Forest Products Economics (3) A WAGGENER

Economic analysis of the forest products industries; market structure, regional impact of forest products industries, current problems in forest products economics. Prerequisite, permission.

### 576 Photomicrography of Woody Tissues (3) Sp LENEY

Theory and method in microscopy and photomicrography of woody tissues. Prerequisite, permission.

### 577 Wood and Paper Science Seminar (1) AWSp

Discussion of current topics in the science of wood and its various composites in the form of composition board, laminates, and paper. Prerequisite, permission.

### 578 Environmental Protection in the Pulp and Paper Industry (3) Sp HRUTFIORD

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Sources of air and water pollution in the pulp and paper industry are identified, and the chemistry of formation of the pollutants is discussed. Methods of pollution control are discussed in detail, with emphasis on newer techniques involving water recycle and operations integrated to minimize pollution loading. Waste-water treatment also will be considered. Offered jointly with the Department of Chemical Engineering as Chemical Engineering 578. Prerequisite, senior standing or permission; 406, 476 or Chemical Engineering 470, 471 recommended.

### 590 Graduate Studies (1-5)

Study in fields for which there is not sufficient demand to warrant the organization of regular courses. Prerequisite, permission.

- 600 Independent Study or Research (\*)
- 700 Master's Thesis (\*)
- 800 Doctoral Dissertation (\*)

## **Tutorial Study**

Tutorial study designed to meet individual requirements is available to graduate students in the Graduate Studies courses listed below. Such study may include literature review and field and laboratory work. The courses are offered in all quarters, and credits can vary from 1 to 5, and with the permission of the instructor, each course may be repeated for credit. Credits are individually arranged for each course. Prerequisites include graduate standing and permission of the instructor.

- 510 Graduate Studies in Forest Soils (1-5) COLE, GESSEL, UGOLINI
- 515 Graduate Studies in Forest Influences (1-5) FRITSCHEN, WOOLDRIDGE
- 516 Graduate Studies in Forest Meteorology (1-5)
  - FRITSCHEN
- 520 Graduate Studies in Forest Ecology and Silviculture (1-5) SCOTT
- 526 Graduate Studies in Forest Genetics (1-5) STETTLER
- 530 Graduate Studies in Forest Fire Control (1-5) MURPHY, SCHAEFFER
- 534 Graduate Studies in Forest Pathology (1-5) DRIVER
- 535 Graduate Studies in Forest Entomology (1-5) GARA
- 540 Graduate Studies in Logging Engineering (1-5) STENZEL
- 550 Graduate Studies in Forest Recreation (1-5) FIELD, HENDEE, SHARPE, WAGAR
- 555 Graduate Studies in Wildlife Management (1-5) TABER
- 556 Graduate Studies in Forest Zoology (1-5) AWS WEISBROD
- 560 Graduate Studies in Forest History and Policy (1-5)
- 563 Graduate Studies in Forest Mensuration (1-5) TURNBULL
- 565 Graduate Studies in Forest Management (1-5) BARE, SCHREUDER
- 566 Graduate Studies in Forest Photogrammetry (1-S) SCHREUDER
- 568 Graduate Studies in Forest Economics (1-5) DOWDLE, WAGGENER
- 570 Graduate Studies-in Forest Products (1-5) ALLAN, BRYANT, ERICKSON, GARDNER, HRUTFIORD, JAYNE, LENEY, SARKANEN, • THOMAS

## QUANTITATIVE SCIENCE

See Interschool or Intercollege Programs.

## WILDLIFE SCIENCES

See Interschool or Intercollege Programs.

## INTERDISCIPLINARY GRADUATE DEGREE PROGRAMS

#### **BIOMATHEMATICS** -

BMATH · 600 Independent Study or Research (\*)

BMATH 700 Master's Thesis (\*)

BMATH 800 Doctoral Dissertation (\*)

## **COMPARATIVE PHYSIOLOGY**

C PHY 800 Doctoral Dissertation

### **COMPUTER SCIENCE**

## C SCI

470 Design of Digital Data Systems (4) A Fundamental gating circuits are developed into large logic gating structures. The use of these structures in the design of central processing units, memories, and peripheral equipment is illustrated. Course for majors in Computer Science. Offered jointly with the Department of Electrical Engineering as Electrical Engineering 470. Prerequisite, permission of instructor.

#### C SCI

## 472 Computer Software Systems (3)

Principles of operating systems, compilers, assemblers, interpreters, and loaders for digital computers. Not intended for graduate students who require a detailed knowledge of systems programming. Not open to students who have taken Electrical Engineering 501 or 502. Offered jointly with the Department of Electrical Engineering as Electrical Engineering 472. Prerequisite, 478.

#### C SCI

#### 478 Computer Organization and Machine Language Programming (4) ASp

Differences and similarities in computer structure. Flow of control. Instruction codes and their execution for arithmetic, logical, character manipulation, and input-output operations. Indexing and indirect addressing; subroutine linkage. Study of information representations and their relationship to processing techniques. Offered jointly with the Department of Electrical Engineering as Electrical Engineering 478. Prerequisites, Engineering 141 or equivalent and Assembly Language Programming.

#### C SCI

#### 501- Programming Languages and Systems I (3-) W

Discussion of computer languages: machine language, assembly language, problem-oriented languages. Manipulation of symbols and strings. Formal definition of computer languages. Offered jointly with the Department of Electrical Engineering as Electrical Engineering 501-. Prerequisite, 478 or permission.

#### C SCI

#### -502 Programming Languages and Systems II (-3) Sp

Basic concepts and design of interpreters, assemblers, compilers, and operating systems for digital computers. Offered jointly with the Department of Electrical Engineering as Electrical Engineering -502. Prerequisite, 501.

#### C SCI

#### 508. Representation and Handling of Data Structures (3) W

Linear lists (stacks, queues, deques): sequential and linked allocation. Circular and doubly-linked lists. Trees, binary trees and threaded lists: traversal algorithms—analysis of flowcharts—path length on trees. Garbage collection. Dynamic storage allocation. Transferring algorithms. Data management on external media. Prerequisite, 478 or permission of the instructor.

#### C SCI

#### 510 List Processing and String Manipulation (3) Sp

Structure of information sets which reflect the syntactic or semantic relationships in the information. The generation and processing of structures such as lists and trees. Generalized information systems. Pattern recognition and manipulation of symbolic strings. Markov algorithms. Algebraic symbol-manipulation processes. Syntax, semantics, and use of recent versions of languages such as LISP, FORMULA-ALGOL, SNOBAL, and FOR-MAC. Prerequisite, 501 or permission.

#### C SCI

520 Computer Science Seminar (0) AWSp Weekly discussion by students and faculty or visitors on topics of current interest. Must be taken by all graduate students for three quarters.

#### C SCI

## 531 Automata Theory I (3) W

Finite, probabilistic, growing, and reproducing automata. Representation of automata by state graphs, regular expressions, logical nets, recursive functions. Turing machines. Prerequisite, Mathematics 305.

#### C SCI

## 532 Automata Theory II (3) Sp

Continuation of 531. Prerequisite, 531, Mathematics 403, and Mathematics 405 concurrently.

#### C SCI

#### 537, 538 Computability Theory (3,3) Introduction to the theory of effective computability. Formulation of the concepts of recursive and partial recursive function and recursively enumerable set. Study of the relationship between a program and the properties of the function computed by that program.

Introduction to reducibility procedures, construction of undecidable problems, degrees of unsolvability, recursive invariance, and isomorphism. Classification of unsolvable problems, the arithmetical hierarchy, the relation of the degree of unsolvability of a set to the logical complexity required to describe the set. Connection with mathematical logic, the theorems of Godel, Church, and Tarski. As time permits, introduction of various related topics in computational complexity. Prerequisites, 531, Mathematics 403, 405, or permission.

#### C SCI

#### 540 Discrete System Simulation (3) A NOE

Principles of simulation of discrete, eventoriented systems. Model construction, simulation, and validation, and relationship to other techniques for system analysis and design. Use of special-purpose simulation languages such as SIMSCRIPT and SIMULA, and study of their functional components and data structures, with examination of the equivalent tasks necessary to use general-purpose languages for simulation. Prerequisites, knowledge of FOR-TRAN, ALGQL, and an assembly language will be assumed, with programming experience in at least one of them that is equivalent to average experience of entering Computer Science graduate students.

#### C SCI

#### 541 Computer Measurements and Evaluation Techniques (3) W

Viewpoints, problems, and techniques in assessment of computer systems and subsystems. Selection of models, analysis, simulation, and instrumentation, with problem assignments making use of computers available on campus. Prerequisite, 478 or Electrical Engineering 478, or permission.

#### C SCI

#### 551 Operating Systems (3) A

Description of design of operating requirements and design criteria for batch processing, real time, and time-sharing systems. Practical exercises and illustrations using Computer Science Teaching Laboratory. Prerequisite, 502 or permission.

#### C SCI

#### 552 Systems Programming Practicum (3) WSp

Designed to give students experience in implemetnation of computer software for controlling equipment allocation, e.g., operating systems. Students must enroll for two quarters. A systems project will be selected, designed, and implemented using the Computer Science Teaching Laboratory equipment. Prerequisites, 551 and permission.

#### C SCI

## 573 Artificial Intelligence I (3) A

Introduction to the use of the computer in non-numerical problem solving. Survey of theorem proving, symbol manipulating, pattern recognition, and inductive problem-solving techniques. Computer models of human thought. Prerequisite, 478.

#### C SCI

## 574 Artificial Intelligence II (3) W

Continuation of studies of artificial intelligence systems, emphasizing theorem proving, symbolic problem solving, pattern recognition, and natural language data processing. Students will be required to do projects. Prerequisite, 573 or permission of instructor.

## INTERSCHOOL OR INTERCOLLEGE PROGRAMS

#### C SCI

585 Numerical Mathematics (3)

Numerical solution of linear algebraic systems, algebraic eigenvalue problems, ordinary and partical differential equations. Offered jointly with the Department of Mathematics as Mathematics 585. Prerequisites, Mathematics 303, 438, and programming with a procedure-oriented language.

#### C SCI

## 586. Numerical Mathematics (3)

Continuation of 585. Selected topics in numerical mathematics. Prerequisite, 585 or permission. Offered jointly with the Department of Mathematics as Mathematics 586.

#### C SCI

590 Special Topics in Computer Science (\*) AWSp

Lectures and discussions of current interest in computer science. May not be offered every quarter; content may vary from one offering to another. May be repeated for credit. Prerequisite, permission.

#### C SCI

600 Independent Study or Research (\*) AWSp

#### C SCI

700 Master's Thesis (\*) AWSp

C SCI 800 Doctoral Dissertation (\*)

## **DRAMA ARTS**

D ART 800 Doctoral Dissertation (\*)

## **INDIVIDUAL PH.D. PROGRAM**

### IPHD

800 Doctoral Dissertation (\*)

Restricted to graduate students approved for a special individual Ph.D. program in the Graduate School. Requires permission of the student's Supervisory Committee Chairman. Name of dissertation supervisor should appear on the student's Program of Studies.

## PHYSIOLOGY PSYCHOLOGY

P PSY

800 Doctoral Dissertation (\*)

## **PUBLIC HEALTH STUDIES**

- PC
- 600 Independent Study or Research (\*) PC

700 Master's Thesis (\*)

## QUATERNARY STUDIES

(No degree program is offered.)

### QUAT

417 Quaternary Stratigraphy and Early Man (5)

History of climatic changes during the Quaternary Period, as revealed by physical and biological data. Global chronology and correlation of quaternary sediments. Offered jointly with the Department of Anthropology as Archaeology 417 and the Department of Geological Sciences as Geological Sciences 417. Prerequisite, senior standing or permission.

## QUAT

501 Seminar in Quaternary Environments (2, max. 8) W

Interdisciplinary seminar in the changing natural environments of the Quaternary Period, with emphasis on climatic changes and their effects.

## QUAT

502 Interdisciplinary Quaternary Investigations (3-5, max. 15)

Research course for interdisciplinary investigations of Quaternary problems. Problemoriented case study required if taken in conjunction with 501.

## **RADIOLOGICAL SCIENCE**

#### RADS

520 Radiological Science Seminar (1, max. 6)

#### RAD S

600 Independent Study or Research (\*) AWSp

RAD S

700 Master's Thesis (\*) AWSp

## INTERSCHOOL OR INTERCOLLEGE PROGRAMS

## UNIVERSITY CONJOINT COURSES

#### UCONJ 410 Study of Interdisciplinary Evaluation and Management of Handicapped Children (3) AWSp BOLLA

Multidisciplinary study of handicapped children, including identification of children with problems, clinical assessment by multidisciplinary team, formulation of plans for management, and reassessment in terms of progress made. Prerequisites, assignment to a practicum at CDMRC and evidence of knowledge in child development, or permission. (Offered cooperatively by School of Nursing, College of Education, Departments of Pediatrics and Psychiatry in the School of Medicine, Departments of Psychology, Speech, and Home Economics in the College of Arts and Sciences, School of Social Work, and School of Dentistry.)

#### UCONJ 490 Social Sensitivity in Health Care (3) A

STANDEVEN

Multidisciplinary course for students in the health professions to sensitize them to the life situation of the poverty and minority groups as it relates to the community's health-care system. Focuses particularly on the social, cultural, and physical barriers that these groups encounter when they seek solutions to their health problems. Stimulates student to define more clearly his professional role in the health-care problems of these groups. Since the primary input of information for this course is experiential, students are involved in field experiences with people in minority groups and poverty situations to furnish students with the first-hand personal involvement with the life styles and living experiences of these people. The faculty is selected from the involved schools, as well as from members of the cultural groups being surveyed. Enrollment is limited to 20 students. An attempt is made to achieve a balance of students from the various departments. (Offered cooperatively by School of Nursing, School of Dentistry, School of Social Work, School of Medicine, College of Pharmacy, and Department of Home Economics in College of Arts and Sciences.) Prerequisite, permission.

## BIOENGINEERING

Administered by the School of Medicine and the College of Engineering.

## **Courses for Undergraduates**

#### 299 Introduction to Bioengineering (1) AWSp

Lectures, discussions, and reading assignments on the various aspects of bioengineering; orientation in bioengineering studies and practice.

### 460 Wave Effects in Bio-Materials (3) Sp

Ultrasonic, electromagnetic, and optical wave effects in biological materials. Applications to biomedical uses in diagnosis, therapy, and surgery. Prerequisite, Electrical Engineering 483 or other course in wave propagation, as approved by instructor. Offered jointly with the Department of Electrical Engineering as Electrical Engineering 460.

#### 490 Materials Engineering for Biomedical Applications (3) A

Combined application of the principles of physical chemistry, biochemistry, materials engineering, mass transfer, and fluid mechanics to biomedical problems. Case studies will include considerations of the selection of materials, 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. Offered jointly with the Department of Chemical Engineering as Chemical Engineering 490.

## 499 Special Projects (2-6, max. 6) AWSp

Individual undergraduate bioengineering projects under the supervision of an instructor. In addition, classes on selected topics of current interest as announced, such as the application of engineering principles and analysis to the cardiovascular system and its components. Prerequisite, permission of department chairman.

## **QUANTITATIVE SCIENCE**

Administered by the College of Fisheries and the College of Forest Resources.

## **Courses for Undergraduates**

## APPLIED STATISTICS

#### 281 Elements of Statistical Method (5) AWSp

Elementary concepts of probability. Binomial and normal distributions. Basic concepts of testing hypotheses and estimation. Chi-square tests. Linear regression theory. Applications of these methods primarily to biological problems. Equivalent to Mathematics 281. Prerequisite, Mathematics 105.

381 Elementary Concepts in Statistics (4) A Elementary concepts of probability. Binomial and normal distributions. Basic concepts of

testing hypotheses and estimation. Chi-square tests. Linear regression theory. Applications of these methods, primarily to biological problems. Term paper on statistical application in student's field of interest; cannot be taken for credit by anyone who has received credit for 281 or equivalent. Prerequisite, graduate standing or permission.

#### 382, 383 Statistical Inference in Applied Research (5,5) AW, WSp MCCAUGHRAN

Analysis of variance and covariance; chisquare tests; multiple and curvi-linear regression; sampling theory; discrete distributions; experimental design and power of tests. Application to biological problems. Use of computer programs in standard statistical problems. Prerequisites, 281 or 381, Mathematics 124 or Quantitative Science 291 or permission for 382; 382 for 383.

#### 486 Experimental Design (3) Sp MALE

Topics in analysis of variance and experimental designs: choice of designs, comparison of efficiency, power, sample size, use of computer for standard analyses. Prerequisite, 383 or Mathematics 485.

#### APPLIED MATHEMATICS, **OPERATIONS RESEARCH**

291, 292 Analysis for Biologists (3,3) AW,WSp

CHAPMAN, HATHEWAY Differentiation; integration including multiple integrals and partial derivatives. Numerical and computing techniques in analysis. Emphasis on biological problems, particularly in ecology. Prerequisites, Mathematics 105 for 291; 291 or Mathematics 124 for 292.

#### 391 Introduction to Matrices and Their Applications (3) A TURNBULL

Elementary concepts of matrices and matrix operations; use of computer in inverting matrices, solving systems of equations and other matrix operations; applications in operations research and biology. Prerequisites, 281, Mathematics 125 and 114, or Fisheries 240 or equivalent course in computer use, or permission.

#### **Techniques of Applied Mathematics in** 392 Biology (3) A

Ordinary differential equations, linear and nonlinear; systems of differential equations; approximation techniques: applications to biological processes. Prerequisite, 292 or Mathematics 126, or permission.

#### 396 **Operations Research in Resource** Utilization I (3) A RARE

Introduction to some of the tools of operations research and the application of these in examining, defining, analyzing, and solving complex problems of resource management and of resource product manufacturing. Emphasis is placed on networks and graphs, principally PERT analysis, and on linear pro-gramming and its extensions, such as the transportation assignment and transhipment models. Sensitivity analysis and duality also are presented. Prerequisite, 391, which may be taken concurrently.

#### 491 Systems Analysis in Resource Management (4) A MAR

Nature of systems; systems goals and objec-

tives; models; transformation of inputs to outputs; control systems; information; survey of methods of optimization; general systems; comparative systems; fishing systems; design and analysis of actual systems. Prerequisite, 291 or Mathematics 124.

#### 496 **Operations Research in Resource** Utilization II (3) W

SCHREUDER

Presents additional operations research methods, principally model-building techniques and simulation approaches. Existing biological and physical models largely will be taken for granted. These models will be extended and interpreted within a social science framework. Specifically economic and managerial decision making under uncertainty, both when analytic solutions can be obtained and when they cannot, will form the core of the course. This course can be taken independently from 396. Prerequisites, 281, 291.

### 497 Advanced Mathematical Programming with Applications in Resource Management (3) Sp

BARE

Selected techniques from mathematical programming, with primary emphasis on the formulation, solution, and interpretation of natural resource-oriented problems. Material presented includes: (1) selected techniques from linear programming, i.e., the revised simplex, dual simplex, decomposition, and primal-dual algorithms; (2) integer program-ming; (3) classical optimization techniques; (4) Kuhn-Tucker conditions, (5) quadratic programming; (6) general convex programming, (7) separable programming, and (8) dynamic programming. Prerequisites, 396 and 496, or Quantitative Methods 450 and 451.

## MATHEMATICAL ECOLOGY

## 456 Mathematical Models in Population Biology (4) A

CHAPMAN, PAULIK

Definition and role of mathematical models in population biology; types of models; population processes and population growth; use of computer in model building; sampling and other methods of estimation of population parameters. Prerequisites, 281, 292, Fisheries 425 or Biology 210 or permission.

#### Management of Exploited Animal 457 Populations (4) W MATHISEN

Equilibrium yield model; spawner-recruit models, management methods; use of catch-effort statistics in estimation and management, computer simulation in management decisions. Prerequisite, 456.

## 460 Ecological Models (4) Sp

HATHEWAY Empirical models; energy flow and compartmental models and their use in ecology; spatial patterns; ecological diversity; other special models. Prerequisite, 456.

## WILDLIFE SCIENCES

Administered by the College of Fisheries and the College of Forest Resources.

#### Survey of Wildlife Biology and 350 Conservation (3) W TABER

Wildlife ecology and population biology, and interrelationships between wild animals and

man, including encouragement of wildlife population growth and productivity, control of pest populations, and preservation of endangered species. Prerequisite, junior standing.

#### 401 Wildlife Biology (3) A TABER

The relationships of the animal and its environment: the biotic community, climate as an environmental factor, cover requirements, food and nutrition, water requirements, mobility and local adaptation in birds and mammals. Properties (characteristics) of wildlife populations: population dynamics, sex and age structure of the population, social structure of the population, reproduction, mortality and dispersal, predation, reproduction, mortan-ity and dispersal, predation, parasites and disease, introduced populations, and cyclic populations. Prerequisite, 350 or permission.

#### 402 Wildlife and Man (3) W TABER

Human customs, attitudes, and institutions with regard to wild bird and mammal populations. Economics of wildlife populations. Governmental administration and custodianship of wildlife. Frictional relationships between human and wildlife populations (crop damage, public health, etc.) Prerequisite, 401 or permission.

#### 403 Wildlife and Land Use (3) Sp TABER

Review of natural habitats and faunas. Wildlife diversity and abundance in relation to range management, forest management, agricultural land management, wetlands; and in relation to human population growth and engineering developments (cities, highways, airports, dams, etc.), wildlife diversity and development. Prerequisite, 402 or permission.

## SCHOOL OF LAW

### 400 Contracts (8) AWSp

CORKER, COSWAY, RIEKE Principles that regulate the creation, operation, and extinguishment of the legal relation known as contract. The major subdivisions covered are mutual assent, consideration, conditions (express and constructive), performance, breach, damages, discharge, assignment, and beneficiaries. More limited coverage is accorded interpretation, the parol evidence rule, the statute of frauds and illegality.

### 410 Civil Procedure (6) AW

MEISENHOLDER, TRAUTMAN

Fundamentals of procedure prior to trial in civil litigation. The major subdivisions include jurisdiction of courts, venue, commencement of actions, pleading, discovery and other pre-trial devices, and parties. The effect of former chindication may be discussed adjudication may be discussed.

## 416 Legal Research and Analysis (6) AWSp

CROOKS, LYNESS, ROMBAUER An integrated introduction to analysis, research, and legal writing. In the orientation phase, how to study law, including briefing, basic decision analysis, synthesis of decisions, and problem solving are discussed. The next phase continues a more intensive introduction to basic research tools through instruction in legal bibliography. Students integrate their research, analysis, problem solving, and writing skills through preparation of office memoranda or exercises in drafting or preparation of

memoranda for lower courts. In the final phase, students prepare appellate briefs and argue orally before a moot appellate court.

#### 420 Criminal Law and Procedure (5) Sp HARDISTY, JUNKER

Definitions of principal crimes and defenses to criminal prosecution, both common law and statutory, along with a critique of these definitions in light of the actual roles and goals of criminal law processes in a democratic society.

## 430 Property I (8) AWSp

CROSS, PROSTERMAN, STOEBUCK

Ownership and transfer of realty and personalty. The course analyzes the legal relationship of persons to things, from both a historical and a contemporary point of view. Specific subjects included are bailments, fixtures, gifts, leases, real estate contracts, deeds, the recording system, title insurance, and transfers of personal and real property. There is also a brief introduction to the law of nuisance and water rights.

## 440 Torts (8) AW

## PECK, RODGERS

Liability for civil injuries arising from the intentional and unintentional interference with personal and property interests.

#### 500 Administrative Law IV (4) Section A, Sp ANDERSEN

Administrative process and its role in the legal system. Because the administrative process involves action that is susceptible of characterization as executive, legislative, and judicial, a considerable portion of the course involves a study of the relationship of administrative agencies with these more traditional departments of government. Both formal and informal administrative procedures are examined.

## SECOND- AND THIRD-YEAR ELECTIVES

#### 500 Administrative Law IV (4) Section B, Sp PECK

Administrative process and its role in the legal system. Because the administrative process involves action that is susceptible of characterization as executive, legislative, and judicial, a considerable portion of the course involves a study of the relationship of administrative agencies with these more traditional departments of government. Both formal and informal administrative procedures are examined.

## 503 Associations I (3) A

#### TUNKS

Introduction to law relating to association in business and its nonprofit analogues through agency, partnership, other unincorporated forms, and corporations. Emphasis throughout will be upon the legal, financial, and tax factors bearing upon the type of structure to be selected for group activity. Basic principles concerning operation of agency and partnership relationships will be considered along with an introduction to related corporate law doctrines, all in the context of both profit and nonprofit activities. Complete in itself, this course can also serve as a foundation for further study in such areas as business organization. Not open to students who have taken the former Law 503, Agency and Partnership.

#### 505 Corporations VI (6) AW CHISUM

Basic corporation law and practice. The

course covers state law provisions and common contractual arrangements governing the formation of corporations; the allocation of control, profit, and risk among the constituents of the corporation; the financing of corporations through the issuance of debt and equity securities; the duties of officers, directors, and controlling shareholders; the rights of shareholders; corporate and shareholders' litigation; mergers, sales of assets, and other fundamental changes in the corporate structure. Emphasis is placed on the "federal corporation law" evolving out of the SEC proxy rules and Rule 10-b-5.

#### 506 Corporations IV (4) Sp

HENDERSON A shorter version of Law 505.

#### 507 Business Planning (6) AW KUMMERT

Advanced work in corporations and federal taxation in the context of business planning and counseling. Examination will be made of a series of problems involving common business transactions and presenting corporate and tax issues for analysis and resolution. The problems covered include such topics as the formation of corporations, both closely held and publicly owned, stock redemption, the sale and purchase of businesses, mergers and other forms of acquisition, and recapitalization, division and dissolution of corporations. Prerequisite, Law 505 or 506. Students normally should complete Law 532 before taking Law 507. With permission of the instructor, however, students may take the necessary tax course concurrently with Law 507. (Not offered 1972-73.)

## 508 Securities Regulation (3) Sp

Legal controls over the issuance and distribution of corporate securities with primary emphasis on federal regulation: registration and distribution under the Securities Act of 1933; regulation of trading under the Securities and Exchange Act of 1934; regulation of investment companies under the Investment Company Act of 1940; regulation under state Blue Sky laws. Prerequisite, Law 505 or 506. (Not offered 1972-73.)

#### 509 Federal Courts and the Federal System (4) Sp CHISUM

A study of the role of the federal courts in the operation of the federal system. The course is planned as an advanced course in public law and judicial administration, presupposing a foundation in both constitutional law and administrative law. It is concerned with the relations of the federal courts both with other branches of the federal government and with state courts and state governments. In the study of federal-state relationships there are two major themes: problems of the allocation of jurisdiction as between state and federal courts, and the distinct problems of allocation of authority as between state and federal law. The course is intended to give a working knowledge of the rules governing access to the federal courts and to the state courts in federal matters, of the powers under federal law of both sets of courts, and of significant practices characteristic of federal judicial administration. Its principal emphasis, however, is upon the central problems of legal statesmanship in the delimitation of the powers of government with which the federal courts have been and are confronted.

#### 510 Legal Problems Relating to Women (3) Sp ROMBAUER

Includes an examination of existing bases for attacking unjustified discrimination against women (e.g., the equal protection clause, the Ninth Amendment, the Civil Rights Act of 1964, EEOC guidelines under the Civil Rights Act, federal antidiscrimination statutes and executive orders, the Washington equal employment statute) and of the vehicles by which unjustified discrimination against women might best be attacked (constitutional amendment, court actions, etc.). Selected problems with respect to discrimination under state and federal statutes and regulations are examined with a view to identifying unjustified discrimination, the legal processes by which change might best be effected, and the possible impact of desired changes on reverse discrimination (laws discriminatory against men, for the benefit of women). (Not offered 1972-73.)

#### 513 Law and Psychiatry (2) A HARDISTY

Study of the standards and procedures (1) for the voluntary and involuntary civil commitment of persons who are mentally disordered, (2) for the involuntary commitment of persons who are incompetent to stand trial because of a mental disorder, and (3) for the involuntary commitment of persons found not guilty because of insanity. The course also considers what legal devices, if any, are desirable to provide supervision of the administration of mental hospitals. Both legal and nonlegal materials bearing on these problems are considered.

#### 516 Commercial Transactions V (5) WSp COSWAY, SMITH

Payment, financing, and other problems in the distribution of merchandise. Sale, transportation, and storage of goods, as well as commercial paper, including notes, drafts, and checks, are studied. Emphasis is given the Uniform Commercial Code.

## 519 Negotiation: Dispute Settlement and Planning (3) Sp

## LYNESS

Study of the negotiation process and its interrelationship with litigation and counseling. The materials used include actual case histories of settlements negotiated with respect to such matters as personal injuries, property distribution in contested divorces, will contests, contract disputes, and criminal charges. Assigned readings include selections from work on social psychology and studies of small-group behavior. Negotiation between paired students on various problems is included to simulate development of the skills inherent in the process and the familiarity with the pressures the process generates.

#### 520 Constitutional Law VIII (8) Section A, AW; Section B, AWSp CORKER, MORRIS

Principles of constitutional law under the United States Constitution as they relate to the scope of and limitations on the powers of state and national governments in dealing with matters of life, liberty, and property. Federalstate relationships and the constitutional role of the courts are also analyzed.

#### 523 Evidence III (3) Sp GALLAGHER

Selected rules of evidence analyzed, with emphasis on trial practice problems. Major areas

covered include relevance, the hearsay rule and its exceptions, examination of witnesses, and demonstrative evidence and writings.

### 524 Contemporary Maritime Law Problems (2) Sp

RODDIS

Conducted by Seattle practitioners, this course deals with current maritime problems, on a practical basis, contrasted with the more theoretical treatment in Law 550. It deals with a broad spectrum of problems: e.g., shipping documents, safety at sea, pollution, multination organizations, federal regulation, marine insurance, port facilities, maritime litigation, and the impact of various courts. Hours are to be arranged.

#### 525 Equitable Remedies IV (4) Sp RODGERS

Basic substantive and procedural rules developed and applied in equity, including specific performance and reformation of contracts, desegregation of public schools, and injunctions against proceedings in another jurisdiction will be considered. Particular emphasis will be placed on issues arising out of the formulation, modification, and enforcement of an equitable decree. Procedural devices developed in equity for managing multiparty litigation (such as interpleader, intervention, and class suits) and for hastening the determination of rights (such as an injunction to settle the validity of projected governmental action) will also be considered.

#### 527 Contemporary Problems in Copyrights, Patents, and Trademarks (3) Sp GALLACHER

Introduction to the federal laws of copyrights, patents, and trademarks and their relation to unfair competition doctrines under state law. Taxation, licensing, and litigation aspects are considered. Contemporary issues examined include photocopying, CATV broadcasting, computer programs, and franchising.

#### 532 Federal Income Taxation VI (6) AW KUMMERT, TUNKS

Study of the pature of income and the gross income concept; statutory exclusions from income; personal deductions; business deductions; income splitting through trust and nontrust arrangements; special provisions for the treatment of gains and losses in respect to capital assets; partnership taxation; and the basic provisions relating to corporate income tax treatment. Procedural rules and the principal accounting devices are examined.

#### 533 Federal Tax Procedure (3) W

Consideration of procedural problems involved in the settlement of tax disputes. Topics covered include (1) return and filing requirements; (2) deficiencies and the mechanics of their assessment; (3) waivers and consents; (4) extended periods of limitation on assessments and claims for refund; (5) jeopardy assessments and injunctions; (6) payment, credits, and refunds; (7) additions to tax, revocable and irrevocable elections, and legal effect of regulations; (8) rulings, compromises, and closing arguments; (9) appellate division settlements, estoppel and set-offs; and (10) recoupment and the obligation of consistency. Prerequisite, 532, which may be taken concurrently. (Not offered 1972-73.)

#### 535 Property II (8) Section A, AW; Section B, WSp

Problems of voluntary disposition of assets, primarily through wills and trusts. Attention is

paid to disposition by will, creation of and disposition by a trust, and the effectiveness of the disposition in the creation of present and future interests in property. Some consideration is given to alternative methods of wealth transmission and to the basic tax framework important in formulating plans of disposition.

#### 537 Problems of Judicial Administration Workshop (3) Sp

## FLETCHER, STAFF

Workshop in selected current problems of judicial administration. During the first phase of the workshop, participating students are divided into groups for field work and research on specific topics and for preparation of report papers. During the second phase, each group presents to the entire class a summary of the results of the group's firstphase investigations, with opportunities for questions and discussion. Offered on satisfactory/not satisfactory basis only. Enrollment limited to 20.

#### 538 Personal Property Security (3) A SHATTUCK

This is a course concerned with all aspects of security in personal property. ("Personal property" includes everything except land.) Covered are problems and legal principles relevant to the creation of the security interest, to its perfection, to priorities between competing security interests and between a security interest and other kinds of property interest, to payment and redemption, and to realization procedures. Both the Uniform Commercial Code and the non-Code law are considered, with emphasis on the former.

#### 539 Real Property Security (3) Sp SHATTUCK

Methods by which an obligation may be secured by property of the obligor or of a third person. The course covers the common law principles and statutes that regulate the creation, operation, and extinguishment of the legal relations known as real property mortgage and deed of trust.

#### 540 Products and the Consumer (4) Sp KUMMERT

Introduction to the issues involved in trying cases that involve dangerous and defective products, in legislating on products problems, and in administering statutes dealing with such matters. The course is fairly evenly divided between products and issues involved in civil actions for harm resulting from defective and dangerous products.

## 546 Legal History (3) Sp

STOEBUCK

In-depth study of selected episodes important to the development of the Anglo-American legal system. Such episodes include, among others, the origins of the common-law writ system, English seventeenth-century constitutional struggles, the role of legislatures in the formation of American law, and the development of legal education in America. Especially in dealing with English affairs, readings are assigned in basic historical source material. The primary objective of the course is to give a perspective on the legal system, and a secondary objective is to develop familiarity with legal history research materials. (Not offered 1972-73.)

#### 550 Admiralty (3) Sp CROOKS

Admiralty jurisdiction, including its nature and sources, waters and subject matter within the jurisdiction, vessels subject to the jurisdiction, laws affecting maritime rights and obligations and problems of government vessels. In addition, coverage is given maritime liens, seamen's rights, carriage of goods, charter parties, salvage, general average and limitation of liability.

#### 551 Community Property (3) A CROSS

Dealing with all aspects of community property, including what constitutes community property as distinguished from separate property, how it may be acquired and disposed of, and the problems of conflict of laws encountered in transactions with common law jurisdictions. Washington cases constitute nearly

## 553 Conflict of Laws VI (6) WSp TRAUTMAN

all of the course material.

Problems arising when one or more fact elements in a case occur in a jurisdiction other than the forum. The course involves the study of that part of the law which determines before the courts of what state or nation a suit may be brought and by the law of what state or nation a suit may or should be decided.

## 554 Legislative Clinic (15) W

JOHNSON

A limited number of law students work full time with a legislative committee, such as the House Judiciary Committee or the Senate Judiciary Committee, during Winter Quarter while the legislature is in session. The clinic offers a direct experience in the legislative process, including analysis and drafting of legislation, research on statutory, common law, and constitutional questions affecting legislation, attendance at hearings, preparation of reports on bills for committees, and participation in executive committee sessions. At the end of the quarter, each student must prepare a written report in three parts: (1) a factual description of what he did, including copies of all memoranda, bills, amendments, or other documents worked on during the session (unless confidential); (2) an analysis of the experience; (3) a detailed report on some particular aspect of the legislative process and how it might be improved.

#### 555 Creditor-Debtor Law (4) A SMITH

Principal rights and remedies of unsecured creditors, individually and collectively. Among matters discussed are judgments and judgment liens, executions, attachments, garnishments, fraudulent conveyances, compositions, assignments for the benefit of creditors, and debtors' exemptions. Bankruptcy emphasized.

## 556 Criminal Procedure VI (6) AW

JUNKER

State and federal rules of criminal procedure, including the constitutionally derived procedural rights of those accused of crime.

## 558 Death and Gift Taxation (3) W

Federal and state death and gift tax systems. The major subdivisions covered include basic application of death and gift taxes, transfers subject to both, and the application of death and gift taxes to joint interests, community property, and life insurance. Territorial jurisdiction to impose these taxes is considered as are the various components of the tax liability and the valuation for tax purposes of property transferred.

#### 559 Domestic Relations (3) A RIEKE

Law pertaining to marriage, protection of the marital relation, disintegration of the family relation, divorce, adoption, and the juvenile court. Washington' law is emphasized, with comparisons being made to the law of other jurisdictions. Consideration is also given to such related conflict of laws problems as jurisdiction, procedure, costs, alimony, support, property division, custody, and modification of orders and their enforcement.

#### 560 Estate Planning Workshop (3) Sp PRICE

Techniques of planning and implementing dispositive arrangements, effective during lifetime or at death, of properties and other rights possessed or controlled by an individual. The course attempts to interrelate and integrate principles of trusts, insurance, income tax, gift and death taxes, wills, fiduciary administration, property (real and personal), and accounting in the effectuation of dispositive arrangements. Prerequisites, Law 535 and 558.

#### 561 Evidence (5) AW

Scope and function of rules of evidence analyzed in the context of trial practice. Major problems covered include examination of witnesses, admission and exclusion of evidence, competency of witnesses, privilege, relevancy, demonstrative evidence, hearsay and its exceptions, authentication of writings and the best evidence rule, burden of proof and presumptions, judicial notice and the parol evidence rule. Emphasis throughout is laid on trial evidence and trial problems.

## 562 Juvenile Courts (3) W

#### HARDISTY

The following aspects of the juvenile justice system are covered: philosophical bases, criminal and noncriminal delinquency jurisdiction, neglect and dependency jurisdiction, constitutional procedural safeguards, police investigation, case intake, preliminary screening, detention, waiver of juvenile court jurisdiction, hearing and corrections. (Not offered 1972-73.)

#### 563 Government Regulation of Business (5) AW

#### KUMMERT

Control of economic activity by attempts to encourage and maintain competition. The law of antitrust is studied and contrasted to government ownership and direct supervision. Particular attention is given to monopolies, restraints of trade, mergers, and price discrimination. Emphasis on statutory interpretation, including Sherman Act, Clayton Act, Robinson-Patman Act, and Federal Trade Commission Act. Preservation of competition is examined as the fundamental national economic policy.

### 564 Insurance (3) W

RODDIS

Aspects of insurance law most commonly encountered by attorneys, with particular emphasis on life, fire, and casualty insurance problems. More specifically, the course examines federal and state control of insurance; insurable interests, third party interests, amount of recovery and subrogation as they relate to property and liability insurance; insurable interests, rights and interests of beneficiaries, community property problems, and double indemnity in the life insurance area. The selection and control of risks and the marketing of insurance are also examined.

## 566 Jurisprudence and Legal Philosophy (4) AW

#### MORRIS

Introduction to legal philosophy. The course considers some of the traditional schools of jurisprudence as represented by selected authors and undertakes an analysis of the method and aims of jurisprudence in light of recent writings. Enrollment limited to 10.

### 567 Labor Law (3) A

PECK

Labor problems preceding the establishment of a collective bargaining relationship. More specifically, the course is concerned with the relationship of the individual employee with the union, and the organizational rights of the employee and the union. Included is a coverage of the economic weapons available to parties to labor disputes. Since this background provides the basis for understanding the bargaining process in which the parties engage, it is desirable that this course be taken by students who plan to take Law 568. It is also recommended that students taking this course first take either Law 500 or 501.

#### 568 Labor Relations (3) W PECK

Processes of collective bargaining. Included is a coverage of the statutory duty to bargain and problems which arise under specific contract clauses. Administration of the contract is also the subject of intensive investigation. Because an understanding of the limitations on the economic weapons available gives meaning to the bargaining processes, it is desirable that students taking this course have taken Law 567 and recommended that they take either Law 500 or 501.

#### 569 Professional Responsibility (1) Sp HUNT

Selected problems illustrative of the responsibilities of members of the legal profession: admission to the bar and the integrated bar; building a law practice; unauthorized practice of the law; decision to represent the unpopular defendant; relationship between lawyer and judge, legislator, and administrator; lawyer's fiduciary relation; the attorney-client privilege; conflict of interest; fees and remuneration; public responsibilities of the lawyer; the lawyer and the poor.

#### 570 Legislation (3) W JOHNSON

Characteristics of the legislative process. The objectives of the course are to delineate the uses and functions of statutory law, acquaint students with legislative procedures and controls under which legislative bodies operate, examine different types and parts of legislation and the judicially-developed principles and rules applicable thereto, and review judicial techniques of interpretation. Enrollment limited to 15.

#### 571 Local Government Law (3) A TRAUTMAN

Legal problems encountered in the conduct of government at the local level; e.g., cities, counties, school districts, and other specialized units of government. The course examines the general organization and powers of local government units and the intergovernmental relations between local and federal, local and state, and the different local units themselves. There is some specialized consideration of problems in the areas of police power regulation, special assessments, borrowing, public expenditures, contracting, and tort liability.

#### 572 Private Land Development (3) W STOEBUCK

Emphasis is on the problems encountered by a lawyer representing developers of land for commercial use, such as a retail shopping center. Some attention is given to the development of land, such as subdivisions, for housing purposes. Problems considered include, among others, financing, choice of developing entity, commercial leases, platting, and those of "over promoting."

#### 573 Workshop in the Legal Rights of Prisoners (3) AWSp CHISUM

Workshop on the legal rights of prisoners and the procedures for protecting them. Areas covered include postconviction remedies, legal disabilities, and other problems arising from the prisoner's isolation from society, and remedies for the mistreatment of prisoners. The role of the lawyer and the adequacy of present legal representation is considered. The workshop is open only to students concurrently participating in the Legal Assistance to McNeil and Monroe Prisoners program or similar programs.

#### 574 Water, Public Land, and the Environment (3) A JOHNSON

Covers key aspects of water law and policy, dealing with irrigation, power generation, pollution control, esthetics, recreation, environmental quality, and municipal and industrial uses. It covers federal land law and policy dealing with national parks, recreation, wildlife, environmental quality, mining, grazing, and timber production. It reveals the points of conflict between these competing uses of land and water and analyzes the changes in priorities now occurring among them.

#### 575 Problems in Urban Government (5) AW ANDERSEN

Anatomy of urban government from the perspective of the lawyer, acting either as a representative of private interests or dealing with a community problem such as environmental quality, housing, transportation, poverty, or crime. Emphasis will be upon the relationships of local governments to one another and to the state and national governments. Among the topics considered are the allocation of functions' of local government power, problems associated with the functional territorial division of governmental power at the local level, role of the federal government, and special problems of judicial review that are raised in these contexts. Not open to students who have taken Law 571.

#### 577 Problems in Urban Finance (3) W ANDERSEN

Examination of the legal problems of state, regional, and local finance. The variety of techniques by which the modern urban community finances the provision of public goods and services will be considered, including taxation, borrowing, intergovernmental grants, federal revenue sharing, etc. Emphasis will ultimately be on issues of tax policy, viewed from both individual and community perspectives. Not open to students who have taken the former Law 577, State and Local Taxes.

## 579 Suretyship (3) Sp SHATTUCK

Methods by which an obligation may be secured by the promise of a third person. The course covers the common law principles and statutes which regulate the creation, operation, and extinguishment of the legal relations known as suretyship, guaranty, accommodation paper, and accommodation contracts on negotiable paper. (Not covered are several types of bond typically written by professional corporate bondsmen, particularly court, fidelity, construction, and supply bonds. Bail bonds are also excluded.)

580 Trial and Appellate Practice (5) WSp Washington statutes, rules and decisions governing various aspects of the trial and appeal of cases. Within the available time, the course attempts to provide information and training in the how-to-do-it of trial practice. A required part of the course is the conduct of an actual case before a judge from the local superior courts. The emphasis throughout is on the example of Washington procedure and only limited consideration is given federal practice.

## 585 Problems in Evidence (4) Section A, W; Section B, Sp

MEISENHOLDER

Course in evidence conducted by the problem method. A casebook is not used. The major subdivisions covered are relevancy, examination of witnesses, opinion rule, hearsay rule, introduction of exhibits in evidence, and the best evidence rule. Other topics are covered as time permits. This course is not an advanced course, but an alternate course on the basic subject matter.

#### 586 International Legal Order (3) W PROSTERMAN

Considers those aspects of public international law that are crucial to human survival, in relation to a series of specific problems: the Cuban missile crisis, the Dominican intervention, the Panama Canal crisis, the civil war in Cyprus, and the Nuclear Test-Ban and Non-Proliferation treaties.

#### 587 International Law of the Sea (3) A BURKE

Examination of the way nation-states regulate activities on and under the ocean. The course covers the international regulations and institutions concerned with fishery exploitation, pollution, transit rights, scientific research, fuel and 'nonfuel mineral development, and the boundary issues involved in these various ocean uses.

## 588 Workshop in Land-Use Planning Law(3) W

HUNT

A workshop in selected problems of land-use controls, with specific reference to planning, zoning, and subdivision regulations. The emphasis is on the interrelationship of the respective roles of lawyer and planner in the planning process. Certain concepts, problems, practices, and procedures will be discussed in depth, and several short written memoranda will be required. Open to second and thirdyear law students and to candidates for a graduate degree in Urban Planning. Enrollment limited at the discretion of the instructor, (Not offered 1972-73.)

#### 590 Corporate Income Tax (3) Sp KUMMERT

A study of the tax consequences of conduct-

ing business in corporate form, with consideration of such items as the formation of corporations; distributions of dividends; complete and partial liquidations; stock redemptions; stock dividends; and corporate acquisitions, divisions, and reorganizations. Special problems arising from distorted capital structures and unreasonable accumulations of earnings, and special treatment of personal holding companies, collapsible corporations, and corporations electing to be taxed as partnerships are also discussed.

## 593 Social Legislation (3) Sp

ROMBAUER

Consideration of major problems arising under selected social welfare legislation, including workmen's compensation, economic assistance for the aged and for dependent children and their parents, social security insurance, unemployment benefits, equal employment opportunity, medical services, and legal services.

#### 594 Transnational Tax (3) Sp HJORTH

United States taxation of foreign income and tax treaties; concerned mainly with tax problems of American investors and businessmen who have investments, other income producing property, and business operations abroad. Prerequisite, Law 531 or 532. (Not offered 1972-73.)

## 595 Introduction to Japanese Law (3) A

The topics will be those deemed most useful to American lawyers seeking a career specialty: brief history of Japanese law, and reception of western law; constitutional framework, with emphasis on the judicial power and courts; the training and roles of the bench and bar; elements of the Japanese codes as a system with emphasis on the Code of Civil Procedure, Civil Code, and Commercial Code and the relationship between them and between these general codes and the vast bulk of special statutes. Enrollment limited at the discretion of the instructor. No Japanese language requirement.

#### 600 Independent Study or Research (\*) AWSp

#### 605 Research and Writing (\*)

Alternative to satisfy the research and writing requirement for graduation, in addition to offerings presently designated as six-hour seminars.

#### 613 Corporate Planning and Counseling Seminar (6) AWSp CHISUM

Selected problems in the area of corporate planning and finance. In 1971-72, the seminar examined in depth the franchising industry, its role in the economy, and the legal and public policy problems it presents. Areas of concern included the nature of the franchise relationship, existing and proposed legislation to protect franchisees; antitrust problems with franchise contracts; the financial and accounting practices of franchising companies. Students are expected to prepare one or more papers, individually or jointly, that may entail field, as well as library, research.

#### 614 Criminal Procedure Seminar (6) AWSp JUNKER

A critical study of the criminal law and related processes at various stages from detention to appeal, including a study of state and federal rules of criminal procedure, and the constitutionally derived procedural rights of persons accused of crime or other deviant behavior. Possibilities for research will include field studies of enforcement practices and studies of the procedure in "quasi-criminal" proceedings involving juveniles, parolees and probationers, alleged mental incompetents, and other persons subject to a loss liability based on a violation of official norms. Prerequisites, Law 556, 520. Enrollment limited to 8.

#### 615 Indian Legal Problems Seminar (6) AWSp

JOHNSON

Students in this seminar may choose topics for research that concern Indian tribal laws, conflicts of laws between Indian and non-Indian laws, federal laws concerning Indians, or state laws concerning Indians. A major piece of research and writing will be required.

#### 616 Federal Court Seminar (6) AWSp MEISENHOLDER

Selected topics in the structure, function, and power of federal courts. Problems not covered in depth in federal courts and the federal system will be considered. Primary emphasis will be placed upon individual research in the production of a written paper. Enrollment limited to 8 third-year students.

## 617 Federal Tax Policy Seminar (6) AWSp TUNKS

An intensive examination of the substance of limited areas of federal tax law and the policy underlying that law. Different aspects of federal tax law, such as the tax treatment of exempt organizations, taxation of capital gains, problems of income splitting, etc., will be considered each year. The seminar will focus upon individual research and writing, and upon the mutual examination and discussion of the research efforts of the group. Prerequisite, Law 532. Enrollment limited to 6 third-year students.

## 622 Consumer Protection Seminar (6) AWSp SMITH

This seminar will examine selected problems in consumer protection, including those arising from the use of consumer credit, the dissemination of credit information, fraudulent and deceptive practices, and those related to health and safety protection. Consideration will be given to methods of providing protection, such as existing legislation, the proposed Uniform Consumer Credit Code, and consumer education. Each student will be expected to produce a high-quality paper.

#### 623 Natural Resources Seminar (6) AWSp CORKER

Selected legal problems relating to natural resources. Problems will be chosen from among those relating to (1) water allocation; (2) environmental impacts of electric power generation by (a) falling water, (b) fossil fuel, (c) nuclear energy. Preference in enrollment will be given to those who have completed Law 574 and to those who will complete that course during the year.

#### 624 Ocean Resources Seminar (6) AWSp BURKE

International law of the high seas, concerned with fisheries, mineral, and other resources of the continental shelf, navigation, and territorial waters; treaty law and the law of international organizations as they relate to the resources of the sea. Special attention will be paid to the four Conventions concerning the use of the high seas adopted at the Geneva Law of the Sea Conference of 1958. Enrollment limited to 8 and open to second-year students with permission of instructor.

#### 625 Political and Civil Rights in The United States Seminar (6) AWSp MORRIS

Concentrates upon the basic problems inhering in the relationship of the individual to authority and in the protection of the rights of minority groups. Current problems, as illustrated by recent or pending Supreme Court cases, will be emphasized. Students will be required to do substantial amounts of in-depth research, including, but not limited to, an isolation of the history of the doctrines involved, their relations to intellectual endeavor in related areas, and an exploration of alternative, competing solutions to modern problems. The seminar will run throughout the year, but there will be times of recess to facilitate student preparation of a high-quality paper which, in turn, will be thoroughly discussed by the seminar group, plus rewriting(s). Enrollment is limited to 6 secondor third-year students, with permission of the instructor.

## 627 Selected Problems on Environmental Protection Seminar (6) AWSp

RODGERS

This seminar will examine legal problems resulting from impairment of the environment by technological advances and urban growth. Various issues, including air and water pollution, the use of pesticides, protection of wildlife, and transportation will be considered. Special emphasis will be placed upon examining the utility of litigation as an instrument for assuring protection of the environment. Pending cases will be examined. The current political and legal efforts of groups such as the Sierra Club and the Washington Environmental Council will also be considered. Experts in various fields will be invited to participate.

### 628 Problems in Urban Government and Finance Seminar (6) AWSp ANDERSEN

An opportunity to explore in depth selected legal problems arising from our efforts to govern urban areas and to finance the services they require. For more specific subject-matter coverage, see course descriptions for Law 575 and 577. Prerequisite, Law 571 or 575.

## 631 Human Ecology Seminar (6) AWSp RIEKE

Deals with selected problems drawn from poverty, welfare, health, or correction programs. Emphasis will be placed upon the relation of a nonlegal social system and the legal system with respect to a specific problem (é.g., medicine and law related to alcoholism; social casework and law related to child abuse; parole board operation and law related to deviancy; community organization and law related to "Model City" structure, etc.) in order to evaluate interaction. It is anticipated that students will work with materials from one discipline other than law. Students will be expected to develop the requisite personal contacts with professionals or students in such other discipline. Joint research with a graduate or professional student in another school would be welcomed. Studies the adequacy with which modern law facilitates the donative transmission of wealth, effectuating the reasonable wishes of the donor, providing for the needs of the immediate family, meeting the reasonable expecta-tions of family and others as to the donor's property, and satisfying other demands of society. Incident to that study, it considers the relative availability of various types of property to the reach of creditors, of taxing bodies and of other claimants, and the cost and adequacy of the various mechanisms by which donative transmission is effected. Specific topics may include an intensive study of parts of the Uniform Probate Code (1969) and of other statutory patterns and may also include the preparation of proposals for comprehensive statutory treatment of various subjects. The seminar presupposes a basic knowledge of wills, trusts, and future interests, some knowledge of the wealth transmission aspects of various forms of property ownership and of certain contractual relationships such as insurance, and at least a modest acquaintance with federal estate and gift taxation. A paper is required. Prerequisite, 535; 551 and 558, which may be taken concurrently, recommended.

## 635 International Legal Order Seminar (6) AWSp

PROSTERMAN

Selected problems in the area of international legal order. In 1971-72, the seminar focused on the international legal context, especially bilateral or multilateral foreign-aid mechanisms, that promotes or inhibits democratic development and economic growth: Land reform, food production, and population growth were major problems considered. Encouraged will be papers that seek to develop concrete legal and administrative approaches (draft treaties, foreign-aid legislation, administrative regulations) for dealing with these problems.

#### 637 The Mentally Disabled and the Law Seminar (6) AWSp HARDISTY

For research, students may choose topics that concern the legal problems of the mentally disordered and the mentally retarded. Possible research problems include those relating to civil and criminal commitment and release, to treatment and hospital procedures, to incompetency, and to insanity defenses. The primary objective is the production by each student of a high-quality paper resulting from research, writing, and rewriting. Experts in various fields are invited to participate in the seminar. Enrollment limited to eight secondand third-year students. Prerequisite, Law 513, which may be taken concurrently.

#### 638 Estate Planning Seminar (6) AWSp PRICE

Supplement to the Estate Planning Workshop, which is problem or practice oriented. In the seminar, some of the problems taken up in the workshop are subjected to an advanced analysis (e.g., the use of the widow's election, private annuities, etc.), and some additional topics are considered in depth. Among the latter are the problems of migratory clients (i.e., those who came to community property states from common law states and vice versa). Their problems are considered in light of the existing law (including Cal. Probate Code sec. 201.5) and proposals made for legislation in common law states. Seminar papers are based on traditional' research and, possibly, directed empirical research. Prerequisite, Law 535; 532 and 558, which may be taken concurrently, recommended.

#### **Postgraduate Courses**

#### 545 Legal Analysis and Research for Students Not Trained in the Common Law System (4) AW ROMBAUER

Integrated introduction to legal analysis, research, and writing for students trained in a noncommon law system. Papers on two or three major research projects are required. This course is for graduate students who have already attained a professional standing in law, but who require experience in using American law sources.

#### 548 United States-Japanese Tax Problems (4) Sp

HUSTON

This course is concerned with the operation of the income-tax laws of Japan on income earned in Japan by American nationals and on income earned in the United States by Japanese nationals; and with the operation of the income-tax laws of the United States on income earned in the United States by Japanese nationals, and on income earned in Japan by American nationals. A series of problems based on transnational business transactions will be solved by individual students, whose solutions will be scrutinized by the class.

## 549 United States-Japanese Administrative

Law Problems (3). W This is a course concerned with selected administrative law problems, discussed comparatively in terms of Japanese and United States law. Especially emphasized will be the legal principles that govern the procedural and decision-making aspects of the administrative process, the Japanese concept "administrative guidance," and the possibilities that gaps between 'theory and practice may exist. (Not offered 1972-73.)

#### 596 Justiciability Under the Civil Law and the Common Law (4) A FUJITA

Problems of justiciability in the transnational setting, with particular emphasis on the differences between civil law and common law. Considered are the potential and limitations in litigation, arbitration, and conciliation in transnational transactions; problems about the legal status of aliens; functions of bureaucracies in private transactions.

## 597 United States-Japanese Contract and Sales Problems (4) A

SHATTUCK

Basic contract and sales principles in Japanese and United States law are discussed, and term papers based on transnational transactions involving these countries are prepared.

#### 598 United States-Japanese Corporate Relations (4) W

Corporate law problems with emphasis on transpacific business planning, and United States-parent, Japanese-subsidiary problems. (Not offered 1972-73.)

#### 620 Tutorial in Japanese Law (6) AWSp HENDERSON, STAFF

Individual research project handled on a tutorial basis, involving an area of law of mutual interest to student and teacher. In the case of a student whose basic training was in a civil law jurisdiction, the subject matter of the tutorial is a topic selected from the law and the practice of the United States; in the case of a student whose basic training was in a common law country, the subject matter of the tutorial is a topic selected from the law and the practice of Japan or of the Republic of China, depending on the student's linguistic competence. In any instance, the tutorial discussions may be comparative, drawing on the law of more than one country.

#### 700 Master's Thesis (\*) AWSp

800 Doctoral Dissertation (\*)

## SCHOOL OF LIBRARIANSHIP

Permission of the Director of the School is required for all librarianship courses.

#### 440 Libraries and Society (3) AS

LIEBERMAN An introduction to the principal types of libraries and to issues and trends in modern li-

braries and to issues and trends in modern librarianship. A prerequisite to graduate courses in librarianship.

#### 441 Basic Library Materials (3) AS NELSON

A presentation of the materials, book and nonbook, which form the sources of reference for the informational function of the library. A prerequisite to graduate courses in librarianship.

#### 442 Book Selection (3) WS

NELSON

Basic principles of book selection applicable to library work. A prerequisite to graduate courses in librarianship.

## 443 Organization of Library Materials: Theory and Practice (3) SpS

PAGE, SOPER

Current problems and practices in the organization of recorded information, including an introduction to principles of classification and cataloging. A prerequisite to graduate courses in librarianship.

## 450 Library Materials for Teachers (3) AS

AHLERS

The evaluation and use of various types of instructional materials in teaching, with emphasis on the role of the library program in implementing the curriculum. Not open to librarians or education minors in librarianship.

#### 451 Children's Literature I (3) WSpS BENNE, SHAW

A survey of children's literature for teachers; librarians, and others interested in evaluating and using children's books according to the needs, interests, and abilities of children.

### 452 Storytelling (3) AWS

BENNE, SHAW The role of the storyteller in the past and present. Selection, preparation, and presentation from folk and contemporary literature for various groups and purposes.

#### 453 Literature for Young People (3) AWSpS AHLERS

Reading and appraisal of literature appropriate to the needs, interests, and abilities of young people. For the general student as well as the librarian and teacher. 454 Library in the School (3) WSpS

The role of the library in the school, with an introduction to library services and methods of management.

#### 465 Hospital and Institution Libraries (3)

Orientation in the field: organization and techniques that apply to different types of hospitals, institutions, and public library extension services. Special emphasis on bibliotherapy and the library's contribution to rehabilitation.

## 470 History of the Book (3) WS

Development of the written and printed book, growth of the book trade, and aspects of rare book collecting as it affects libraries.

#### 476 Archival Management (3) \*

Lectures and demonstrations in archival administration, organization of manuscript collections and study of the principles and techniques employed by state archival and historical institutions.

#### 480 Supervision of Public School Library Systems (3) AHLERS

A course designed to aid school personnel in the administration and supervision of districtwide school library programs; emphasis will be given to problems involved in the organization and development of library systems.

#### 485 Seminar in Library Programs for Children and Young People (3) WS\* AHLERS

A course designed to provide an opportunity for discussing changing concepts in library development for children and young people, and for planning programs that reflect current educational trends. Prerequisites, 454 or equivalent, and permission of instructor.

#### 491 Documentation (3) SpS\*

PAGE

A course in the various means of recording, organizing, locating, and duplicating informational materials. Emphasis will be given to practical methods of the documentation cycle.

#### 496 Library Analysis (3) A

The library as an object of study. Introduction to some concepts and notation of systems analysis, with application to libraries.

#### 497 Computers and Libraries (3) W

Development of computers and their role in libraries. Introduction to library automation. Prerequisite, 496 or permission of instructor.

#### 498 Introduction to Document Retrieval Systems (3) Sp

Introduction to computer-based information storage and retrieval systems for collections of documents. Design sequence including: goals, specifications, functional components, measures of performance, and evaluation. Prerequisite, 497 or permission of instructor.

#### 502 Library Organization and Administration (3) WS PAGE, SMITH

Study of public and academic library service, including a consideration of legal structure; finance and statistics; buildings and equipment; personnel; public relations; and other phases of library management. The extension of library service is also considered.

\*In courses where class enrollment is limited, the instructor chooses those who may enroll.

#### 509 Directed Field Work (2-4) SpS LIEBERMAN

Four weeks of professionally supervised field work in various types of libraries.

#### 513 Government Publications (3) SpS

Government publications of the United States and foreign countries, their acquisition, organization, and use.

#### 514 The Library and Audio-Visual Materials (3)

LIEBERMAN

Types, cost, utility, and characteristics of modern sensory aids employed in communicating ideas; organization for handling films, film-strips, recordings and transcriptions, slides, pictures, exhibits, and similar materials in the library; experience in operating various types of equipment; techniques in extending the use of audio-visual materials by community groups; sources of information about materials and equipment.

#### 515 Bibliography and Library Materials in the Humanities (3) AS

SKELLEY

An examination of national and international problems of bibliographic control. Study and evaluation of library resources in the humanities. Prerequisite, 441.

#### 516 Library Materials in the Social Sciences (3) WSpS

SKELLEY

Study and evaluation of library resources in the social sciences, with attention to written milestones of the field. Prerequisite, 515.

517 Library Materials in Science and Technology (3) WSpS

MIGNON, SKELLEY, SMITH

Study and evaluation of library resources in the natural and physical sciences and in technology. Attention is given to the special characteristics peculiar to library materials in the sciences. Prerequisite, 515.

#### 535 Organization of Library Materials: Comparative Methods (3) AS PAGE, SOPER

A consideration of current practices in technical services and a critical study of comparative methods of classification, subject analysis, and descriptive cataloging. Prerequisite, 443.

## 536 Organization of Library Materials: Advanced Problems (3) WS

PAGE, SOPER

A study of new developments in technical services, Library of Congress classification schemes, and organization of special types of printed and nonbook materials. Prerequisite, 535.

## 537 Library of Congress Classification (3) WS PAGE

An extensive consideration of the basic principles of Library of Congress classification and subject headings. Emphasis is on theory and practice in the use of the scheme. **Pre**requisites, 443, 535.

## 540 Advanced Legal Bibliography (2) A

GALLAGHER Bibliographical data and use of federal and state law reports and statutes; quasi-legal and commissioners' reports of the states; bar association records, legal periodicals, indexes and digests, and cooperative bibliographies of law collections.

## MEDICINE

541 Selection and Processing of Law Library Materials (4) A GALLAGHER

Aids to selection, processing, microphotography of legal material, etc.

#### 542 Legal Reference and Research (5) GALLAGHER

Bibliographical lists, law reference questions, briefing, and annotations.

#### 543 Law Library Administration (5) W GALLAGHER

Staff, patrons and public relations, circulation, architecture, book arrangements, equipment, rules, publicity, publications, budgets, reports, professional societies, regional service.

#### 550 Introduction to Library Service for Children (3) AS BENNE, SHAW

Philosophy of library service to children; examination of aids and review media for selection of materials, with emphasis on the evaluation of children's books for school and public libraries.

#### 553 Public Library Service for Children (3) WS

BENNE, SHAW

Administration of children's departments in public libraries; planning and promoting programs and services; evaluation of library collections; community and professional roles of the children's librarian. Prerequisite, 451 or 550.

#### 554 Children's Literature II (3) SpS BENNE, SHAW

Reading and discussion of children's books of all levels; examination of tools and review media for selection, with practice in selection for various fields of interest. Prerequisite, 451 or 550.

#### 555 History of Children's Literature (3) BENNB

Literature for children, from the earliest times through the nineteenth century. Consideration of significant qualities in the cultural context of the time, with attention given to representative authors and titles. Prerequisites, 451 or 550, and 554.

#### 590 Special Topics in Librarianship (3) Seminar dealing with various topics in librarianship. To be offered by visitors or resident faculty. Topics will be changed from quarter to quarter. May not be offered every quarter. May be repeated for credit. Prerequisite, per-

- mission. 599 Methods of Research in Librarianship (3) AS
- MIGNON, SMITH

A survey of problems and methods.

600 Independent Study or Research (\*)

700 Master's Thesis (\*)

# SCHOOL OF MEDICINE

#### ANESTHESIOLOGY

480 Basic Clinical Clerkship (\*) AWSpS WYTB

Introduction to the principles of anesthetic management, airways management, fluid therapy, emergency care, resuscitation, management of pain, and respiratory care. Prerequisite, Human Biology 460 or Medicine 465. (Two weeks, full time.) All affiliated hospitals.

#### 481 Advanced Anesthesiology Clerkship (6) AWSpS WYTE

Clerkship designed to meet the specific needs and goals of the individual student who desires greater experience in some facet of anesthesiology. Individual programs are established in the following areas: respiratory care, surgical anesthesia, obstetrical anesthesia, and dolorology. Prerequisite, 480. (Six weeks, full time.)

#### 497 Anesthesiology Special Electives (\*) AWSpS WARD

WARD

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 students of possible opportunities. 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.

#### 498 Undergraduate Thesis (\*) AWSpS WARD

#### 499 Undergraduate Research (\*) AWSpS WARD

Specific research problems relating to pulmonary, cardiovascular, renal, obstetric, and central nervous system functions and their alteration by anesthetic agents and techniques. Prerequisite, permission.

## 521, 522, 523 Anesthesiology Seminar (\*, \*, \*) A,W,Sp

## MARTIN, WARD

Seminars deal with basic science correlated to anesthesiology, with quarterly themes of physiology and pharmacology of circulation; respiration, acid base regulation, anesthetic uptake, gestation, pain. Anesthesiology 480 recommended. May be repeated for credit.

## BIOCHEMISTRY

#### 405 Introduction to Biochemistry (5) WSp

DERANLEAU, FISCHER, HERRIOTT, KELLER Introductory course in general biochemistry offered two times each year covering basic principles. Emphasis is placed upon a broad understanding of the chemical events in living systems in terms of the metabolism and the structure-function relationships of biologically important molecules. This course does not fulfill the prerequisites for advanced courses in biochemistry (see Biochemistry 440, 441, 442). Winter Quarter for students in dentistry and pharmacy, others by permission as space permits. Spring Quarter, open registration. Prerequisite, organic chemistry or permission.

#### 408 Introduction to Biochemistry Laboratory (3) Sp

Laboratory exercises in general biochemistry for students in medical technology and other undergraduate students by permission. Prerequisite, 405, which may be taken concurrently.

#### 412 Medical Students' Laboratory (3) Sp BARD

Content similar to 444. Where possible, the relationship of the biochemical techniques or experiments being performed to clinical or

diagnostic medicine is demonstrated or discussed. For medical students and others by permission. Prerequisites, Human Biology 410 or equivalent and permission of instructor.

#### 440, 441, 442 Molecular Biology

(3,3,3) A,W,Sp

DAVIE, FANGMAN, MC CARTHY, PARSON, WALSH

An interdisciplinary course in general biochemistry with a strong component in molecular biology designed for undergraduate students enrolled in the new curriculum in molecular and cellular biology and graduate students in other science departments. Prerequisites, Chemistry 337 or permission for 440; 440 for 441; 441 for 442; introductory physical chemistry recommended.

#### 444 Molecular Biology Laboratory (3) AW BARD

Laboratory projects and conferences designed to acquaint the student with many of the current techniques of biochemistry. All students will perform certain basic experiments, but a number of optional experiments are available. The student may also choose a limited research problem of interest to him, subject to the approval of the attending staff. The Autumn Quarter laboratory is primarily for biochemistry graduate students, although other qualified students may be admitted. The Winter Quarter laboratory is for graduate students, medical students, and others by permission. Prerequisite, permission.

## 498 Undergraduate Thesis (\*) AWSpS

For senior medical students. Prerequisite, permission.

### 499 Undergraduate Research (\*) AWSpS

Investigative work on enzymes, proteins, lipids, nucleic acids, protein biosynthesis, intermediary metabolism, physical biochemistry, and related fields. Prerequisite, permission.

## **Courses for Graduates Only**

## 520 Seminar (1-3) AWSp

A seminar course dealing with special topics in the field of biochemistry. May be repeated for credit.

## 540, 541, 542 Literature Review

(2 or 3, 2 or 3, 2 or 3) A,W,Sp Emphasizes critical evaluation of original articles in the literature. Coordinated with Biochemistry 440, 441, 442, and to be taken concurrently. For first-year graduate students in biochemistry and students of other science departments, with permission.

## 560 Physical Biochemistry (2) A

DERANLEAU, TELLER Specialized aspects of physical chemistry as applied to systems of biological interest. Particular emphasis on hydrodynamic and optical properties of macromolecules. Prerequisite, physical chemistry.

#### 562 X-Ray Structure—Analysis of Proteins (2) A

## HERRIOTT

The conformation of proteins and enzymes as revealed by X-ray diffraction analyses. Methods of protein crystallography, evaluation of results, mechanism of enzyme action at the atomic level. (Offered alternate years; alternating with 563.) Prerequisite, 442 or permission.

#### 563 Structure and Function of Proteins (2) W

NEURATH, PETRA, WALSH

Consideration of the chemical structure and conformation of proteins as they relate to biological function and molecular evolution. Particular emphasis will be given to the structure and the chemical modification of active sites of enzymes and to the subunit structure of proteins in macromolecular aggregates. Prerequisite, 442 or Human Biology 410 or permission. (Offered alternate years.)

#### 565 Enzyme Mechanism (2) W DAVIE, FISCHER

Chemical versus enzymatic catalysis and mechanism of enzyme action. Mapping of active sites, physiological control of activity by covalent and noncovalent modification of enzymes and by protein-protein interactions. Prerequisite, 442 or permission. (Offered alternate years.)

#### 569 Biochemistry of Nucleic Acids (2) Sp DAVIE, GORDON

Chemistry and structure of nucleic acids, enzymes active toward nucleic acids, replication of nucleic acids, the coding problems and biosynthesis of proteins. Prerequisite, 442 or permission. (Offered alternate years.)

#### 572 Metabolism in Organized Structures (2) Sp

MORRIS, PARSON

Assembly of multienzyme complexes, cellular organelles, and membranes. Biochemical activities in complex structures: active transport, electron transport, oxidative phosphorylation, and photosynthesis. Prerequisite, 442, which may be taken concurrently, or permission.

#### 573 Biochemical Evolution (2) Sp MC CARTHY

Discussion of the mechanism of evolution at the molecular level, including mechanisms of mutagenesis, gene duplication, and selection of new characters, and their effects on the structure and function of nucleic acids and proteins. Prerequisite, 442 or Human Biology 410 or permission.

#### 574 The Biochemical Basis of Disease (2) Sp BORNSTEIN, SHAPIRO

Discussion of pathologic physiology and molecular basis of clinical disorders. An attempt will be made to demonstrate the relevance of biochemical research to the understanding and the rational therapy of human disease. Scope limited to diseases in which new developments permit description in biochemical terms. Prerequisite, 442 or Human Biology 410 or permission.

## 583 Advanced Techniques in Biochemistry (3) W

TELLER, WADE

An intensive course involving conferences, reading assignments, and laboratory procedures, including ultracentrifugation, electrophoresis, chromatography, spectrophotometry, and radioactive isotope techniques. For firstyear graduate students in biochemistry and students of other science departments, with permission. Prerequisites, 441, 444, and permission.

## 586 Enzyme Regulation (1) AWSpS

DAVIE, FISCHER, GORDON Review of the current literature on the control of cellular processes at the molecular level. Topics include hormonal control of mammalian systems, role of cyclic-AMP in proand eukaryotic organisms, allosteric and covalent modification of regulatory enzymes, etc. Direct participation of students in the presentation of topics is required. May be repeated for credit. Prerequisite, permission.

#### 587 Seminar on Animal Cell Membranes . (1) AWSpS

HAUSCHKA, KELLER, NAMEROFF Weekly conference in which recent literature on animal cell membranes is discussed. May be repeated for credit. Prerequisite, permission.

## 588 Current Topics in Molecular and Cellular Biology (1) AWSpS

BYERS, KELLER, SHAPIRO, YOUNG Critical evaluation of the biochemical literature in areas related to molecular and cellular biology. May be repeated for credit. Prerequisite, permission.

#### 589 Connective Tissue Macromolecules (1) AWSpS

BORNSTEIN

Seminars designed to discuss current knowledge of the biochemistry and pathophysiology of fibrous proteins and other structural macromolecules. Prerequisite, 442 or Human Biology 410 or permission.

## 590 Proteins and Enzymes Seminar (1, max. 8) AWSpS

NEURATH, TELLER, WALSH

Weekly conferences on current research in proteins and enzymes. For graduate students in biochemistry. Prerequisite, permission. May be repeated for credit.

#### 591 Seminar on Protein Structures (1) AWSpS

HERRIOTT, JENSEN

Topics on the determination of protein structure by X-ray crystallography, and on relationships between structure and chemical properties in solution and in the crystalline state. Prerequisite, permission. May be repeated for credit.

#### 592 Topics in the Biochemistry of Regulation (1) AWSpS

MORRIS

Control of enzyme activity and gene expression related to biology of growth and function. Prerequisite, permission. May be repeated for credit.

## 593 Seminar in Nucleic Acid Chemistry and Protein Synthesis (1) AWSpS

DAVIE, GORDON, MORRIS

Seminar discussions in current developments in the chemistry of nucleic acids and protein biosynthesis. Prerequisite, permission. May be repeated for credit.

#### 594 Glycogen Metabolism Seminar (1) AWSpS FISCHER

FISCHER

# Weekly conferences on research in glycogen metabolism. Prerequisite, permission. May be repeated for credit.

595 Nucleic Acid Biosynthesis (1, max. 8) AWSpS

MCCARTHY

KAPLAN

Weekly conference on current research in structure biosynthesis and evolution of nucleic acids. Prerequisite, permission.

## 596 Clinical Chemistry Seminar (1) AWSpS

Conferences on research and development in

clinical chemistry. For postdoctorals in clinical chemistry and graduate students with permission. Prerequisite, permission. May be repeated for credit.

#### 597 Plant Viruses Seminar (1) AWSpS GORDON

The structure and mode of replication of plant viruses will be discussed in detail. The effects of ultraviolet radiation on plant viruses and their component protein and nucleic acids will be examined. Prerequisite, permission. May be repeated for credit.

#### 598 Seminar in Developmental Biology (1) AWSpS HAUSCHKA

Discussion will cover recent advances in the field of developmental biology, especially those areas that are or can be analyzed by a biochemical approach. Prerequisite, permission. May be repeated for credit.

#### 599 Seminar in Physical Chemistry of Polymers (1)

TELLER

Weekly conferences on current research in the physical chemistry of macromolecules. For graduate students in biochemistry. Prerequisite, permission. May be repeated for credit.

600 Independent Study or Research (\*)

700 Master's Thesis (\*)

800 Doctoral Dissertation (\*)

## BIOENGINEERING

See Interschool or Intercollege Programs.

## **BIOLOGICAL STRUCTURE**

301 General Anatomy (4) Sp BRODERSON

Survey of systemic human anatomy, with correlated lectures and laboratory demonstrations. Limited to students who have declared majors in health education, physical education, physical therapy, occupational therapy, or orthotics and prosthetics; others by permission.

## Conjoint 316, 317-318 Introductory Anatomy and Physiology (2, 5-5)

(See Conjoint Courses.)

## 331 Introduction to Neuroanatomy (2) W COATES, LUND

General survey of the structure of the central nervous system, including an analysis of sensory and motor systems and higher integrative functions.

#### 340 Systemic Anatomy for Dental Students (8) A

KASHIWA

Lecture and laboratory work in neuroanatomy, microscopic anatomy, and gross anatomy. The emphasis will be on head and neck anatomy. For dental students; others by permission.

#### 350 Surgical Anatomy for Dental Students (4) Sp

KASHIWA Dissection of oral cavity and related areas, emphasizing the location, relationships, and functions of anatomical structures pertinent to the practice of dentistry. Prerequisite, 340. Conjoint 400 Human Anatomy and Physiology (6 or 9) (See Conjoint Courses.)

401 Gross Anatomy (2 or 4 or 6) A Lecture and dissection course in regional anatomy of thorax, abdomen, pelvis, and perineum. For graduate students, and medical students; others by permission.

## 402 Gross Anatomy (4) W

Lecture and dissection course in regional human anatomy: head and neck. For graduate students, medical students, or others by permission.

#### 403 Gross Anatomy (2 or 4 or 6, max. 6) SCHWARZ

Lectures and dissection probably most appropriate after first medical year. The area of concern will be pelvis-perineum (for 2 credits) and/or extremities (for 4 credits). Prerequisite, permission. (Not offered Spring Quarter 1972 or Spring Quarter 1973.)

## 404 Human Embryology and Development

(3) A blandau

Lectures and laboratory demonstrations covering the development of the human embryo and fetus, with emphasis on abnormal development; special attention to problems of maturation, fertilization, and physiology of the gametes. For graduate students and medical students; others by permission.

#### 411 Cellular Structure and Function (3-4) W

EDDY, KOEHLER, SZOLLOSI

The course will provide an introduction to the principles of cytological experimentation, including a survey of microscopic and other instrumental techniques. Emphasis will be toward a detailed analysis of cellular architecture, particularly as it can be related to functional considerations and the dynamic behavior of cells. Cellular membranes, organelles, nuclear constituents, and organization, will be discussed. Prerequisite, permission.

## 412 Human Microanatomy (4) Sp

ROOSEN-RUNGE Lectures and laboratory treating the specialized tissues and organs of the body from the microscopic and ultramicroscopic points of view. Prerequisite, permission.

#### 415 Histological Basis of Biomechanics (3) W LUFT, PROTHERO

Certain biological structures are specifically adapted to a biomechanical function. Examples include muscle, skin, and bone. The structure and the mechanical properties of selected biomechanical systems will be studied. Prerequisites, Conjoint 400, Mechanical Engineering 340, or permission.

#### 429 Neuroanatomy (3½) Sp LUND

A comparative approach to the nervous system of mammals, more particularly, primates, including man. Prerequisite, permission.

#### 440 Special Topics in Dissection (1-3, max. 6) AWSpS

BRODERSON, GRANEY, KASHIWA, ROSSE Guided dissection. Primarily for advanced medical students. Prerequisite, permission.

#### 475 Cellular Differentiation (1, max. 2) WSp NAMEROFF

Seminar in which students read and critically

discuss papers on the literature on cellular differentiation. The first part of the course covers basic cellular and intercellular phenomena. The second part covers differentiations of specific tissue and cell types in relation to the basic processes discussed in the first part of the course.

#### 497 Biological Structure Special Electives (\*) AWSpS

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 students of possible opportunities. 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.

498 Undergraduate Thesis (\*) Prerequisite, permission.

**499 Undergraduate Research (\*)** Prerequisite, permission.

#### **Courses for Graduates Only**

501 Hemopoiesis (3) W ROSSE

Students will study the histology and the cytology of blood, lymph, bone marrow, and lymphoid tissue with the light microscope. Experimental methods (chromosome markers, radioautography, transplantation, culture, etc.) for the study of cellular kinetics and differentation will be discussed in lectures and demonstrations. Seminars will cover topics relating to stem cells, origin, fate, and function of hemopoietic cells, the microenvironment, the kinetics of red cells, granulocyte and lymphocyte production, and of some immunological responses. Prerequisite, permission.

#### Conjoint 505 Histochemical and Cytochemical Methods (3)

(See Conjoint Courses.)

#### 505 Comparative General Histology (3) W ROOSEN-RUNGE

A study of biology, histology, and ultrastructure of general tissues in vertebrates and invertebrates. Prerequisite, permission. (Offered Winter Ouarter 1973.)

#### 515 Biological X-ray Structure Analysis (3) W JENSEN

Theory of X-ray diffraction, with emphasis on

applications to biological systems. Prerequisite, permission.

## 516 Bioinstrumentation and Research Methods (2-3) W

LUFT, PROTHERO

Introduction to instrumentation, physical and cytological methods employed in medical research generally and biological structure in particular. Emphasis on principles. Prerequisite, permission.

## 521 Seminar in Electron Microscope Anatomy (1) AWSpS

Discussion of individual research problems in electron microscopy.

## 525 Brain Dissection (2) AWSpS EVERETT, SUNDSTEN

A detailed consideration of the macroscopic

anatomy of the human brain (individual study). Prerequisite, permission.

## 531, 532, 533 Electron Microscopy (1-5, 1-5, 1-5) A,W,Sp

Theoretical and applied aspects of microscopy in biology, with emphasis on newer methods.

#### 540 Embryology and Anatomy of Human Cardiovascular System (2) W BLANDAU

A detailed study of the embroyology of the heart and great vessels during the first eight weeks of life. Prerequisite, gross anatomy of thorax and abdomen and permission. (Offered Winter Quarter 1974.)

#### 557 Seminar (1, max. 9) AWSp Prerequisite, permission. May be repeated for credit. Required of graduate students.

Conjoint 585 Surgical Anatomy (1-3, max. 12) (See Conjoint Courses.)

- 600 Independent Study or Research (\*) AWSpS
- 700 Master's Thesis (\*) AWSpS
- 800 Doctoral Dissertation (\*) AWSpS

## **BIOMEDICAL HISTORY**

#### 401 Historical Development of Medical Thought (3) A BODEMER

Survey of the history of medicine from antiquity to the twentieth century, emphasizing concepts and ideas that influenced and were influenced by medicine.

#### 415 The History of Physiological Chemistry (3) Sp

WHORTON

Examination of the application of alchemy and chemistry to the investigation and the explanation of physiological phenomena, from the period of classical antiquity through the nineteenth century.

#### 416 The History of Chemical Therapy (3) A WHORTON

Survey of the use of drugs to treat illness, from ancient pharmacy to the antibiotics. Emphasis will be placed on the historical development of alchemy and chemistry and their influence on the evolution of pharmacy.

## 417 History of Disease and Public Health (3) Sp

WHORTON

Investigation of the effects of disease on human society, from ancient times to the present, and of the practices and the institutions developed by society to combat disease. Attention will be given not only to the contagious diseases, but also to such subjects as dietary diseases, food adulteration, air and water pollution, and occupational health.

#### 418 History of American Medicine (3) A WHORTON

Examination of the development of medicine in America, from colonial times to the twentieth century, with emphasis on both the European and the uniquely American influences that shaped this development.

#### 419 The Historical Foundations of Modern Biology (3) W SLOAN

A survey course examining the origins and development of the biological sciences from antiquity to the twentieth century. Major emphasis will be given to the conceptual foundations' of biology in antiquity, the relation of the biological sciences to the scientific revolution of the seventeenth century, and the subsequent diversification of the biological sciences.

#### 420 Biology and the Scientific Revolution (3) Sp

SLOAN

Detailed analysis of the personalities and the concepts in the development of the biological sciences in the sixteenth, seventeenth, and early eighteenth centuries. Under consideration will be the renaissance in the biological sciences, and the impact of the new mechanistic science of Galileo, Descartes, and Newton on creation of a mechanistic biological science. Prerequisite, permission. (Not offered 1972-73.)

## 421 Biology in the Nineteenth Century (3)

**Sp** sloan

General survey of the development of the biological sciences from the 1770's to 1900. Consideration will be given to both descriptive and experimental biology, with major topics to be treated, including the impact of intellectual movements on biology, the professionalization of biology, and the consideration of the major scientific developments in biological science. (Not offered 1971-72.)

#### 422 Evolutionary Thought and Society (3) Sp SLOAN

Exploration of the social and humanitarian implications of the theory of organic evolution, examined from both a historical and a contemporary viewpoint. The impact of Darwin's theory on the social, religious, and political thought of the post-Darwinian period will be explored, utilizing the writings of Darwin, T. H. and Julian Huxley, G. G. Simpson, Teilhard de Chardin, and T. Dobzhansky, as well as those of other thinkers. (Not offered 1973-74.)

## 424 Philosophical Foundations of the Biomedical Sciences (3) W

Analysis of the philosophy of the biomedical sciences from the standpoint of the general philosophy of science. Examined from both a contemporary and a historical perspective will be such topics as the status of theories and facts, and the role of induction and deduction in scientific theories. Emphasis will be given both to contemporary analysis and to actual historical cases drawn from the history of medicine and biology.

### 425 Revolutions in the Biomedical Sciences (3) Sp

SLOAN

Analysis of select major events in the biomedical sciences and of the conceptual changes they have embodied. Under consideration will be the theory of the circulation of the blood, the theories of generation in the seventeenth and eighteenth centuries, the physiological revolution of the eighteenth century, the discovery of Mendelian genetics, and the work of Pasteur on spontaneous generation. Prerequisite, permission. (Not offered 1973-74.)

#### 430 Medicine and Society in the Age of Reason (3) A BODEMER

A detailed consideration of medicine and its institutions during the seventeenth and eighteenth centuries. Emphasis will be placed upon the interacting forces and ideas leading to the development of scientific and humanitarian medicine.

## 431 Medicine During the Nineteenth Century (3) W

BODEMER

A detailed consideration of the development of the basic and clinical medical sciences during the nineteenth century, emphasizing medical theory and practice.

#### 432 Madness and Civilization (3) W BODEMER

Survey of attitudes toward madness, concepts of psychopathology, and the treatment of the mentally ill at different periods in the development of Western civilization. Special emphasis will be placed upon the various social, psychological, and cultural factors determining the position of the mentally ill in society.

### 497 Biomedical History Special Electives (\*) AWSpS

BODEMER Prerequisite, permission.

## **498 Undergraduate Thesis (\*) AWSp** Prerequisite, permission.

**499** Undergraduate Research (\*) AWSpS Investigative work in history of the biomedical sciences. Prerequisite, permission.

#### 500 Biomedical Historiography (4, max. 12) AWSp

Emphasis is placed on bibliography and utilization of bibliographic sources. Practice in techniques of organizing and writing history of medicine. (Not offered 1973-74.)

#### 505 The Growth of Biological Thought (3) A BODEMER

Survey course intended for, but not limited to, teachers of biology, tracing the development of Western biological thought from the period of classical antiquity to the twentieth century. Particular attention will be devoted to the factors influencing the character of biological theories and to the techniques and the effects of biology upon society.

#### 510 Topics in Biomedical History (3, max. 9) AWSp

Detailed study of topics selected by the class in biomedical history through lectures, seminars, and discussion. Open to graduate students and qualified medical students. Prerequisite, permission.

#### 520 Seminar (3-6, max. 12) Sp

Seminar in the history of medicine and allied sciences, stressing original literature and emphasizing independent research by the student. Prerequisite, permission.

#### 600 Independent Study or Research (\*) AWSpS

700 Master's Thesis (\*) AWSpS

## **CONJOINT COURSES**

LANDAU

## 316, 317-318 Introductory Anatomy and Physiology (2,5-5) A,W,Sp

Human physiology with anatomical demon-

strations. An elementary course integrating anatomy, histology, physiology, and biochemistry of the human body. Offered conjointly by the Departments of Biological Structure and Physiology and Biophysics. For nursing and dental hygiene students; others by permission only.

### 400 Human Anatomy and Physiology (6 or 9) A

SKAHEN

An advanced course integrating anatomy, histology, physiology, and biochemistry of the human body. Designed to meet the needs primarily of graduate students in psychology, physiology and biophysics, and bioengineering, who have no background in histology, anatomy, and physiology. Offered conjointly by the Departments of Biological Structure and Physiology and Biophysics. Prerequisite, permission.

#### 411 Functional Neuroanatomy (31/2) W LUND, O. A. SMITH, SUNDSTEN

Lecture and laboratory course in neuroanatomy, the sequence being coordinated with Physiology and Biophysics 411 (Neurophysiology). Laboratory will include some experience in histological techniques, as well as conventional study of gross brain and slide material. Cat and monkey material, as well as human material, will be provided. Offered conjointly by the Departments of Biological Structure and Physiology and Biophysics. Prerequisite, permission.

#### 444 Medical Aspects of Sexual Problems (11/2) W

Lecture-discussion format, covering a body of information on sexual behavior, both normal and disturbed, with particular focus on the pertinence to medical practice. Elective open to medical students. Prerequisite, permission.

## 450 Clinical Infectious Diseases (3) A

DAVIS, FOY, HOLMES, ROBERTS Important infectious diseases in the United States are reviewed by systematic didactic presentation and by case study. Emphasis is placed on etiology, epidemiology, pathogenesis, clinical manifestations, laboratory diagnosis, treatment, and prevention. Permission required for graduate students in microbiology and pharmacology. Graduate students who have not had Human Biology 421 would have considerable difficulty with this course.

## 464 Perinatal Clerkship (9) AW

HODSON, VONTVER

A full-time program that will allow the student to provide family-oriented continuing care through pregnancy, labor, delivery, and the puerperium. Time will be spent in each major specialty area, but this will be flexible to allow attendance at appropriate scheduled conferences and lectures in each field. Will stress continuity of patient care. Prerequisite, Human Biology 460.

#### 473 Advanced Musculoskeletal Pathology (2) Sp

CLAWSON, LAZERTE

Advanced musculoskeletal pathology with electron microscopic, light microscopic, xray, and clinical correlation. Subjects will include normal histology and electron microscopy of the MS system, biochemistry and physiology of normal and abnormal specialized connective tissues, embryology of the MS system, repair, infections, and circulatory disturbances. This course is offered in even- and odd-numbered years alternately with Conjoint 474. The courses need not be taken in sequence. Offered conjointly by the Departments of Pathology and Orthopedics. Prerequisites, Human Biology 460, Orthopedics 481, or permission.

#### 474 Advanced Musculoskeletal Pathology (2) Sp

#### CLAWSON, LAZERTE

Advanced musculoskeletal pathology with electron microscopic, light microscopic, xray, and clinical correlation. Subjects will include tumors of the musculoskeletal system, benign and malignant, and hamartomas. This course is offered in even- and odd-numbered years alternately with Conjoint 473. The courses need not be taken in sequence. Offered conjointly by the Departments of Pathology and Orthopedics. Prerequisites, Human Biology 460, Orthopedics 481, or permission.

#### 477 Clinical Allergy (\*) AWSpS BIERMAN, VAN ARSDEL (University Hospital)

Clinic and office experience in diagnosing and managing allergic disease; clinical conferences, hospital rounds on hypersensitivity and immunology and allergy research seminars. Students taking four-week elective may have two half days free for other electives. Student ' may elect a flexible program, depending on his interests, emphasizing adult or pediatric allergy with a balanced introduction to the entire field of clinical allergy. Offered conjointly by the Departments of Pediatrics and Medicine. Prerequisite, Pediatrics 465 or Medicine 465 or Family Medicine 465. (2, 4, or 6 weeks, full time; 2 weeks full time by special arrangement.)

#### 505 Histochemical and Cytochemical Methods (3) Sp

BRODERSON, KASHIWA, LAGUNOFF

Introduction to principles and techniques of tissue fixation, sectioning, and staining; theory and application of histochemical methods for carbohydrates, lipids, nucleic acids, minerals, and proteins, including enzyme histochemistry and fluorescent antibody methods. (Offered Spring Quarter 1973.) Prerequisite, Human Biology 410 or permission.

### 509 Neurochemistry (3) W

STAHL, STAFF

Introductory neurochemistry course covering chemistry and metabolism, chemical pathology of disorders of lipid, amino acid, and carbohydrate metabolism, transport phenomena, neurotransmitters, memory, the visual system, and unique proteins of the central and peripheral nervous systems. This course is recommended for graduate students in the biological sciences and for medical students. A general knowledge of biochemistry is strongly advised. Offered conjointly by the Department of Physiology and Biophysics, Neurological Surgery, Biochemistry, Ophthalmology, and Biological Structure. (Offered alternate years; offered 1972-73.) Prerequisite, permission.

#### 510 Animal Models and Comparative Pathology in Biomedical Research (3) W

GIDDENS

Explores the history of comparative pathology in the various ways in which naturally occurring animal diseases are used as models in biomedical research. Selected examples of animal models of human disease will be reviewed. Students will develop and will present

## 560 Tumor Biology (3) S

I. HELLSTROM, K. E. HELLSTROM, HAKOMORI, SMUCKLER

Primarily designed for graduate students, but may also be taken by interested medical students. It will be given as a combination of lectures and conferences. The general areas covered are the basis of carcinogenesis, tumor progression and metastasis, virus-induced tumors, tumor genetics, and tumor immunology. Offered conjointly by the Departments of Microbiology and Pathology. Prerequisite, permission of Department of Microbiology.

585 Surgical Anatomy (1-3, max. 12) AWSp A course in guided dissection of selected regions supplemented by conferences. Offered conjointly by the Department of Biological structure and clinical departments. Prerequisite, permission.

# EXPERIMENTAL ANIMAL MEDICINE

#### 400 Diseases of Laboratory Animals A DOLOWY, WOLF

Provides basic knowledge of the medical problems, the physiological baseline values, and the techniques commonly used with the animals used in biomedical research. Normal morphology and physiologic values, as well as the diseases of dogs, cats, monkeys, mice, rats, rabbits, guinea pigs, hamsters, gerbils, fowl, and cold-blooded animals will be covered. Techniques for injection and for collection of specimens will be demonstrated. Prerequisite, permission. Medical or zoological background in anatomy and physiology is desirable. (Offered alternate years.)

#### 401 The Laboratory Mouse (3) Sp DOLOWY, WOLF

The laboratory mouse is presented in some detail as to anatomy, physiology, genetic particulars, nutrition, the gnotobiotic and germfree states, and its research uses. In addition, thirteen lectures are devoted to careful and complete coverage of its diseases. Course will provide background for research usage of this animal. Prerequisite, permission. Some medical or zoological background in anatomy, physiology, and pathologic processes is desirable. (Offered alternate years.)

#### 402 Marine Mammal Medicine (1) Sp KEYES

Presented are the medical problems of marine mammals, including pinnipeds and cetaceans, against a background of their normal anatomy, physiology, nutrition, and habits. Three Saturday field trips complement ten lectures. No prerequisite for sophomore, junior, or senior medical students or for health sciences, zoology, or fisheries graduate students; permission required for others.

## 403 The Laboratory Primate (2) W WOLF

Provides broad coverage of the biomedicine of the various species of subhuman primates used in research. This includes comparative anatomy and physiology, genetics, breeding, care, diseases, and their suitability as models in certain research areas. No prerequisite for health sciences or zoology graduate students; permission required for others. (Offered alternate years.)

#### 404 Diseases Transmissible Between Animals and Man I (1) W

Detailed description, emphasizing the transmission, the pathogenesis, and the prophylaxis of the diseases transmitted between pets, livestock, or wild animals, and man. Designed to serve the interest and the needs of medical and paramedical students who will be involved in clinical practice, particularly general practice or family medicine, laboratory medicine, or research. Provides useful background information for bioscience graduate students and zoology majors who will work with such animals. Prerequisites, for medical students, Human Biology 421; for others, Microbiology 441-442 or permission. (This course precedes Experimental Animal Medicine 405 and occupies only the first half of Winter Quarter.)

#### 405 Diseases Transmissible between Animals , and Man II (1) W

Detailed description, emphasizing the transmission, the pathogenesis, and the prophylaxis of the diseases transmitted between the animals of the laboratory and man. Designed to serve the interest and the needs of medical and paramedical students who will conduct animal experiments, especially those who will choose, entirely or partially, a research career. Provides background information for bioscience graduate students and zoology majors who intend to conduct animal experimentation. Prerequisites, for medical students. Human Biology 421; for others, Microbiology 441-442 or permission. (This course follows Experimental Animal Medicine 404 and occupies only the latter half of Winter Quarter.)

## FAMILY MEDICINE

#### 465 Community Clinical Clerkship in Family Medicine (9) AWSpS PHILLIPS

Stresses the common and important clinical problems in family practice. Student functions as clinical clerk in a community clinical unit of the Department of Family Medicine, where he participates in care of assigned patients, using office, hospital, home, and community resources. Prerequisites, Human Biology 460 and Medicine 465 or permission. (6 weeks, full time.)

#### 475 Advanced Preceptorship in Family Medicine (\*) AWSpS PHILLIPS

An opportunity for the student to apply and extend his clinical skills by working with a selected family physician in an active practice. The preceptor and the location are chosen to fit the individual student's interests, and, in some instances, arrangements can be made for the student to live in the home of the preceptor. Opportunities are available throughout Washington and in adjoining states. This elective will be of greatest value if the student has completed one or more general clinical clerkships previously, e.g., Medicine 465, Pediatrics 465, Surgery 465, etc. Prerequisite, Human Biology 460 or permission.

## **HUMAN BIOLOGY**

This sequence is required for all medical students. Other students may enroll by permission of the Assistant Dean for Curriculum, School of Medicine.

#### 409-410 Molecular and Cellular Biology (0-7) A,W

GORDON

Classical molecular and cellular biochemistry, cell fine structure and cell physiology. Special characteristics of microbial cells will be covered and contrasted with mammalian cells. Also viral synthesis and replication; molecular and chromosomal genetics with extension to important examples in medical genetics; nutrition, growth, and death of mammalian and microbial cells.

#### 411 Anatomy and Tissue Structure (4) A EVERETT

Development of the embryo from fertilization and implantation to full organ and organismal differentiation, with illustration of basic body plan. Important examples and etiology of faulty prenatal morphogenesis. Cell differentiation leading to a study of basic histology. Developmental and morphological aspects of hemopoietic system.

#### 412 Biostatistics and Epidemiology (1½) A PETERSON

An introduction to statistical inference and basic concepts of variance and statistical significances as applied to problems in human biology and medicine; statistical and epidemiological health information systems and measurements of morbidity and mortality; computer usefulness, potentialities and limitations; epidemiological approaches to infectious and noninfectious diseases. Interaction of agent, host, and environment in causation and transmission.

#### 413 Medicine, Health, and Society (1½) A GILSON

The impact of general social and cultural factors on the physical and psychological health of the individual, with special reference to economic and minority group problems and the influence of urbanization. Natural selection and human evaluation in health and disease. Episodic consideration of major life crises which concern the well-being of the individual and the family.

#### 420 Cell and Tissue Response to Injury (4) W

SMUCKLER

Patterns of cell and tissue response to injury. Immunity and immune responses. Hypersensitivity, homograft reaction and auto-immune response. Immunohematology. Morphological, functional, and kinetic aspects of leucocytes and immunocytes. Principles of neoplasia.

#### 421 Natural History of Infectious Diseases and Chemotherapy (3½) W SHERRIS

Pathogenesis and immunity of infectious diseases, natural barriers. Microbiology, epide, miology, 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.

#### 422 Control Systems and Mechanisms of Homeostasis (4) A WOODBURY

WOODBURY

Bioenergetics Membrane transport. Introduction to physiologic and biochemical control and feedback mechanisms. Nervous, hormonal, and pressor mechanisms. Blood volume and electrolyte homeostatic mechanisms. Drug absorption, distribution, excretion, and metabolism. Mechanisms of drug actions and selectivity. Dose response and variation. Drug toxicity and detoxification.

#### 423 Musculoskeletal System (3½) W ROSSE

Gross, surface, applied and X-ray anatomy of system including entire spine, but excluding head and neck. Histology of bone, cartilage, tendon---myotendinal junction and joints. Musculoskeletal trauma and healing. Pathology and clinical manifestations of other degenerative, inflammatory, metabolic, nutritional, and congenital disorders. Physical examination.

## 430 Skin System (11/2) Sp

ODLAND

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.

## 431 Head, Neck, Ear, Nose, and Throat (21/2) Sp

SCHWARZ

Gross anatomy (including skull, pharynx, and larynx). Audition and balance. Physiology and clinical evaluation. Maxillo-facial disorders, diseases of nasal passages, naso- and oropharynx, accessory sinuses. Physical examination.

#### 432 Nervous System (5½) Sp SUNDSTEN

An integrated approach to: Normal structure and function of the nervous system, including the eye. Basic neuropathology and diseases of the eye. Neuropharmacology with emphasis on modes of action and classes of drugs. Clinical evaluation of the nervous system and eye with illustrative examples of the manifestations of specific and important neurological lesions, and common and rare, but important and reversible conditions.

#### 433 System of Human Behavior (3½) Sp BAKKER

An integrated approach to the normal and abnormal intellectual, behavioral, personality, and social development of man: Perception, cognition, learning and memory, expression. Emotion, motivation, ethology, sexuality, identity. Psychophysiology, psychopharmacology, conditioned responses, biochemical basis of behavior. Personality development, selfimage, conscious and subconscious function, dreaming and waking, reaction and adaptation. Concepts of mental health, principles of psychopathology, character disorders, affective disorders, conversion-dissociation and obsessive disorders, schizophrenia.

### 434 Endocrine System (2) Sp

WOOD

Gross and microscopic anatomy of the endocrine system. Principles of endocrine physiology as illustrated by model systems (extending the concepts of homeostasis, control and feed-back systems previously learned), hormonal biosynthesis and important pathophysiologic states. The endocrine integration of metabolism.

#### 440 Cardiovascular-Respiratory System (6) A BROWN

Anatomy of heart, vessels, and lungs; physiology of heart, circulation, respiration (including gas transport); major pathological disorders of the heart, great vessels, and lungs; physical examination of the chest and cardiovascular system. Prerequisite, permission.

#### 441 Gastro-Intestinal System (31/2) A SAUNDERS

Anatomy of gastro-intestinal system; physiology and pathology of digestion and hepatic function; and physical and laboratory examination. Prerequisite, permission.

#### 442 The Ages of Man (2) A SMITH

Physical and psychological development of the whole individual from birth through old age (including neonatal adaptation, nutrition, and developmental milestones in childhood and adolescence, degenerative problems of senescence). Prerequisite, permission.

#### 443 Medicine, Health, and Society (2) A GILSON

Human ecology and health; characteristics and growth of United States and world population; delivery of health services; planning for community health services. Prerequisite, permission.

#### 449-450 Genetics and Reproductive Biology (0-3½) A,W

VONTVER

Gross anatomy of systems to be taught conjointly and then systems subdivided for physiology, pathology, and examination. Prerequisite, permission.

## 451 Introduction to Clinical Medicine (7) W

Instruction in history taking and interviewing techniques; continuation of the physical examination previously taught by organ systems; and introduction to clinical and laboratory diagnosis. Prerequisite, permission.

#### 452 Urinary System (4) W CHAPMAN

Physiology, pathology, and examination, including radiology, of the lower urinary tract; kidney microscopic anatomy; physiology of the kidney, including fluid and diuretic therapy; pathology, microbiology, and immunology of renal disease with clinical examples; physical and laboratory examination.

## 460 Basic Hospital Clerkship (18) Sp

Hospital routine and staff interrelationships, developing basic skills in history-taking, physical and laboratory examination and diagnostic synthesis; acquainting student with specific but limited variety of clinical problems; fundamentals of clinical pharmacology and therapeutics. Prerequisite, permission.

## LABORATORY MEDICINE

#### 321 Medical Technology: Introductory Clinical Hematology (5) W BEHRENS, LE CRONE

Instruction in cellular morphology, coagulation, special instrumentation, and selected hematological diagnostic studies.

#### 322 Medical Technology: Introductory Clinical Chemistry (4) Sp LE CRONE, SZABO

Lecture and laboratory covering the theoretical and practical concepts associated with testing procedures performed in clinical chemistry.

#### 420 Medical Technology: Clinical Microscopy (3) S HAMERNYIK

Lecture and laboratory covering urinalysis testing procedures and associated disease entities.

#### 421 Medical Technology: Medical Microbiology (5) S

MC GONAGLE

One-quarter lecture and laboratory designed to prepare medical technology students for further training in a clinical microbiology laboratory.

## 422 Medical Technology: Seminar (5) S FRY, STAFF

Advanced didactic coverage of topics relating to the theoretical and practical concepts of laboratory medicine.

#### 423 Medical Technology: Clinical Chemistry (11) A

SZABO, STAFF

Clinical testing related to protein and amino acid determinations, pancreatic functions and intestinal absorption, renal and liver function, enzymes, electrolytes and acid-base balance, lipids, toxicology and endocrinology.

## 424 Medical Technology: Clinical Microbiology (9) W

MC GONAGLE, STAFF

Clinical review of general techniques, study of clinically significant bacteria, including specific methods of specimen examination, fluorescence microscopy, and testing for antibiotic susceptibility.

#### 425 Medical Technology: Clinical Hematology (7) W BEHRENS, STAFF

Clinical coverage of automated and manual cell counting, cellular morphology, and testing procedures related to red and white cell disorders.

## 426 Medical Technology: Clinical Immunohematology (5) A

HAMERNYIK, STAFF

Clinical study of immunohematology of the red cells and hemagglutination techniques.

#### 427 Medical Technology: Selected Studies in Laboratory Medicine (15) Sp

disciplines of laboratory medicine, in all major disciplines of laboratory medicine, in all major disciplines of this field or pursuance of a clinical research problem.

### **MEDICAL PRACTICE**

#### 401 Medical Practice Preceptorship (1) AWSpS

Provides opportunity for first- and secondyear medical students to gain personal experience with, and insight into, the medical practice situations. The student will be stationed with clinical faculty members in their offices to observe and participate in the care of their patients, and to gain insight into the management aspects of the clinical practice of the following specialties: surgery, internal medicine, family medicine, and pediatrics. (Onehalf day each week for ten weeks, by arrangement.)

## MEDICINE

#### 401 Samples of Clinical Medicine (\*) Sp WILLIAMS

Elective course in which patients with classic

manifestations of certain common diseases are presented to give perspectives of common aspects of clinical medicine, but more to demonstrate usefulness of basic medical knowledge in understanding symptoms and signs and in management of diseases. Offered to first-year medical students.

## 403 Clinical Preceptorship in Internal Medicine (6 or 9) AWSpS

WALLACE

Full-time elective providing inpatient and outpatient experience in internal medicine. Students act as clinical clerks in close association with physician-preceptors at a private community medical center, the Wenatchee Valley Clinic. Housing is provided for the student and his family. Prerequisite, 465. (4 or 6 weeks.)

#### 431 Human Genetics (\*) AWSp FIALKOW, MOTULSKY

Weekly seminar dealing with a variety of topics in medical genetics given by staff of the Division of Medical Genetics and related departments and divisions. Open to medical students with a good foundation in genetics, others by permission.

#### 432 Applied Blood Group Genetics (2) Sp GIBLETT

Lecture and laboratory work including individual projects which are related to blood transfusion, immune hemolysis, and inheritance. Prerequisites, Human Biology 434 and 460.

#### 440 Dermatology Clinic (3) AWSpS ODLAND

Students attend dermatology clinic on Monday mornings and Thursday afternoons for twelve weeks. Prerequisite, Human Biology 460.

## 441 Clinical Gastroenterology (6) AWSp

FENSTER (Virginia Mason and Mason Clinic)

Combined inpatient-outpatient elective in clinical gastroenterology, which includes practical experience in GI fluoroscopy, proctoscopy, upper GI endoscopy, and liver biopsy. Directed tutorial work. Special arrangements can be made for students with special interests. Prerequisite, 465. (4 weeks, full time.)

## 442 Clinical Oncology (\*) AWSpS THOMAS (USPHS Hospital)

Particular emphasis is placed on oncology, transplantation biology, and radiation biology, in addition to clinical hematology. Prerequisite, 465. (4 weeks; 6 or 12 weeks with special permission.)

#### 445 Outpatient Hematology (6) AWSpS FINCH

Students participate in hematology rounds and conferences and examine and treat, under supervision, patients in the hematology clinic at University Hospital. Prerequisite, 465.

#### 447 Clinical Pharmacology and Therapeutics (1) AWS

AAGAARD, HOLCENBERG

Seminar that reviews significant and timely therapeutic problems in the field of internal medicine. Prerequisite, 465.

#### 448 Genetics, Medicine, and Society (1) WSp

FIALKOW, MOTULSKY Students and faculty discuss in lectures and seminars the aspects of genetics relevant to medicine and society. Prerequisite, Human Biology 450 or permission.

## 449 Application of Genetic Principles to Medicine (4½) WSp

Ward rounds, clinic, and seminar discussions of patients and topics in clinical genetics. Students attend medical genetics clinic Tuesdays, examine families and obtain pedigrees under supervision, and attend genetics rounds on the wards Thursdays. Prerequisite, Human Biology 450.

### 465 Clinical Clerkships (\*, max. 24) AWS

BEATY, EVANS, PETERSDORF, TURCK Hospital patients are assigned to each student for a complete work-up. Ward rounds are held daily; lectures, clinics, and conferences weekly. Prerequisite, Human Biology 460. Six or twelve weeks, full-time.

## 478 Clinical Dermatology (3 or 6) AWSpS ODLAND (University Hospital)

Participants in dermatology clinics and inpatient consultations at University Hospital, Harborview Medical Center, U.S. Public Health Service Hospital, Veterans Administration Hospital, and Children's Orthopedic Hospital and Medical Center. Journal club and clinical conferences each week with entire staff. A continuing series of teaching seminars and weekly dermatopathology conferences. Weekly half-day preceptorship in office of selected clinical faculty member. Prerequisite, Human Biology 460 or 465. (4 weeks; 2 weeks with special permission.)

#### 479 Clinical Gastroenterology (\*) AWSpS volwiller (University Hospital)

Participation in consulting ward rounds, workshops, procedures, conferences, and selected clinics with full-time Divisional staff at University, Veterans, and U.S. Public Health Service Hospitals and at Harborview Medical Center, plus directed tutorial work. Prerequisite, 465 or Human Biology 460. (4 or 6 weeks full time; students may have 2 mornings free for other electives.)

## 480 Rheumatology (5) AWSpS

MANNIK

Clinical experience is provided in diagnosis and treatment of rheumatic diseases, utilizing outpatient clinics and patients hospitalized at the University Hospital. Emphasis is placed on concepts in pathophysiology, diagnosis, and treatment of these diseases. Reading, seminars, and preceptorial sessions are the methods of instruction. This course is offered every quarter during the second four-week period. All mornings and Friday afternoon are committed to the course. The remaining time is free for other courses. Prerequisites, 465 or Human Biology 460; Pediatrics 465 and Family Medicine 465.

#### 481 Advanced Clinical Endocrinology (\*) AWSpS

PAULSEN (USPHS Hospital)

Full-time inpatient-outpatient clerkship in clinical endocrinology at U.S. Public Health Service Hospital. Library review on selected topics in the field and participation in medical clinical research problems optional during this clerkship. Prerequisite, Human Biology 460. (4, 6, or 12 weeks.) 482 Clinical Cardiology and Electrocardiography (6) AWSpS BRUCE (University Hospital), COBB (Harborview Hospital), KENNEDY (Veterans Administration Hospital), MC DONNOUGH, WILLS (U.S. Public Health Service Hospital)

Clerkship in clinical cardiology--combined inpatient-outpatient assignments, ECG inter-pretation. At Harborview Medical Center and Veterans Administration Hospital special emphasis will be placed on operation of an acute cardiac care unit. Prerequisite, 465. (4 weeks.)

483 Clinical Respiratory Disease and Pulmonary Physiology (5 or 6 or 9) AWSpS

BUTLER (University Hospital), FISHER (Harborview Medical Center), SULLIVAN Administration (Veterans Hospital), DOHNER (U.S. Public Health Service Hospital)

Training in respiratory disease diagnosis and pulmonary therapy, with special emphasis on cardiopulmonary function testing and inter-pretation. Inpatient and outpatient teaching rounds, conferences, and basic science inte-gration. Prerequisite, Human Biology 460. (4 weeks.)

## 484 Clinical Hematology (\*) AWSpS AWSpS

FINCH (University Hospital), HILLMAN (Harborview Medical Center), ADAMSON (Veterans Administration Hospital), HUFF (Virginia Mason Clinic), WRIGHT (Swedish Hospital), FUNK (U.S. Public Health Service Hospital)

(a) University Hospital—4 weeks. AWSpS
(b) Harborview Medical Center—4 weeks. ÀŴSpS

(c) Veterans Administration Hospital — 4 weeks. AWSpS

(d) Virginia Mason Clinic-4 weeks. AW

(e) Swedish Hospital—4 weeks. AW (f) U.S. Public Health Service Hospital—4 weeks. AW

Outpatient and inpatient experience with hematologic disorders. The elective includes teaching rounds, conferences, and evaluation of laboratory work. Prerequisite, 465.

#### 485 **Clinical Genetics (\*) AWSpS**

FIALKOW, MOTULSKY

Intensive study of genetic principles required in clinical work. May work in depth on a selected laboratory problem or get broader experience in working up a variety of clinical cases. Prerequisite, Human Biology 460. (6 weeks.)

#### 486 Advanced Clinical Neurology (\*) AWSpS

P. SWANSON (University Hospital) Inpatient and outpatient experience in clinical neurology at the University Hospital, Veterans Administration Hospital, or Harborview Medical Center. Students work closely with staff, attend clinical conferences, present patients on attending rounds, participate in seminars on topics in clinical neurology, and become more familiar with diagnostic neurological procedures. In addition, students attend one clinic per week. Prerequisite, 465 or permission. (4 weeks.)

#### 487 Ambulatory Medicine Elective (\*) AWSpS

CLARK, WALLACE (University Hospital and Harborview Medical Center)

Students acquire knowledge and skill in deal-

ing with ambulatory patients with problems commonly encountered in the office practice of internal medicine. By assuming first-line responsibility for patient care under the supervision of an attending physician, students become acquainted with the demands that long-term personal medical care places on the internist. Students may elect to spend from two to five half-days each week in the general internal medicine clinics either at University Hospital (morning clinics) or at Harborview Medical Center (afternoon clinics); the remainder of their time is free to be spent taking medical subspecialty electives or electives offered by other departments. Details of the highly flexible elective program should be obtained as early as possible from the Department of Medicine adviser. Prerequisite, 465 or Family Medicine 465 or permission. (12 weeks.)

#### 488 Ward Medicine Subinternship (\*) AWSpS 3

TURCK (Harborview Medical Center) EVANS (Veterans Administration Hospital)

Students will act in capacity of interns on the medical wards under supervision of house staff and visiting physicians. They will attend all regular medicine rounds and conferences as their schedule permits. Prerequisite, 465. (6 or 12 weeks.)

#### Clinical Infectious Diseases (\*) AWSpS 489 KIRBY (University Hospital)

Students will participate in the consultation service throughout the hospital; attend daily plate rounds, conferences and seminars. Pre-requisite, 465. (2, 4, or 6 weeks.)

BEATY (Harborview Medical Center) Students participate in the consulting service throughout the hospital. They are given the opportunity to learn the microbiological as-pects of infectious diseases through the clinical laboratories. Prerequisite, 465. (4 weeks.)

#### 490 Cardiology Subinternship (\*) AWSpS BLACKMON

Students act in the capacity of interns on the white service under the supervision of house officer. There is a \$100 stipend for four weeks. Prerequisite, 465.

#### 492 Clinical Endocrinology and Metabolism (\*) AWSpS

GOODNER (Harborview Medical Center) LAVIS (University Hospital)

Participation in inpatient rounds, conferences and outpatient clinics at University Hospital and Harborview Medical Center. Directed tutorial work in selected aspects of endocrinology and metabolism. Prerequisite, Human Biology 460. Full-time or part-time (outpatient clinic only) scheduling may be arranged with instructor. (4 or 6 weeks.)

#### Nephrology and Fluid Balance (\*) AWSpS SCRIBNER

A nephrology/fluid balance clerkship on the blue service at University Hospital and the renal-electrolyte service at Harborview Medical Center. Students will work in the renal clinic and attend a series of fifteen one and one-half hour seminars on problems in fluid balance and nephrology. Prerequisite, 465.

#### Metabolism and Diabetes (3 or 6) AWSp 494 NIELSEN (Virginia Mason Clinic)

In addition to the clinical evaluation of pa-

tients with endocrine disorders, this elective period provides opportunity to become actively involved in the treatment of metabolic disorders, with particular emphasis on the education of the diabetic and on the control of his disorder. Prerequisite, 465. (2 or 4 weeks, full time.)

#### 495 Clinical Aspects of Aging (11/2) AWSp BIERMAN

On-the-scene training and experience in the special medical and social problems of old age are offered in a variety of actual community situations ranging from public hospitals to private nursing and retirement homes. Local physicians devoted to delivery of health care to this group with its special problems are used as preceptors. This is an opportunity to incisively examine one's own ap-proach to chronic illness and to the dying patient. Students work up and follow individual diagnostic, therapeutic, and social prob-lems. Prerequisite, 465 or Human Biology 460.

#### 497 Medicine Special Electives (\*) AWSpS PETERSDORF

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 students of possible opportunities. The department is particularly interested in placing students in preceptorships in Hawaii. 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. (6 or 12 weeks.)

## 498 Undergraduate Thesis (\*) AWSp

For medical students. Prerequisite, permission.

## 499 Undergraduate Research (\*) AWSp Case studies, with laboratory research. For medical students. Prerequisite, permission.

## MICROBIOLOGY

#### 101 The Microbial World (5) W GROMAN

A course for majors in the social sciences and humanities but open to science majors other than biologists. Using the nature and activities of bacteria and viruses as the focus of interest, a view or a model of life based on cellular, subcellular, and molecular organiza-tion is developed. Major biological concepts are stressed, as is the nature of scientific inquiry. A voluntary laboratory is available.

#### 235 Microbiology for Students of Dentistry (5) A

## SHERRIS

Lecture and laboratory introducing the student to the principles of microbiology. Infectious microorganisms and the flora of the mouth are emphasized. Required for second-year dental students. Students who have had previous training in microbiology may sub-stitute a research problem for the laboratory work. Prerequisite, for nondental students, permission. Laboratory credit: 1 for Core Program to 3 for Selective Program.

#### 236 Microbiology Laboratory for Students of Dentistry (2) A SHERRIS

Laboratory and demonstration course in med-

ical microbiology designed to supplement the laboratory exercise given with Microbiology 235 and intended for second-year dental students with a special interest in microbiology. Prerequisite for non-dental students, permission.

## 301 General Microbiology (3) AWSpS

A one-quarter lecture course designed to acquaint students in the physical and biological sciences with micro-organisms and their activities. The understanding of basic biological concepts elucidated through investigations of micro-organisms will be emphasized. Topics include microbial cell structure and function metabolism, microbial genetics, and the role of micro-organisms in disease, immunity, and other selected applied areas. Prerequisite, two quarters of chemistry. A course in a biological science is desirable but not required.

#### 302 General Microbiology Laboratory (2) AWSpS NESTER

Laboratory course primarily for students taking 301. The laboratory exercises cover a variety of microbiological techniques, with experiments designed to illustrate major concepts of microbiology, virology, and immunology. Prerequisite, concurrent or previous registration in 301 or permission.

#### 319 Laboratory Techniques in Microbiology (1) AWSpS

CHAMBERS, GROMAN

A self-instruction, self-scheduled laboratory in which the student performs the techniques fundamental to microbiology. Instructional material is presented in visual, audiovisual, and written form. Prerequisite, prior or concurrent enrollment in a microbiology course or permission. Not recommended for those who have already taken a laboratory in microbiology.

#### 320 Media Preparation (2) AWSpS PARKHURST

Practical work in the preparation of culture media and solutions. Nutritional requirements of micro-organisms are considered. For students expecting to enter vocations involving laboratory work with bacteria. Prerequisites, 301 or equivalent, and permission.

#### 322 Applied Bacteriology (5) AWSpS ROBERTS, SCHOENKNECHT

Practical experience in a clinical or public health laboratory; fifteen hours per week. For students majoring in medical microbiology. Prerequisites, 443 and permission.

#### 400 Fundamentals of Bacteriology (3) ASp DOUGLAS, ORDAL

Basic bacteriology; comparative morphology, taxonomy, physiology of bacteria. For students majoring in microbiology and others interested chiefly in the biological and chemical aspects of microbes. Required for students majoring in microbiology. Recommended for graduate students in biochemistry or biology. Prerequisites, 6 credits in organic chemistry; Biology 210, 211, and 212, or 10 credits in botany or zoology.

### 401 Fundamentals of Bacteriology Laboratory (3) A

DOUGLAS, STALEY

Laboratory course taken concurrently by students taking 400. Isolation by enrichment culture techniques of a wide selection of nonpathogenic bacteria. The isolates are identified, and exercises are performed to illustrate the kinetics of growth, quantitation of microorganisms, genetic transfer in bacteria and yeast, and isolation of bacteriophage. Prerequisites, two quarters of organic chemistry; Biology 210, 211 and 212, or 10 credits in botany or zoology.

#### 430 Microbial Metabolism (3 or 5) W DOUGLAS, WHITELY

The major patterns of fermentative and oxidative metabolism of yeasts and bacteria. For students majoring in microbiology or food science. Prerequisites, 400 or 301, and Chemistry 221 and 232. Lectures only, 3 credits.

#### 435 Microbial Ecology (5) A STALEY

Consideration of the various roles that microorganisms, particularly bacteria and bluegreens, play in environmental processes. The interrelationships among micro-organisms and the effects of the physical, chemical, and biological properties of their environment will be discussed and assessed. The lake ecosystem will be used as a model system for analysis in the laboratory. Prerequisites, 400 and 401 or permission.

## 444 Medical Mycology and Parasitology (4) Sp

ROBERTS

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, 10 credits in basic biology and 6 credits in organic chemistry, and permission.

## 441-442 Medical Bacteriology, Virology, and Immunology (3-3) A,W

EVANS, FALKOW, WEISER

Introduction to immunology and to medical bacteriology and virology and, to a limited extent, mycology and parasitology. Designed for students in medical technology and graduate and undergraduate students in microbiology. Lectures and some conferences and demonstration periods. Prerequisites, 10 credits in basic biology and 6 credits in organic chemistry.

#### 443 Medical Microbiology Laboratory (3) W

SCHOENKNECHT

A laboratory course for medical technology students, microbiology majors, and on an elective basis for medical students. Procedures used in the medical microbiology laboratory for isolation and identification of pathogenic microorganisms and testing of their susceptibility to antibiotics. Selected reading assignments and a one-hour demonstration period each week. Prerequisites, 445 or enrollment in 441-442 sequence or Human Biology 421, and permission. (Formerly 446.)

#### 447 Fundamentals of Immunology (4) Sp HELLSTROM, WEISER

Broad coverage in immunology with stress on fundamentals. For students in specialized areas of medicine and dentistry and various undergraduates and graduates with interests in areas requiring substantial knowledge in immunology. Occurrence and properties of antigens and haptens; synthesis, nature, fate, and activities of antibodies; antigen-antibody interaction; immunologic injury; tissue transplantation; blood groups and transfusion; tumor immunology; Rh diseases; allergic and autoimmune diseases; and immunity to parasites. Prerequisites, 10 credits of zoology or biology; 5 credits of organic chemistry, and upper-division standing; for medical students, Human Biology 421.

#### 495 Honors Undergraduate Research (\*) AWSpS

GROMAN

Specific problems in medical and general microbiology. Prerequisite, permission.

#### 496 Undergraduate Library Research (2) AWSpS

STALEY

An introduction to library research and to the microbiological literature. Topics will be assigned and supervised by staff members. Prerequisite, permission; senior standing desiraable. Offered only on credit/no credit basis.

#### 497 Microbiology Special Electives (\*) AWSpS

SHERRIS

By specific arrangement with the Department of Microbiology, special clerkship, externship, or research opportunities can at times be made available at institutions other than the University of Washington. The faculty can advise students of possible opportunities. Students wishing to elect this course should obtain from the dean's office a "Special Assignment" form and contact the chairman of the Department of Microbiology at least one month before preregistration. Prerequisite, permission. Limited to medical students.

#### 498 Undergraduate Thesis (\*) AWSpS

For medical students. Prerequisite, permission.

#### 499 Undergraduate Laboratory Research (\*) AWSpS

Specific problems in medical and general microbiology. Prerequisite, permission; senior standing desirable.

## **Courses for Graduates Only**

## 501 Research Techniques in Virology (°, max. 5) A

GROMAN

An introduction to the basic experimental techniques in virology. Prerequisite, permission.

#### 502 Research Techniques in the Study of Microbial Enzymes (\*, max. 5) W WHITELEY

Cultivation of large quantities of bacteria; purification of proteins; enzyme kinetics; sedimentation properties; control of enzyme activity and synthesis; localization of enzymes in bacterial structures. Prerequisites, 400, Biochemistry 440, 441, 442, and permission.

#### 503 Research Techniques in the Study of Nucleic Acids (\*, max. 5) W WHITELEY

Techniques used in the study of the macromolecular composition of bacterial cells, and in the isolation and purification of several of these macromolecular components. Prerequisites, 400 or Biochemistry 440, and permission.

#### 504 .Research Techniques in Microbial Genetics (\*, max. 5) AWSp NESTER

The isolation and characterization of mutants by biochemical and genetic techniques. Prerequisite, permission. 505 Immunological Techniques (\*, max. 5) Sp STORB

Theory and use of current immunological techniques. Prerequisite, permission.

506 Techniques in Electron Microscopy of Micro-organisms (3) Sp CHAMBERS

Techniques used in the preparation of microorganisms for electron microscopy, the operation of the electron microscope, and the photographic reproduction of observations. Prerequisites, major in a biological science and permission.

#### 510 Physiology of Bacteria (3) Sp WHITELEY

Fundamentals of physiological and metabolic processes of bacteria with emphasis on the synthesis of cellular constituents, mechanisms, and energy-yielding processes. Prerequisites, 400 and Biochemistry 440, 441, 442, or permission. (Offered alternate years; offered 1972-73.)

520 Seminar (1) AWSp

May be repeated for credit.

#### 530 Advanced General Microbiology (4) W ORDAL

Enrichment, isolation, and comparative morphology and physiology of selected bacteria, including some with distinctive developmental cycles. Prerequisite, permission.

## 540 Virology (3) Sp

GROMAN Prerequisite, permission. (Offered alternate years; offered 1973-74.)

550 Selected Topics in Immunology (2, max. 18) AWSp WEISER

Formal seminar-discussion course for advanced students focused on recent developments in the field of immunology and consisting of literature research and intensive in-depth study of important and timely topics. Three-hour seminars semimonthly and a comprehensive final examination.

#### 553 Pathogenesis of Infectious Diseases of Man (4) W

WEISER

Discussion course focusing on the pathogenesis of infectious diseases, with emphasis on bacterial and mycotic infections of man in which selected models of important diseases are used to explore the biochemical, physiological, and immunological bases of the hostparasite interactions that govern host injury, development of lesions, and the course of disease. Prerequisites, 441-442 or Human Biology 421, Pathology 444 or Human Biology 420, Biochemistry 405 or Human Biology 410 and permission. (Offered alternate years; offered 1973-74.)

#### 555 Advanced Clinical Microbiology (21/2) AWSp

SCHOENKNECHT, SHERRIS

Attendance at daily plate rounds and the weekly journal club of the Division of Clinical Microbiology. This is designed to increase understanding of clinical microbiological work and its application to the care of the patient. Prerequisites, 443 and permission.

#### 556 Clinical Microbiology Training and Research (\*, max. 12) S

RAY, ROBERTS, SCHOENKNECHT, SHERRIS Training in clinical microbiology and research. Attendance at daily laboratory rounds in addition to bench-side training and research. Prerequisites, 443 and permission. For medical students only.

Conjoint 560 Tumor Biology (3) S (See Conjoint Courses.)

- 600 Independent Study or Research (\*) AWSpS
- 700 Master's Thesis (\*) AWSpS
- 800 Doctoral Dissertation (\*)

## **NEUROLOGICAL SURGERY**

#### 428 Neurological Surgery Seminar (1) AWSpS CALVIN

A weekly seminar centered around neurological research topics with discussion by staff and students. Prerequisite, Human Biology 432 or permission.

#### 441 Neurosurgery for the Generalist and Clinical Specialist (2) W KELLY, LOESER

Series of lectures, seminars, and clinical demonstrations designed to identify and describe those diagnostic and therapeutic aspects of neurosurgical disease, the understanding of which is essential in the general practice of medicine. This course will not include experience in patient care, nor will it emphasize research data or techniques. The initial diagnosis and management of such conditions as head and spinal injuries, intracranial hemorrhage, CNS mass lesions, disc disease, hydrocephalus, and chronic pain will be covered in depth. Although a reading list and a syllabus will be available, the major mode of in-formation transferral will be the clinical presentation. Prerequisite, Human Biology 432; detailed information about any of the neurosciences is not required. This course is not intended for those students planning to take 479 or 480.

#### 442 Clinical and Basic Research Correlates of Epilepsy (2) A

FETZ, OJEMANN, WESTRUM

Clinical symptoms and treatment of epilepsy; related basic research in neuroanatomy, neurophysiology, neuropsychology, and neuropharmacology of epilepsy. Prerequisite, Human Biology 432 for medical students; permission for others.

#### 477 Electroencephalography Laboratory (\*) AWSp

### CHATRIAN

For medical students who desire to acquire familiarity with the techniques, clinical applications, and basic interpretive criteria of electroencephalography. Prerequisites, Human Biology 432 or Medicine 465 and permission. (2, 4, or 6 weeks.)

## 479 Clinical Neurological Surgery (\*) AWSpS

Student serves clinical clerkship as active extern on neurological surgery ward at University Hospital or University-affiliated hospital. Prerequisite, Human Biology 460. (2 weeks.)

#### 480 Neurological Surgery Clerkship (\*) AWSpS OJEMANN

Student serves clinical clerkship as an intimate member of the staff, participating in in-patient and out-patient care, both pre- and post-operative, involving neurological surgery patients. University Hospital or a University-affiliated hospital may be selected, subject to approval of the Department. May be taken in lieu of 479 if student wishes. Prerequisite, Human Biology 460. (4 weeks.)

### 497 Neurological Surgery Special Electives (\*) AWSpS

WARD

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 students of possible opportunities. 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.

#### 498 Undergraduate Thesis (\*) AWSpS

OJEMANN

Prerequisite, permission.

## 499 Undergraduate Research (\*) AWSpS

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.

## OBSTETRICS AND GYNECOLOGY

#### 465 Introduction to Obstetrics and Gynecology (\*) AWSpS GIBSON

Clinical clerkship in obstetrics and gynecology including preceptorial sessions, private office experience, and lecture seminars. Prerequisite, Human Biology 460. (2 weeks.)

#### 479 Obstetric and Gynecologic Investigation (\*) AWSpS HERRMANN, VONTVER

The investigation may cover any one of the following fields: uterine muscle physiology, toxemias of pregnancy, hormone assays in obstetrics and endocrinology, obstetric and gynecologic oncology. By arrangement.

#### 480 Clinical Clerkships (\*) AWSpS GIBSON

The student spends two or more weeks as a clinical clerk on obstetrics and/or gynecology at the University Hospital, Harborview Medical Center, U.S. Public Health Service Hospital, Madigan General Hospital, or Virginia Mason Clinic. On the obstetrical service the student actively participates in the deliveries and closely follows the management of all obstetric patients. In the gynecology service the student makes ward rounds and actively participates in the medical or surgical management of the inpatient gynecologic patients. In addition, he is assigned to the obstetric and gynecologic outpatient clinics, which affords him the opportunity to learn the office problems of the specialty. Prerequisite, 465, Conjoint 464 or equivalent.

#### 484 Endocrinology of Reproduction (\*) HEINRICHS, 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. By special arrangement with instructor.

## 497 Obstetrics and Gynecology Special Electives (\*) A WSpS

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 students of possible opportunities. 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.

#### 498 Undergraduate Thesis (\*) AWSpS VONTVER

By arrangement.

## 499 Undergraduate Research (\*) AWSpS VONTVER

Prerequisite, permission.

## **OPHTHALMOLOGY**

## 424 Special Topics in Vision (3) ASp HENDRICKSON

Seminar covering special topics concerned with recent research in the anatomy, the biochemistry, and the physiology of vision. Prerequisite, permission.

#### 481 Ophthalmology Clinical Elective (6) AWSp

KALINA

Inpatient and outpatient diagnosis and treatment of eye disease combined with review of basic sciences and ophthalmic pathology and neuroanatomy teaching collection. Prerequisite. Human Biology 460, (4 weeks.)

#### 497 Ophthalmology Special Electives (\*) AWSpS

KALINA

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 students of possible opportunities. 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.

#### 498 Undergraduate Thesis (\*) AWSpS KALINA

Thesis based on clinical research on the visual system conducted in the Department of Ophthalmology. Elective. Prerequisite, permission.

#### 499 Undergraduate Research (\*) AWSpS KALINA

Laboratory or clinical research in physiology, anatomy, or biochemistry of the visual system. Elective. Prerequisite, permission.

## ORTHOPEDICS

Conjoint 473 Musculoskeletal Pathology (2) Sp

(See Conjoint Courses.)

Conjoint 474 Advanced Musculoskeletal Pathology (2) Sp

(See Conjoint Courses.)

475 Preceptorship in Orthopedics (\*) AWSpS ANDERSON, BURGESS, CALLAHAN,

GLOYD, RAMAMURTI, STEWART

Student spends full time with the preceptor

during all his 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 orthopedic practice. Prerequisites, Human Biology 460 or Surgery 465 and permission of the department. (2 weeks, full time.)

#### 476 Pediatric Orthopedics (\*) AWSp STAHELI

Specifically designed for potential pediatricians and general practitioners to acquaint the student with all aspects of musculoskeletal problems in childhood. In addition to the didactic conferences and seminars, the student has opportunities for active participation in both inpatient and outpatient care at the Children's Orthopedic Hospital and Medical Center, Prerequisite, Human Biology 460 or Surgery 465. (4 weeks, full time.)

## 477 Musculoskeletal Trauma (6) AWSp

**GUNN** (Harborview Medical Center) Instruction takes place largely at Harborview Medical Center, where there is a high concentration of musculoskeletal trauma. The student follows the patient from the emergency room onto the wards and into the operating room as necessary and has opportunity to continue followup in the outpatient clinics. Instruction is given in both general and special clinics, including hand, hip, foot, and fracture, with emphasis placed on physical examination of the patient. Prerequisites, Human Biology 460 and Surgery 465. (Students will automatically be registered in 481 and 482, with no additional credit.) (4 weeks, full time.)

## 480 General Orthopedic Clerkship (6) AWSp

CLAWSON, STAFF

This clerkship offers the unique opportunity to study the wide variety of problems presented to a general orthopedic service. The University and U.S. Public Health Service Hospitals offer general inpatient and outpatient clinics covering general trauma, bone and joint infections, degenerative joint disease, rheumatoid arthritis, and outpatient pediatrics. The Veterans Administration Hospital is principally an inpatient service involved with a wide variety of musculoskeletal problems, including reconstruction of war injuries. Emphasis is placed on the diagnosis and the evaluation of functional deficits. Prerequisite, Human Biology 460 or Surgery 465. (Students automatically will be registered for 481 and 482, with no additional credit.) (4 weeks, full time.)

#### 481 Correlative Pathology of the Musculoskeletal System (3/2) AWSp CLAWSON, CONVERY

A review of the pathology of the musculoskeletal system as it involves common clinical problems. Prerequisite, Human Biology 460 or Surgery 465. Required course with 476, 477, or 480. No additional credit given with clerkships. One conference per week. (4 weeks.)

#### 482 Correlative Anatomy of the Musculoskeletal System (1/2) AWSp CLAWSON, STAFF

Designed as a review of gross anatomy in light of the clinical problems affecting the musculoskeletal system. An anatomic, clinical, and radiographic correlation of disease processes. Prerequisite, Human Biology 460 or Surgery 465. Required course with 476, 477, 480. No additional credit given with clerkships. (Two conferences per week, 4 weeks.)

## 497 Orthopedics Special Electives (\*)

AWSpS CLAWSON

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. A special opportunity is available Winter Quarter only for each of four students to work in Aspen, Colorado, for six weeks. This opportunity provides a maximum exposure to injuries encountered on the ski slopes. 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.

## 498 Undergraduate Thesis (\*) AWSpS

Student will work directly with a preceptor in selecting a suitable area for laboratory or clinical research in the area of orthopedics, and will develop a thesis for recognition. Prerequisites, Human Biology 423 and permission of Department. (12 weeks.)

#### 499 Undergraduate Research (\*) AWSpS CLAWSON, STAFF

Investigation of problems pertinent to the study of musculoskeletal problems in the orthopedic laboratories as part of the research group conducting investigations in histochemical and electron microscopic changes of cartilage undergoing effects of aging, trauma, and repair. Prerequisite, permission of department. (12 weeks.)

## **OTOLARYNGOLOGY**

## 481 Otolaryngology Clerkship (\*) AWSpS DONALDSON (University Hospital)

DONALDSON (University Hospital) Student will participate in evaluation and care of outpatients and inpatients at the University Hospital. In addition he will attend Department conferences. Prerequisite, Human Biology 460. (4 weeks, full time.)

## 482 Otolaryngológy Externship (\*) AWSpS

CARLSON, MORRISON (USPH'S Hospital) Student serves externship in Otolaryngology in outpatient clinic where visits average 600 per month supplemented by inpatient assignments. Individual training provided, giving student opportunity to utilize his own diagnostic abilities; performs or assists instructor in all phases of patient work-ups and care; attends ward rounds and conferences. Prerequisite, Human Biology 460. (4 weeks, full time.)

## 483 Otolaryngology Externship (\*) AWSpS HAYS, LEE, SCHINDLER (Madigan

Hospital) Individual externship training at outpatient clinic where visits average 1,200 per month, supplemented by inpatient assignments. Responsible for patient work-ups; follows assigned patient to operating room; participates in ward rounds and hospital conferences. Students reside at the hospital during externship, using facilities of BOQ and hospital mess. (Subsistence and quarters charges, approximately \$2 per day.) Prerequisite, Human Biology 460. (2 or 4 weeks, full time.)

#### 484 Otolaryngology Clerkship (6) AWSpS WALIKE

Student will participate in evaluation and

care of outpatients and inpatients at Harborview Hospital. He will assist in surgery. In addition, he will attend Department conferences both at Harborview Medical Center and University Hospital in conjunction with department training. Prerequisite, Human Biology 460.

#### 485 Otolaryngology Externship (6) AWSpS NOVACK

To give medical students additional training in pediatric otolaryngology at Children's Orthopedic Hospital and Medical Center. Students will assist in patient work-ups, surgery, post-operative care, and will study general otolaryngology problems with special emphasis in childhood disease entities. Prerequisite, Human Biology 460 or Surgery 465. (4 weeks.)

#### 496 Otolaryngology Seminar (1) AWSp DONALDSON

Advanced course on diseases of the ear, nose, and throat intended for those physicians interested in the field in more depth than that provided in the medical basic curriculum. Open to second-, third-, and fourth-year medical students. Prerequisite, Human Biology 431.

#### 497 Otolaryngology Special Electives (\*) AWSpS

DONALDSON

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 students of possible opportunities. 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.

## 498 Undergraduate Thesis (\*) AWSpS DONALDSON, MILLER

Student will work directly with department faculty in selecting a suitable area for laboratory or clinical research in the area of otolaryngology, and will develop a thesis for recognition. Prerequisite, permission.

## 499 Undergraduate Research (\*) AWSpS DONALDSON, MILLER

To offer research opportunities under direction in the area of otolaryngology. May be repeated for credit. (12 weeks.)

## PATHOLOGY

#### 310 Introduction to Pathology (2 or 3) A WIEGENSTEIN

Study of causes, processes, and effects of important diseases. Lectures, demonstrations and discussions. Required course for students in medical technology, dental hygiene, and physical therapy. Prerequisites for other students include Conjoint 316, 317-318, and Microbiology 301 or equivalent courses in human anatomy, physiology, or microbiology.

## 444- General Pathology (5-) A

PAGE Study of basic pathologic processes that underlie disease, including inflammation, neoplasia, infarction, and cellular alterations. An attempt is made to correlate the gross, functional, and biochemical alterations. This information is then applied in a detailed study of cardiovascular disease. Lectures, demonstrations, small-group discussions, and laboratory sessions are used to convey these concepts. The course is designed for secondyear dental students, graduate students, and others with a reasonable grounding in biologic and chemical science. Prerequisite for graduate students, permission.

#### -445 Systemic Pathology (-2) W

ROSS

A survey is made of pathologic processes affecting organs and systems of particular pertinence to the practice of dentistry. Lectures and demonstrations to present a coherent picture of systemic disease will be presented. Necropsy demonstrations in small student groups are supplements to the lectures. Prerequisites, second-year dental students or graduate students and permission.

#### 460 Introduction to the Analysis of Human Disease I (\*) AWSpS REICHENRACH

Autopsy participation and review serves as an introduction to the analysis of disease. The aim is to integrate morphologic, biochemical, and physiologic parameters to gain an understanding of the pathogenesis of disease and of the effects of therapy. The course includes both autopsy and surgical material and covers gross and microscopic aspects, regional and applied anatomy, and biochemical and physiologic abnormalities as they relate to disease processes. Students will be assigned in groups of three or four with each instructor in one of the hospitals indicated. Prerequisites, medical student standing, permission required in order to make appropriate group assignments; for graduate students, permission.

#### 461 Introduction to the Analysis of Human Disease II (\*) W MARTIN

The goal is to illustrate and integrate histoldgic, biochemical, and physiologic parameters in disease and their modification by therapy. Emphasis is on disease at the level of the microscopic autopsy review, but includes both autopsy and surgical material and will cover gross, microscopic, biochemical, and physiological abnormalities as they relate to understanding the pathogenesis of disease. Prerequisite, permission; graduate students by permission. (Limit: 20 students, two sections of 10 each.)

## 462 Cardiovascular Pathology Conference (\*) AWSpS

REICHENBACH

This 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) radiology and pathology conference discussing these cases. Prerequisites, Human Biology 440 and permission.

### 463 Neuropathology (\*) AWSpS

ALVORD This course consists of three parts, which may be taken separately or in combination: (1) Combined neurology-neurosurgery-neuropathology conferences. (2) Gross and microscopic studies of selected autopsied cases with review of study sets. (3) Experimental projects in neuropathology. Prerequisite, permission.

#### 464 Neuropathology Brain Modeling (4 or 8) S

ALVORD Three-dimensional neuroanatomical relationships, critical for understanding neuropathology, can best be obtained in the construction of a model of the brain. Prerequisite, permission.

## 465 Surgical Pathology (\*) AWSpS

The objective is to study fresh gross surgical specimens and to review microscopic sections of diagnostic problems in general surgery. Prerequisites, Human Biology 460 and permission.

#### 466 Pediatric Pathology (\*, max. 5) ASp BECKWITH, TENCKHOFF

Introduction to disease in childhood, utilizing case studies. Special emphasis on clinical pathological correlation of congenital heart disease. Prerequisite, permission.

## 467 Renal Pathology Conference (1-6) AWSpS

STRIKER Light and electron microscopic study of human and experimental renal disease. Conference discussions and individual study. Prerequisite, permission.

#### 468 Skin Pathology (1) AWSpS BARKER

Histopathological aspects of skin diseases will be presented and discussed in a group-conference type of seminar. Current dermatologic cases will also be discussed. Prerequisite, dermatology elective and permission. (Limit: 20 students.)

#### 469 Oral Pathology (1-3) AWSp SREEBNY

To provide students with experience in, and recognition and interpretation of, clinical manifestations in the diseases in, and of, the oral cavity, and to consider basic pathological mechanisms responsible for these conditions. Prerequisites, Human Biology 420 and 431 and permission.

#### 470 Gastrointestinal Pathology (1) Sp NORRIS

Laboratory elective for medical students and certain graduate students covering the developmental, inflammatory, neoplastic, and degenerative diseases of the gastrointestinal tract, liver, gall bladder, and pancreas. The gross, light, and electron microscopic features of these diseases will be correlated with biochemical and physiologic changes and symptomatology. Prerequisites, permission and Human Biology 441. (Limit: 6 students.)

#### 471 Neuroanatomic Pathology (2½) W ALVORD, SHAW, SUMI

The particular diseases occurring in specific parts of the nervous system are considered in terms of the segmental (motor, sensory, and association plates), intersegmental (reticular formation), and suprasegmental (cerebellum, colliculi, and forebrain) components. Clinicopathologic correlations are emphasized. Prerequisites, Human Biology 432 and permission.

#### 472 Neuropathologic Reactions (21/2) A ALVORD, SHAW, SUMI

The reactions of the nervous system, only more or less similar to those of other organs of the body as summarized in the course in tissue reaction to injury are considered in terms of congenital malformations, inflammations, vascular, traumatic, metabolic-toxicdegenerative, and neoplastic diseases peculiar to the nervous system as a whole. Clinicopathologic correlations are emphasized. Prerequisites, Human Biology 432 and permission.

#### 473 Cardiovascular Pathology (3) W REICHENBACH

The spectrum of cardiovascular pathology is covered in depth by case studies and by gross and microscopic material. Case analysis for presentation, including clinical and gross and microscopic material, which is prepared outside of class time. Topics covered include cardiomyopathy, pathology of the pulmonary vasculature, vasculitis, neoplasms, inflammatory diseases, diseases of the pericardium, valvular heart disease, hypertension, arteriosclerotic heart disease, and congenital heart disease. Clinicopathologic correlation is emphasized. Prerequisite, Human Biology 440. (Limit: 14 students.)

## 476 Clinical Pathological Conference (\*) AWSp

MOTTET

Interesting, unusual, or provocative cases principally from the University Hospital are presented for discussion by senior staff of the clinical and basic sciences. For medical students; graduate students by permission. May be repeated for credit.

#### 480 Diagnostic Pathology Clerkship (\*) AWSpS

BECKWITH, CREIGHTON, Children's Orthopedic Hospital, one student; LAZERT, MOSS, SCHWEID, Harborview Medical Center, two students, HUANG, MOTTET, WIEGENSTEIN, University Hospital, two students; NORRIS, VRACKO, Veterans Administration Hospital, one student Medical student participation in the dissec-

Medical student participation in the dissection and study of autopsy and surgical pathology cases. Each student is responsible for the work-up of cases assigned to him under the direction of a senior staff member. The student presents his cases at conferences and seminars and may participate in laboratory teaching. Clerkships are available at the University Hospital, Veterans Administration Hospital, Harborview Medical Center, and Children's Orthopedic Hospital and Medical Center, and selected community hospitals. Prerequisites, Human Biology 420 and permission. (Limit: six students.) (4, 6, or 12 weeks.)

#### 498 Undergraduate Thesis (\*) AWSpS BENDITT, STAFF

Elective. Prerequisite, permission.

#### 499 Undergraduate Research (\*) AWSpS BENDITT, STAFF

Elective. Prerequisite, permission. May be repeated for credit..

## **Courses for Graduates Only**

#### 500 Principles of Pathology (5) A BENDITT

This course concerns the basic pathologic processes, such as inflammation, neoplasia, cell alteration, and genetic and developmental pathology. Lectures, laboratory exercises, and demonstrations of human pathologic materials are used to teach the basic concepts of pathology that are important in medical and biologic research. The course includes a seminar on the various aspects of experimental pathology. Some knowledge of gross anatomy, histology, physiology, and biochemistry is desirable. Prerequisite, permission.

#### 501 Cellular and Subcellular Response to Injury (2) W SMUCKLER

Lecture-seminar. Considerations of current concepts of cellular and subcellular reactions to injury as studied by modern techniques of cell biology. Required of all pathology graduate students. Prerequisite, permission. (Offered alternate years; offered 1974.)

## 502 Inflammation and Repair (2) Sp

Lecture-seminar: A seminar course dealing with systematic examination of the processes involved in inflammation and repair of injury. Required of all pathology graduate students. Prerequisite, permission. (Offered alternate years; offered 1973.)

#### 503 Topics in Genetic Pathology (2) W GARTLER (Genetics), MARTIN (Pathology), PIDUS (Pediatrics)

Introduction to the methodology and the biology of cultured somatic cells; analysis of heritable phenomena in somatic cells. A series of seminars will emphasize selected original literature concerned with mutation, hybridization, and the mitotic cell cycle in mammalian cells. Taught conjointly with Genetics 554. Required of all pathology graduate students. May be repeated for credit. Prerequisites, basic courses in biochemistry and genetics.

## Conjoint 505 Histochemical and Cytochemical Methods (3) Sp

(See Conjoint Courses.)

#### 507 Ultrastructural Pathology (2) S ROSS, TYSON

Lectures on various developments in cell biology and pathology for students interested in electron microscopy. Various aspects of cell structure and function, including discussions of cell organelles, are presented. Lectures on recent developments in methodology, including techniques of cell fractionation and various optical methods, also are presented. May be repeated for credit. Prerequisite, permission.

#### 508 Ultrastructural Pathology (4-6) WS ROSS, TYSON

Instruction in techniques of electron microscopy. Prerequisite, permission. May be repeated for credit.

## 510 Anatomical Analysis of Disease (\*, max. 30) AWSpS

HUANG, MOTTET

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. Prerequisite, permission.

## 520 Experimental Pathology Seminar (1) AWSpS

BENDITT, STAFF

Review of current problems by members of the Department and visiting scientists. Prerequisite, permission of chairman. May be repeated for credit.

#### 551 Experimental and Molecular Pathology (2-5, max. 20) AWSpS BENDITT

An introduction to experimental pathology. A tutorial course introducing the beginning graduate student to selected methods and problems through literature surveys and/or laboratory experience. Emphasis is on cellular and molecular aspects of experimental pathology. Prerequisite, permission of chairman. May be repeated for credit.

#### 552 Contemporary Anatomic Pathology (2-5, max. 30) AWSpS NORRIS

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. May be repeated for credit. Prerequisite, permission.

#### Conjoint 560 Tumor Biology (2)

K. E. HELLSTROM, E. SMUCKLER

(See Conjoint Courses.)

- 600 Independent Study or Research (\*) AWSpS
- 700 Master's Thesis (\*) AWSpS

800 Doctoral Dissertation (\*)

## PEDIATRICS

#### 401 Survey of Human Growth and Development (1<sup>1</sup>/<sub>2</sub>) AWSp KIRSCHNER, WENNER (CTU)...

Clinical observation and study of normal growth patterns in multiple areas of human development, within the setting of routine well-child care. Observation and increasing participation in patient interview, examination, and treatment plan. This course covers briefly the subjects covered in more detail in 402-403-404. (Credit will not be allowed for both 401 and 402-403-404.) Prerequisite, permission.

#### 402-403-404 Human Growth and Development (1½-1½-1½) AWSp

WENNER

The student learns more about physical growth and behavioral development through the supervised intensive observation and discussion of an individual child over the span of a major portion of the child's first year of life. In addition, he becomes aware of the individuality of this child's maturational patterns through the more casual observation of several other children of the same age. The observations take place in the Newborn Nursery, Well Child Clinic, and the child's home. The contribution of the child's constitution, particularly as manifested at the time of birth, is shown as interacting with the situational peculiarities of his family environment. A synthesis of information about the child, reflecting the student's experience in the course, is required in lieu of a final examination. There is an opportunity to observe, to discuss, and to participate in the doctor-patient relationship. Two hours of clinic demonstration and conference a week, with five hours of additional special activities, such as home visits, nursery observation, etc., each quarter, and the preparation of two papers in lieu of examinations. Prerequisite, permission.

#### 405 Longitudinal Pediatric Management (°) AWSpS WENNER

Opportunity for the student to continue contact with the child who has been the focus of his learning in 402-403-404. Emphasis is placed on the emergence of longitudinal trends in the development of the child, with the increasing clinical skills of the student making appropriate his assumption of the clinician role in relation to this child. Alows longitudinal study of development and the relating of this to clinical medicine. Prerequisites, 402-403-404 and permission.

#### University Conjoint 410 Study of Interdisciplinary Evaluation and Management of Handicapped Children (3) AWSpS

(For course description, see Interschool or Intercollege Programs.)

#### 411 Community Night Clinics (2) AWSpS DEISHER

Students will attend at least two night clinics per week for youth and young adults with medical and social problems. Treatment and rehabilitation will be emphasized. Prerequisite, Human Biology 460.

#### 412 Laboratory in Human Embryology and Teratology (3) AW

SHEPARD (University Hospital) Allows the student to specialize in the area of human embryology and teratology. Exact stages of human development (Streeter's Horizons) will be described, and studies are conducted in the laboratory by examination of fresh abortuses and serially sectioned human embryos. The mechanisms of abnormal development (teratology) will be emphasized by techniques being used in the Central Labora-tory for Human Embryology. Prerequisite, Human Biology 411 or equivalent or permission.

**Conjoint 450** Clinical Infectious Diseases (3) (See Conjoint Courses.)

#### 451 Pediatric Electrocardiography (2) W **GUNTHEROTH**

Theory and practice of electrocardiography will be reviewed in seminars. Electrocardiograms from children will be read by the student and reviewed with the appropriate faculty member. Prerequisite, Human Biology 440.

#### 452 Fetal and Neonatal Physiology (1) W HODSON

Lecture course that reviews the normal and abnormal physiology of the developing mammalian fetus and postnatal physiology including adaptation to extrauterine life. Prerequisites, Human Biology 422 and 440.

#### Conjoint 464 Perinatal Clerkship (9) (See Conjoint Courses.)

## 465 Pediatric General Clerkship (\*, max. 16) AWSpS

ROBERTSON

General inpatient and outpatient pediatric clerkship at a variety of locations, including Children's Orthopedic Hospital and Medical Center, University Hospital, Harborview Medical Center, Madigan General Hospital, etc. Besides his clinical experience, the student will have a faculty preceptor and attend seminars on major pediatric subjects. Prerequisite, Human Biology 460.

#### 469 Neonatal Pediatrics-Clerkship (\*) AWSpS

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. 465.

## 470 Pediatric Infectious Diseases and

Immunology (\*) AWSpS RAY (Children's Orthopedic Hospital and Medical Center)

Elective dealing with the development of im-

mune mechanisms and diagnosis and treatment of infectious diseases and immunologic defects in children. Opportunity for experience in clinical research and laboratory techniques will be provided. Prerequisite, 465 or permission.

#### 472 Clinical Experience in Child Growth and Development (\*) W WENNER

Experience at the Clinical Training Unit in the common problems met in clinical practice among children from infancy through adolescence. Emphasis is on normal development and behavior. Prerequisite, Human Biology 460

#### 473 Office Practice (\*) AWSpS BERGMAN

Opportunity to observe and function in the private office settings of a number of clinical pediatric faculty and accompany pediatricians as they pursue their daily activities in the community. Prerequisite, 465.

#### Social Problems Related to Child 474 **Development and Health Care (\*)** AWSpS DEISHER

Combined experience with normal and handicapped infants, children, and adolescents from low-income families and minority cultures and races. Special emphasis will be given to the effect of environment on the child and his functioning. Prerequisite, Human Biology 460.

## 476 Pediatric Clerkship With the Mentally Handicapped (\*) AWSpS **REICHERT** (Rainier School), HAYDEN

(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. For further information apply to Dr. W. O. Robertson, Children's Orthopedic Hospital and Medical Center. Prerequisite, 465. (4, 6 weeks, full time.)

Conjoint 477 Clinical Allergy (\*) (See Conjoint Courses.)

#### 479 **Clinical Problems in Mental Retardation** and Related Handicaps (\*) AWSpS HOLM

Experience in multidisciplinary evaluation of the handicapped child and study of the management of the problem. Prerequisite, 465.

#### 480 Pediatric Clinics (\*) AWSpS ROBERTSON, WEDGWOOD

Elective part- or full-time experience in pediatric general and subspecialty clinics for 12 weeks. From one to ten half-day sessions may be elected each week 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 center. Prerequisite, Human Biology 460.

#### 481 Inborn Errors of Metabolism (\*) AWSp SCOTT

Clinical and laboratory experience related to biochemical errors of metabolism is offered. Emphasis is on the recognition, laboratory diagnosis, and genetic mechanisms operating in human disorders. Prerequisite, 465 or permission.

#### 482 Congenital Defects (\*) AWSpS SHURTLEFF

An advanced course in pediatrics providing experience in the clinical diagnosis and management of structural and metabolic congenital defects. Prerequisite, 465.

#### 483 Pediatric Endocrinology and Metabolic Diseases (\*) AWSpS KELLEY, RUVALCABA

This program can be oriented to the special interest of the individual student so that principal emphasis may be placed on clinical, laboratory, or both clinical and laboratory areas. Intensive clinical experience will be provided in classical endocrinopathies, abnormal sexual differentiation and/or development, abnormal growth, renal diseases, mesenchymal diseases, steroid therapy, diabetes and related disorders, and general metabolic disorders in children. Students also may perform some clinical and/or basic research in the various clinical conditions noted here. Techavailable include chromatography, niques urinary 17 ketosteroid fractionation, identification of specific plasma and urinary hydroxylated steroids, fluorometry, and cytogenetic techniques. Prerequisites, Human Biology 460 and permission.

## 485 Pediatric Hematology and Oncology (\*) AWSpS

HARTMAN

Laboratory and conference participation with the hematology and the oncology units at Children's Orthopedic Hospital and Medical Center. Prerequisite, 465.

#### 486 Pediatric Cardiology (\*) AWSpS GUNTHEROTH

The student will do the admission work-up on all pediatric cardiology inpatients and on one outpatient per week. He will read all electro-cardiograms with the Fellows, and assist in interpretation of pressure and oxygen content data from catheterization and angiocardiograms. During open-heart surgery, the student will observe and participate in the post-operative management, including fluid and electrolyte balance, medication schedules, etc. Prerequisite, 465.

## 487 Pediatric Neurology (\*) AW

CARLSON

An advanced course in neurology emphasizing neurological disease in children. Both inpatient and outpatient experience will be included. Prerequisite, 465.

#### 488 Adolescent Development (\*) AWSp DEISHER

An advanced pediatric clerkship dealing with special problems of the adolescent. Senior medical students are offered an experience in a multidiscipline clinic. Prerequisite, 465.

#### **Advanced General Pediatrics**-490 Madigan General Hospital (\*) AWSpS ROBERTSON

Outpatient, ward, and/or newborn experience, especially with the more common types of pediatric problems. Prerequisites, 465 and permission.

#### **Advanced Pediatric Elective Clerkship** 491 (\*) AWSpS

ROBERTSON, WEDGWOOD

Ward and/or outpatient experience with direct responsibility for patient care. The student will work under the supervision of residents and attending physicians, having the same responsibilities for patient work-up, diagnosis, and care as an intern. This externship type of experience can be obtained at any one, or combination of the hospitals in the affiliated program. Students interested in this opportunity should make arrangements well in advance of registration. May be repeated for credit, Prerequisite, 465.

#### 497 Pediatric Special Electives (\*) AWSpS ROBERTSON, WEDGWOOD

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 students of possible opportunities. Students who wish to elect this course should obtain from the dean's office a "Special Assignment" form at least one month before preregistration. Prerequisite, permission.

#### 498 Undergraduate Thesis (\*) AWSpS ROBERTSON, WEDGWOOD

For medical students. Prerequisite, permission.

#### 499 Undergraduate Research (\*) AWSpS<sup>-</sup> ROBERTSON, WEDGWOOD

An opportunity to gain research experience through participation in various clinical or basic research programs in progress. The following specific opportunities are available, and others can be arranged. No prerequisite. Child development, developmental biology, human embryology and teratology, inborn errors of metabolism, infectious diseases, neonatology, neuroembryology, pediatric cardiology; metabolic aspects, pediatric cardiology: physiological aspects, pediatric endocrinology and metabolism, pediatric immunology, respiratory disease, dysmorphology. Prerequisite, permission.

### **Course for Graduates Only**

#### 505 Physical Growth of the Well Child (2) W KELLEY

Nine weekly seminars (18 hours). Presentation by departmental staff of relationships between growth and development and diseases as they pertain to dental health. For twenty graduate students in dentistry. (Offered even-numbered years.)

## PHARMACOLOGY

234 General Pharmacology (3) Sp 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.

235 Introduction to Dental Research (1) Sp In-depth research experience with members of staff of the Department of Pharmacology. For dental students with specific interest in dental pharmacology.

300 Principles of Drug Action (3) Sp Current concepts of the actions and effects of therapeutic and toxic chemicals. Prerequisites, Chemistry 100 or 101 and Biology 100 or 101-102, or permission.

#### 401 General Pharmacology (5) W VINCENZI

Introduction to general aspects of pharmacology. Consideration of principles governing drug absorption, distribution, excretion, metabolism, interaction with living systems, and dose-effect relationships. General pharmacology of drugs influencing the autonomic and cardiovascular systems, with emphasis on sites and mechanisms of action. For pharmacy students, others, including medical and graduate students, by permission. Prerequisites, Chemistry 236, Physiology and Biophysics 360, Biological Structure 301, Pathology 310, and Biochemistry 405 or their equivalents, or permission.

#### 402 General Pharmacology (5) Sp VINCENZI

Further consideration of general aspects of pharmacology, including actions of drugs on endocrine and central nervous systems and on neoplastic processes. Demonstration laboratory/conference sessions are utilized to illustrate basic pharmacologic phenomena and to consider their relationships to present-day pharmacy, medicine, and society. For pharmacy students, others by permission. Prerequisite, 401 or equivalent or permission.

## 441 Orientation and General Principles of Drug Action (2) A

An introduction to pharmacology including historical aspects; the role of career pharmacologists in modern society; drug development and regulations; and a guide to the scientific literature. Fundamental principles of drug action with emphasis on receptor theory, dose-response relationships and factors involved in the absorption, fate, and distribu-

#### 442 General Pharmacology (3) W DYER, VINCENZI

tion of drugs. Prerequisite, permission.

A study of drugs acting on the autonomic nervous and cardiovascular systems. Emphasis will be placed on physiological and biochemical mechanisms, and consideration of their therapeutic and adverse effects will be discussed. Prerequisite, 441 or Human Biology 422.

#### 443 General Pharmacology (2) W DAVIS

Lectures and discussions on the pharmacology of the kidney, gastrointestinal tract, endocrine system, and chemotherapy of parasitic, microbial, and neoplastic disease. Prerequisite, 441 or Human Biology 442 or permission.

#### 444 General Pharmacology (3) Sp HALPERN

Advanced elective neuropsychopharmacology as a basis for therapeutic applications of drugs for use in neurology, psychiatry, and anesthesiology. Neuropharmacological and psychopharmacological correlates will be presented with clinical demonstration material, where applicable and available, in an attempt to understand drug choice, efficacy, mechanism of therapeutic action, drug interactions, safety, and limitations of therapeutic effectiveness. Prerequisite, 441 or Human Biology 432, or permission.

#### 445 General Pharmacology Laboratory (2) W

#### DAVIS

Selected laboratory experiments in pharmacology for demonstration of basic principles of drug actions. Autonomic nervous system, central nervous system, and cardiovascular drugs will be employed in both intact and isolated mammalian systems. One four-hour laboratory per week. Prerequisite, Human Biology 422 or permission.

#### 497 Pharmacology Special Electives (\*) AWSpS DILLE

By specific arrangement, for qualified stu-

dents, special clerkship, externship, or research opportunities can at times be made available at institutions other than the University of Washington. The faculty can advise students of possible opportunities. 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.

498 Undergraduate Thesis (\*) AWSpS

For medical students. Prerequisite, permission.

## 499 Undergraduate Research (\*) AWSpS

Participation in departmental research projects. For medical students. Prerequisite, permission.

## **Courses for Graduates Only**

### 507 Pharmacology Seminar (1) AWSp

DAVIS 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.

#### 510 Current Topics in Pharmacology (2) W DAVIS

Recent progress in pharmacological research. Considered areas will include renal pharmacology, polypeptides, and selected aspects of toxicology. Prerequisite, permission. (Not offered 1972-73.)

## 511 Special Pharmacological Techniques (3)

A laboratory treatment of biochemical, biophysical, and surgical approaches employed in pharmacological investigation. Prerequisites, 401, 402 or 234, or permission. (Not offered 1972-73.)

#### 525 Cardiovascular Pharmacology (2) Sp VINCENZI

Consideration of basic drug action on electrical and mechanical events in the heart and vascular system with clinical correlation. Prerequisites, 442, 401, 402 or 234 or permission. (Offered alternate years; offered 1972-73.)

#### 526 Autonomic Pharmacology (2) W HORITA

An advanced treatment of pharmacologic effects on storage, release, and action of autonomic transmitter substances. Prerequisites, 442 or 401, 402 or 234, or permission. (Offered alternate years; offered 1972-73.)

#### 527 Biochemical Pharmacology (2) A JUCHAU

Biochemical considerations of the mechanisms of action, structure-activity relationships, and metabolism of pharmacologic agents. Prerequisites, 401, 402 or 234 or permission. (Offered alternate years; offered 1972-73.)

#### 528 Neuropsychopharmacology (2) A HALPERN

The pharmacology of the central nervous system. Prerequisites, 444 or 401, 402 or 234, or permission. (Offered alternate years; not offered 1972-73.)

#### 532 Essentials of Toxicology (2) Sp LOOMIS

A study of harmful effects and various factors that influence the harmful effects of chemicals on biological tissue. Prerequisites, 401, 402 or 234 or permission. (Offered alternate years; not offered 1972-73.)

#### 533 Methods of Toxicology (2) Sp LOOMIS

A combined laboratory demonstration and didactic consideration of chemical, physical, and biological methods involved in studies of harmful effects of chemicals on biological tissue. Prerequisites, 401, 402 or 234 or permission. (Offered alternate years; offered 1972-73.)

600 Independent Study or Research (\*) AWSpS

#### 700 Master's Thesis (\*) AWSpS

800 Doctoral Dissertation (\*) AWSpS

## **PHYSIOLOGY AND BIOPHYSICS**

Conjoint 316, 317-318 Introductory Anatomy and Physiology (2, 5-5) A,W,Sp (See Conjoint Courses.)

#### 350 Basic Human Physiology I (4) AWSpS BROWN

First course in an upper-division sequence of two courses covering human physiology. Organized around the various organ systems of the body, the course covers cell membrane and transport, cardiovascular system, respiratory system, renal system, body fluid homeostasis, and introduction to the nervous system. Clinical and applied aspects of physiology are emphasized. Prerequisite, college chemistry or permission. (Because of varied backgrounds of the potential registrants, it is necessary to evaluate individually students who do not meet the regular prerequisite.) At present, offered only through the Division of Independent Study.

#### 351 Basic Human Physiology II (4) AWSpS BROWN

Second course in an upper-division sequence of two courses covering human physiology. Organ systems covered are gastrointestinal, central nervous, energy exchange and temperature regulation, endocrinology, sexual function, and reproduction. Prerequisite, 350. At present, offered only through the Division of Independent Study.

#### 360 General Human Physiology (5) A CONRAD

Lecture, laboratory, and laboratory conference instruction in the basic principles and basic laboratory techniques of physiology. For students of pharmacy; others by permission. Prerequisites, Zoology -112, Pharmaceutical Chemistry 239, Physics 115 and 118, Microbiology 301.

Conjoint 400 Human Anatomy and Physiology (6 or 9) A (See Conjoint Courses.)

## 405 Human Physiology (5 or 7) W

BRENGELMANN, LUSCHEI Intensive coverage of advanced physiology through lectures, laboratories, and demonstrations. Required for first-year dental students; graduate students and others by permission.

## 406 Physiology and Biophysics Laboratory (1) W

Experiments drawn from areas of muscle, neurophysiology, cardiovascular, respiratory, renal and endocrine physiology; performed by students working in small groups. Discussion of techniques, data analysis, and results. Prerequisite, permission.

#### 410 Nerve-Muscle Physiology (3) A WOODBURY

Detailed consideration of the active ion transport, nerve-impulse conduction, neuromuscular synaptic transmission, excitation-contraction coupling and contraction coupling and contractile processes of vertebrates. Aim is to convey the concepts of excitable, synaptic, and contractile phenomena. Prerequisite, permission.

#### 411 Neurophysiology (3½) W PATTON

Functioning of the central nervous system: somatic and visceral; special senses: audition, vision, vestibular; descending systems: cortical and subcortical; cerebellum, hypothalamus; behavior and neurophysiology; comparative neurophysiology. Prerequisite, permission.

## Conjoint 411 Functional Neuroanatomy (3<sup>1</sup>/<sub>2</sub>) W

(See Conjoint Courses.)

#### 412 Cardiovascular-Respiratory Physiology (3½) W ROWELL, SCHER, YOUNG

Detailed study of the cardiovascular and respiratory systems and their interactions. Topics: functions of the heart, electrical, and mechanical; regulation of cardiac output, circulation to special regions, exercise physiology. Mechanics of respiration, gas exchange; acid-base; regulation of respiration; respiratory function tests. Prerequisite, permission.

#### 413 Physiology of Transport Organ Systems (3½) A STIRLING

Functions of organ systems primarily devoted to active transport. Principles of transport: passive forces and active transport processes, models of active transport. Renal system: fluid dynamics, tubular transport, integration and regulation of tubular functions. Body fluids: volume compartments, cerebrospinal fluid. Gastrointestinal system: motility, secretions, absorption, transport regulation. Prerequisite, permission.

#### 414 Physiology of Chemical and Metabolic Regulation Conference (3½) Sp BROWN, GALE

Energy metabolism and control of temperature: intermediate metabolism, heat production, thermal exchange, temperature regulation. Control functions of endocrine system: pituitary, hypothalamus, target organs, thyroid adrenal cortex and medulla, pancreas; parathyroid, reproduction physiology; physiological control systems. Prerequisite, permission.

#### 415 Physiology Special Research Projects (1-4) AWSpS

Small group or individual research projects in physiology. The student may choose topic involving laboratory and/or library research. Prerequisite, permission.

#### 418 Biological Instrumentation (4) S BRENGELMANN, LUSCHEI

Principles of biological instrumentation systems, transfer relations, transient and frequency response of simple systems, noise, feedback and control systems, analog computation. Oriented toward biology, medical, and premedical students. Prerequisite, beginning calculus or permission.

## 419 Biological Instrumentation Laboratory (2) S

BRENGELMANN

Laboratory to illustrate and extend material presented in 418. Prerequisite, permission.

### 430 Mathematical Methods of Physiology and Biophysics (3) A

STEVENS

Selected mathematical methods particularly useful in physiology and biophysics are developed. Emphasis is on deriving mathematical descriptions, usually in the forms of ordinary or partial differential equations, for physiological systems. Topics covered will usually include solution of differential equations using the Laplace transform linear approximation of nonlinear systems, transfer function, and Green's function description of physiological systems. Prerequisite, permission.

## 431 Biological Control Systems (3) W

BROWN Emphasizes development of the mathematical techniques used in biological control systems analysis: block and signal flow diagrams, description of response of feedback systems; roots and poles of linear systems; frequency response and Bode plots; s-plane description of feed-back systems; synthesis of descriptive functions of experimental results; effect of nonlinearities on control system response. Basically a course in mathematical analysis of feedback systems, using biological examples. Recommended background includes some acquaintance with differential equations and course work in vertebrate or mammalian physiology. Prerequisite, permission.

#### 432 Biological Control Systems (3) Sp FUCHS

Examples of biological control systems are discussed in detail. Problems in research on respiratory, cardiovascular, hormonal, metabolic, oculomotor, and other regulatory systems are presented. Prerequisite, permission.

#### 437 Computer Programming for Biological Research (3) S

KEHL

Application of procedure-oriented languages to biological research. Stress is placed on programming in Fortran IV, ALGOL, and digital-analog simulator. Programming practice on various computers is assigned with term-program written at conclusion of course. Prerequisite, permission.

## 470 Selected Topics in Endocrinology and Metabolism (3) A

GALE

Reading and discussion of current literature with emphasis on regulatory mechanisms in mammals. Prerequisite, permission. May be repeated for credit.

#### 494 Neurological Study Unit (2) AW CRILL

Faculty and student discussion of neurological topics illustrated with clinical cases or demonstrations include the following: physiology, neuroanatomy, neurology, neuropathology, neurosurgery, and psychiatry. Prerequisite for medical students, Human Biology 432; graduate students by permission. May be repeated for credit.

**498** Undergraduate Thesis (\*) AWSpS For medical students. Prerequisite, permission. May be repeated for credit.

499 Undergraduate Research (\*) AWSpS For medical students. Prerequisite, permission.

## MEDICINE

## **Courses for Graduates Only**

#### 505 Physiological Acoustics (3) Sp MILLER

Seminars on the physiological basis for audition. Includes discussion of the function and the structure of the auditory system, the ear, mechanics, transduction processes, and physiology of control pathways. Prerequisite, permission.

## 506 Physiological Basis of Dental Sciences (3) S

VAN HASSEL

Current concepts in areas of physiology related to dentistry, including pain, taste, speech, microcirculation, occlusion, and calcification. Review of basic physiologic mechanisms, survey of recent literature and design of applied dental research in each area. Offered jointly with the Department of Endodontics as Endodontics 525. Prerequisite, permission.

Conjoint 509 Neurochemistry (3) W (See Conjoint Courses.)

#### 515-516-517 Physiological Proseminar (7-7-7) A,W,Sp

A guided survey of the experimental literature of major topics in physiology. Course conducted as seminar with oral analysis of assigned papers and topics. Prerequisite, permission.

## 519 Membrane Biophysics Seminar (1) AWSpS

WOODBURY Detailed discussion and study of current top-

ics in cell membrane function and structure. May be repeated for credit.

520 Physiology Seminar (\*) AWSpS Selected topics in physiology. Prerequisite, permission. May be repeated for credit.

521 Biophysics Seminar (\*) AWSpS Selected topics in biophysics. Prerequisite, permission. May be repeated for credit.

522 Pulmonary Mechanics and Gas Exchange (2-5) A YOUNG

Viscous and elastic properties of chest-lung system; flow of gases in tubes. Generalized alveolar air equations. Gas transport. Prerequisite, permission.

#### 523 Heat Transfer and Temperature Regulation (2-5) S BRENGELMANN, BROWN

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.

#### 524 Advanced Membrane Potentials (3) W HILLE

Quantitative analysis of electrical activity in nerve. Active sodium-potassium transport. Ionic flux equations. Conductance changes. Calculations of the action potential. Prerequisite, permission.

525, 526, 527 Readings in Advanced Physiology and Biophysics (\*,\*,\*) AWSpS, AWSpS, AWSpS

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. Each course may be repeated for credit.

## 528 Advanced Physiological Systems (2-5, max. 10) A

YOUNG Theories of nonlinear mechanics and their applications to physiological systems. Prerequisite, permission. May be repeated for credit.

## 529 Motoneuron Physiology (4) W

CALVIN Electrical properties of surface membrane; excitatory and inhibitory reactions and their ionic mechanisms; properties of the spike potential; interaction of synaptic 'responses. Prerequisite, permission.

## 530 Synapse and Reflex Seminar (4) A

A guided survey of the literature pertaining to reflex and synaptic physiology. Course is conducted as seminar with students giving oral reports on assigned topics. Prerequisites, 515 and permission.

#### 531 Biophysics of Circulation (3) A SCHER, WIEDERHIELM

Study of cardiovascular physiological areas where quantitative models have been seriously proposed: dynamic models of arterial circulation, characteristics of microcirculation, transport across capillary wall. Prerequisite, permission.

#### 535 Operative Techniques in Neurophysiology (2-5) S PATTON, SMITH

Deafferentation, decerebration, and Sherrington reflex preparation, osteoplastic bone flap, Horsley-Clarke apparatus, and reconstruction of lesions; primate colony and operating room management. Prerequisite, permission.

#### 536 Behavioral Techniques in Neurophysiology (2-3) Sp LUSCHEI, SMITH

Study and use of behavioral methods applicable to nervous system studies, quantification of activity and physiological variables, interpretation of neural lesions and chronic electrode implants. Prerequisite, permission.

## 537 Real-Time Computer Systems (3) W KEHL

Use of digital computer as an instrument in biological experimentation. Includes real-time analog-digital conversion, digital-analog conversion, interrupt processing from the "real" world, display and analysis of data. Prerequisite, permission.

## 540 Neurophysiology of Learning (3) W

LUSCHEI, SMITH Consideration of the literature relating to

brain mechanisms of learning. Prerequisite, permission.

#### 545 Physiology of Vision (3) Sp STEVENS, TELLER

Selected readings from recent literature on visual systems. Emphasis is placed on studies of single neuron discharge, but other topics, such as biochemistry of visual pigments and optical properties of the eye, are usually included. Prerequisite, permission. May be repeated for credit.

#### 549 Properties of Neurons (3) Sp STEVENS

Offered in alternate years with 545. Selected

readings from recent literature comparing properties of neurons from different regions of the vertebrate central nervous system. Emphasis is on the critical evaluation of data obtained by intracellular recording. Prerequisite, permission.

#### 550 Cortical Potentials (4) Sp TOWE

Properties of continuous and evoked potentials and their interactions. Relationship of cortical unit activity to cortical potentials. Prerequisites, 515, 529, and permission.

#### 551 Physiology of Cerebellum (3) Sp KENNEDY

Function of cerebellum and its afferent and efferent systems; discussion of current physiological literature. Prerequisite, permission.

#### 559 Integrative Neurophysiology (3) Sp TOWE

Interpretation of neurophysiological phenomena from comparative, biophysical, and evolutionary standpoints. Prerequisite, permission.

#### 560 Contraction of Skeletal Muscle (3) GORDON

Structure and properties of skeletal muscle leading to contraction theories. Length-tension relations. X-ray diffraction, and fine structure studies. Sliding filament hypothesis. Mechanical properties. Heat and chemical studies. Excitation-contraction coupling. Prerequisite, permission.

#### 580 Special Topics in Physiological Control Systems (\*) AWSpS YOUNG

Selected physiological control systems will be covered in detail. A literature survey of pertinent papers will be used as a basis for indicating the direction of future research. Prerequisite, permission. May be repeated for credit.

#### 600 Independent Study or Research (\*) AWSpS

700 Master's Thesis (\*) AWSpS

800 Doctoral Dissertation (\*) AWSpS

## PSYCHIATRY

### 267 Preventive Methods for Mental Health (2) W

TAYLOR Explores the concepts of mental health and mental illness and the factors that produce each, with analysis of methods of primary, secondary, and tertiary programs, including psychological, social, and cultural factors. For nonmedical students.

#### University Conjoint 410 Study of Interdisciplinary Evaluation and Management of Handicapped Children (3)

(For course description, see Interschool or Intercollege Programs.)

## 440 Physiology of Emotions (\*) WSp

HOLMES Seminar based on discussion of selected reading of original articles from psychophysiologic and psychosociologic literature. Designed to orient and interest students for participation in current or future research projects and clinical medicine. Seminar format with guided reading and appropriate case material. For medical students only; others by permission.

#### 442 Culture and Illness (\*) AWSp JAMES

Examination of several social systems with regard to the manner in which patterns of illness are developed, maintained, or modified by cultural elements. A lecture-discussion course with guided reading. Medical students only. Prerequisite, permission. May be repeated for credit. (Limit: 15 students.)

## Conjoint 444 Medical Aspects of Sexual Problems (1<sup>1</sup>/<sub>2</sub>)

(See Conjoint Courses.)

#### 445 Sensitivity Training Group (1) A SATA

An unstructured small-group experience in which the participants learn from experience about group functioning and increase their awareness to group interaction and feedback of themselves and their perception of others. Medical students only. (Limit: 12 students.)

## 447 Problems and Dynamics of Families and Small Groups (2) W

TOWNES

Discussion of the dynamics of family and small-group functioning will include crosscultural data, the structure of communication, leadership, influence and attitude change, cohesiveness, modeling, role assignment, and the relationship of poverty to family style, with particular focus on the pertinence to medical practice. Medical students only. Seminar format with guided reading. (Limit: 15 students.)

#### 448 Social Problems in Aging (2) Sp PRESTON

The psychosocial conditions for the aging in Western societies. Consideration will be given to types of living arrangements including retirement communities, health care plans, selfactualizing activities, and death. Open to medical students and other graduate students by permission. Seminar format with guided reading. Content tailored to individual student needs.

#### 449 Principles of Research in Psychopathology (2)A BECKER

Review of current literature on selective aspects of personality deviation. Theoretically relevant research on the functional psychoses will be stressed. Open to medical students and advanced undergraduate students with the equivalent of an introductory or abnormal psychology course. Can be combined with a research project of the student's own choosing. Prerequisite, Human Biology 433. (Limit: 15 students.)

## 451 Principles of Personality Development (2) W

HEILBRUNN `

Consideration will be given to the physiologic, psychologic, and cultural factors from maturity through old age. For nonmedical students. Prerequisite, 450 or graduate standing.

#### 452 Clinical Psychiatry (2 or 3) Sp SCHER

Traces the development of psychiatric concepts to the present day, including theories of causation, prevention, and treatment. Emphasis on the use of therapies appropriate to the diagnosis. For nonmedical students. Quiz section required for Occupational Therapy students; optional for other students.

#### 454 Program Evaluation in Medicine (2) AWSp TOWNES

Review of pertinent literature concerning re-

search and social innovation, methods of assessing the efficacy of treatment, strategies, teaching effectiveness, and program evaluation from a systems viewpoint. A project in one of these areas is designed and carried out on an individual or group basis, depending upon the interests of the seminar members. Open to medical students and other graduate students. May be repeated for credit. (Limit: 15 students.)

#### 455 Psychoanalytic Theory (1) A RIPLEY

The basic concepts of psychoanalysis including the psychology of errors, dreams, the meaning of symptoms, transference and the libido theory will be considered. Medical students only. Seminar format with guided reading.

#### 456 Classical Readings in Psychiatry (2) W RIPLEY

Selected readings from writings of leading contributors to psychiatric theory. Among them are Janet, Freud, Adler, Jung, Sullivan, Meyer, and Erickson. Medical students only. Seminar format with guided reading. (Limit: 15 students.)

#### 457 Theory of Learning and Behavior Modification (2) W ARMSTRONG

The theory and technique of behavior modification as they are applied to behavioral adjustment problems of adults and children. Seminar format with guided reading, Prerequisite, permission. (Limit: 15 students.)

## 458 Psycho-Social Growth and Development (2) A

TOWNES

Reviews the current literature on psychosocial influences upon development and modification of self-esteem, affiliation, cognitive complexity, self-control, conformity, productivity, and cooperation. Open to medical students and to advanced undergraduate students.

## 459 Interviewing Techniques (1) W

RIPLEY Practice with interviewing psychiatric patients followed by discussion of the technical and clinical aspects. Medical students only. Prerequisite, Human Boilogy 433. (Limit: 10 students.)

#### 460 Community Psychiatry (3) AW . TAYLOR

Familiarizes students with the role of medicine and psychiatry in the Community Mental Health Center movement and provides opportunities for the application of community organization and consultative skills in field work projects. Open to medical students and other graduate students by permission. (Maximum enrollment: 10 students; minimum, 5 students.)

## 461 Workshop on Suicide and Crisis Intervention (1) W

After a presentation of current theories on crisis, suicide, and crisis intervention, students will have an opportunity to learn and to practice various techniques of intervention at the emergency room of Harborview Medical Center. Prerequisite, Human Biology 433 or graduate standing. (6 or 12 weeks full time or half time.) (Limit: 4 students.)

## 462 Principles of Hypnosis (2) Sp

RIPLEY The history and theory of hypnosis. Induction techniques. Application to the treatment of illness. Medical students only. Prerequisite, permission.

#### 463 Experience in the Child Day Care Unit (9) AWSp DAVIS

Involves working in the Child Day Treatment Unit with a seriously disturbed child, especially in group activities, and participating in team conferences around the child and general discussions of treatment. Opportunity for involvement with the schools, because some of the children are ready to go into a public school special education program. It also permits work with some of the parents and observation of the efforts to engage parents in working with their own children. Students also participate in the didactic exercises of the Division of Child Psychiatry. Prerequisite, Human Biology 460. (6 weeks, full time; limit: 1 student.)

#### 465 Clinical Clerkships (9) AWSpS ELY, JOHNSON

Six weeks of closely supervised experience on a psychiatric inpatient service. The student is responsible for diagnostic evaluations of patients with a variety of psychiatric disorders at the University Hospital, Harborview Medical Center, and Veterans Administration Hospital. He is introduced to the principles of the use of psychologic tests, ward milieu management, group psychotherapy, and the physical and pharmacologic treatments. Clinical conferences with discussion of psychoses, psychoneuroses, and psychosomatic disorders are held. Limited consultation and screening experience will be available. Lectures are given throughout the year. Medical students only. Prerequisite, Human Biology 460. (6 weeks, full time; limit: 12 students.)

## 470 Chemical Aspects of Behavior (2) Sp MASUDA

Behavior from the point of view of biochemistry and physiology, e.g., some genetic aspects of behavior, aberrant biochemistry and disease, brain biochemistry, learning and biochemistry, brain substances and drugs, and behavior. Seminar format with guided reading. Open to third- and fourth-year medical students only. (Limit: 10 students.)

#### 475 Psychiatric Externship (\*) AWSp HOLMES

Opportunity to learn, from first-hand experience and active participation, the methods used in caring for seriously ill patients at a state psychiatric hospital. Elective open to medical students only. Prerequisites, Human Biology 433. (Limit: 2 students.)

### 490 Adult Development Program (9 or 18) AWSpS

ARMSTRONG, BAKKER

In the Adult Development Program (ADP), the student functions as a team member. He is expected to participate in all the classes offered in the program. He functions as a consultant to a client assigned to him. He has opportunity to acquire experience with a wide variety of behavior change techniques, including group experiences, role playing, couples workshops, fixed-role workshop, etc. Prerequisite, Human Biology 460. (6 or 12 weeks, full time; limit: 2 students.)

#### 491 Seminars and Conferences in Psychiatry (\*) AWSp RIPLEY

Special seminars and conferences on a variety

## MEDICINE

of topics can be arranged to accommodate the particular interests of students. Offered only in combination with 498 and psychiatry clinical electives. Duration will be the same as the elective with which it is combined. Prerequisite, permission. May be repeated for credit.

#### 492 Behavioral Science Study Unit (\*) AW MASUDA

A variety of topics will be presented under the sponsorship of the Department of Psychiatry, with participation of faculty members from many departments of the total University as well as from the health sciences. When practicable, selected patients will illustrate topics presented. Medical students only. May be repeated for credit.

#### 493 Advanced Inpatient and Consultation Experience (18) AWSpS ELY, JOHNSON

Twelve weeks of intensive experience and contact with adults and adolescents on a psychiatric inpatient service at University Hospital or Veterans Administration Hospital. Some consultation service experience also offered. Under individual faculty level supervision, clerkship offers equivalent of time spent on psychiatry during a standard rotating internship. Duties and responsibilities are comparable to those discharged by first-year psychiatric residents. In addition to being the patients' primary physicians, students are carefully instructed in understanding psychodynamics and psychopathology of emotional and behavioral problems, various interactions between doctor and patient, and methods of counseling and psychotherapy. Prerequisite, 465 or permission. Medical students only. (Limit: 6 students.)

#### 494 Clerkship in Acute Psychiatric and Social Problems (9 or 18) AWSp FUREDY

Elective at Harborview Medical Center that is primarily an inpatient experience, but is combined with some outpatient and emergency room service. It provides an opportunity to work with a broad range of psychiatric and social problems and to gain an experience in a variety of therapeutic approaches as applied to a broad spectrum of patients with varied psychological problems. Third- and fourth-year medical students only. Prerequisite, Human Biology 460. (6 or 12 weeks, full time; limit: 6 students.)

#### 495 Clerkship in Community Mental Health (9) AWSp SATA

Elective that offers actual field experience in working with community agencies and with personnel in providing direct and indirect mental health services. Students participate in community consultation and community education programs as well as in didactic teaching seminars. In addition, each student is assigned part time to the outpatient clinic for psychotherapy experience and to the psychiatric emergency room of the Harborview Medical Center community mental health facility. The program is geared to the specific interests of each student. Prerequisite, Human Biology 460. Third- and fourth-year medical students.)

#### 496 Clerkship in Adult and Child Outpatient Psychiatry (9 or 18) AWSpS CASEY, WICKLUND

Individually supervised work with adult and

child outpatients, stressing psychotherapy geared to patients' individual needs. Focus is on common psychiatric problems as seen in typical medical practice. Prerequisites, 465 and Human Biology 460 or permission of instructor. (12 weeks, full time or part time; limit: 5 students.)

#### 497 Psychiatry Special Electives (\*) AWSpS HAMPSON

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 students of possible opportunities. 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.

## 498 Undergraduate Thesis (\*) AWSpS

Opportunity to complete work on psychiatric research projects or pursue a specific psychiatric topic in depth, for instance through library research. Prerequisite, permission. May be repeated for credit. (2, 4, or 6 weeks, full time.)

#### 499 Undergraduate Research (\*, max. 15) AWSpS

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. May be repeated for credit. (4, 6, or 12 weeks.)

## **Courses for Graduates Only**

## 553 Psychodynamics and Psychopathology (2) A

#### HEILBRUNN

General psychopathologic phenomena and their defense reactions are traced to the developmental history of the individual with due attention to constitutional and organic causes. The general phenomena are applied to the most important psychiatric syndromes. Relevant case illustrations are offered as basis for therapeutic intervention. For nonmedical students. Senior or graduate standing recommended.

## 565 Biological Foundations of Psychiatry (2) Sp

#### HEILBRUNN

Anatomical and physiological factors involved in various forms of psychopathology. For nonmedical students. Prerequisite, graduate standing.

## RADIOLOGY

460 Introduction to Clinical Radiology (1) Sp A basic clerkship in both diagnostic and therapeutic Radiology designed to familiarize the student with clinical radiology and to expand and demonstrate application of knowledge acquired in the basic curriculum. Prerequisite, Human Biology 420.

## 477 Introduction to Radioactive Tracer Techniques (2) A

ROBKIŅ

Introduces the student to the basic concepts of the use of radioactive tracers to measure the transfer between the compartments of a biological system. The theoretical analysis will be restricted to systems with no more than three compartments. The experiments are designed to permit the student to utilize the theory discussed and to make actual determination of transfer coefficients. Offered jointly with the Department of Nuclear Engineering as Nuclear Engineering 477.

#### 480 Nuclear Medicine Technique, Physics, and Instrumentation (21/2) WS NELP

The course provides a familiarization with basic nuclear phenomena and instrumentation coupled with a laboratory application—instrument operation, sample counting, and isotope identification. Prerequisite, Radiology 460.

#### 481 Nuclear Medicine—The Radioisotope Tracer and Diagnostic Techniques (½) Sp NELP

Introduces the student to the theory and the practical application of the isotope tracer to the study of disease problems. Four-week seminar covering the principles of absorption, transfer, and compartmentalization of biologically important radionuclides and radiopharmaceuticals. The instruments used in clinical practice will be discussed. Prerequisite, permission.

## 482 Nuclear Medicine—Pathophysiologic Principles and Patient Presentations (½) Sp

NELP

Considers patient problems that have been studied by the radioisotope method. Students participate in the discussions of the physiologic principles involved while seeing and examining patients on the ward. Prerequisite, 481.

#### 487 Radioactive Tracer Techniques (2) A ROBKIN

The use and behavior of radioactive tracers, is studied; attention is given to the dynamics of the distribution of trace elements after their introduction into the system under analysis. Analysis of current models and application to examples from both living and nonliving systems. Offered jointly with the Department of Nuclear Engineering as Nuclear Engineering 487. Prerequisite, permission.

## 493 General Radiology Clerkship (3 or 6 or 7) AWSp

TROUPIN

Basic clerkship provides a survey of radiology, the depth and breadth of which will be individually structured. Instruction and experience in radiation therapy and nuclear medicine is available; however, the majority of the time is spent in the diagnostic department. Students observe and participate in ongoing film interpretation, fluoroscopy, and special procedures. A variety of X-ray and clinical conferences can be attended, supplementing daily film reading sessions and seminars with the staff. Opportunities for self-instruction are provided in the form of reading material and a large X-ray teaching file. A short experience in community radiology recently has been added to provide insight into radiologic care delivery in community practice. Prerequisite, Medicine 465 or Human Biology 460 or permission.

495 Clinical Cancer Management (\*) AWSp PARKER (University Hospital) Observation, instruction, and supervised par-

ticipation in clinical cancer care with emphasis on radiation therapy. Includes clinical examination, treatment and planning, and administration and conferences. Prerequisites, Medicine 465, Human Biology 460 or permission. (2 or 4 weeks.)

#### Nuclear Medicine Clerkship (3, or 6, or 496 9) A NELP

The student will participate daily in the nuclear medicine clinical laboratory from 8 a.m. to 5 p.m. where diagnostic studies of various types are performed. The student will have responsibility for examining patients and will assist in the diagnostic or therapeutic procedure. He will assist in ward consultation, attend daily clinical conferences, and partic-ipate in the ward rounds of the division. Prerequisite, permission. (2, 4, or 6 weeks.)

#### 497 Radiology Special Electives (\*) AWSpS TROUPIN

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 students of possible opportunities. 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.

#### 498 Undergraduate Thesis (\*) AWSp

The student may write a thesis in either therapeutic or diagnostic phases of radiology. For medical students only. Prerequisite, permission.

#### 499 Undergraduate Research (\*) AWSp FIGLES

Ongoing projects or a new project designed for the student. Opportunities in clinical or laboratory investigation in diagnostic and therapeutic radiology and nuclear medicine can be provided. Prerequisite, discussion with Dr. Figley, Dr. Parker, or Dr. Nelp.

#### 501-502 Biological Effects of Ionizing Radiation (2-2) A,W JACKSON

Effects of ionizing radiation at the molecular, cellular, organ, and organism levels with emphasis on mammalian systems. Prerequisite, permission.

## 503-504 Laboratory in Radiation Biology (1-1) A,W

CHRISTENSEN

Laboratory study of the biological effects of ionizing radiation. Prerequisite, permission.

## 505 Radiological Physics (2) WSp BICHSEL, WOOTTON

Application of physical concepts methodology and instrumentation in the study, production, and mensuration of ionizing radiations and their interactions with biological materials.

#### **Radiation Hazards Analysis and Control** 507 (1) Sp BALTZO

Emphasizes methods and procedures rather than facility or equipment design.

510 Special Topics in Radiation Biology (2) Sp

CHRISTENSEN

A detailed study of current research of special significance to the development of radiation biology.

#### **Chemical Mechanisms in Radiation** 515 Biology (2) A,Sp

CHRISTENSEN

Discussion of radiation-induced chemical reactions and their contribution to biological radiation damage including alterations in enzymes, viruses, bacteria, and mammalian cells.

#### 517 Radiation Dosimetry (4) Sp BICHSEL, WOOTTON

The measurement of radiation energy loss relationships in gases and solids, detection techniques and circuits, units, consideration of human exposure limits. Prerequisite, permission.

## 520 Seminar (2)

May be repeated for credit.

## 540, 541 Topics in Bionuclear Engineering L, II (4,3)

ROBKIN

Investigations into various aspects of the interaction of radiation. with biological material. Included may be topics in the analysis of radiation fields, dosimetry, shielding, biological response to radiation, mathematical modeling, etc. Some experiments may be designed and carried out as part of the course. The course will be conducted on a seminar basis with the discussion not limited to material which is already described in the literature. Original research is not excluded. Offered jointly with the Department of Nuclear Engineering as Nuclear Engineering 540, 541.

#### 550 **Field Practice in Radiological Health** (\*, max. 6) S CHRISTENSEN

The student rotates through laboratories engaged in radiological health and radiation safety work to gain experience in the prob-lems encountered in practice.

## **REHABILITATION MEDICINE**

#### Pre-Occupational Therapy Clerkship (2) 290 AWSp JOHNSON

Supervised observations and work participation with patients in local occupational therapy clinics concurrent with lectures on professional ethics concepts, and major roles of the therapist, and on elementary techniques of occupational therapy. Prerequisite, permis-

320-321 Medical Science (4-4) W,Sp Staff of Departments of Medicine, Obstetrics and Gynecology, Orthopedics, Pediatrics, Rehabilitation Medicine, Psychiatry, Radiology, Surgery, **Community Agencies Serving Various Disability Groups** 

Lectures in medical science fields related to: general surgery, obstetrics and gynecology, internal medicine, neurology, rehabilitation medicine, orthopedics, psychiatry, rheumatology, and roentgenology. Required for occupa-tional therapy students and physical therapy students, others by permission. Required for rehabilitation counseling students; others by permission.

## 332 Pathologic Physiology for Physical Therapists and Occupational Therapists (5) A

Emphasis on normal and pathologic physiology of the circulatory, respiratory, central nervous, and musculo-skeletal systems as basis for treatment in occupational therapy and physical therapy. Required for occupational

therapy students and physical therapy students, others by permission. Prerequisites, Biological Structure 301, Zoology 208 or 118.

#### 340 Spinal Orthotics (3) Sp SIMONS

Instruction in, and experience with, the use of orthotic components and materials, including layout, measurement, and fitting of orthoses for management of spinal pathology. Each student plans, fabricates, and fits orthoses for lumbar, dorsolumbar, thoracic, and cervical regions. Required for prosthetics and orthotics majors; others by permission.

## 341-342 Upper Extremity Prosthetics I, II (6-5) W.Sp

SIMONS

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.

## 343 Upper Extremity Orthotics (9) S SIMONS

Instruction in, and experience with, the use of orthotic components and materials. Students will evaluate and fabricate therapeutic and functional orthoses, including externally powered devices. Required for prosthetics and orthotics majors; others by permission.

## 380 Professional Relations in Occupational Therapy (2) AW

JOHNSON Study of fundamentals applicable to all areas of occupational therapy; relationships of physical therapy, occupational therapy, nursing, rehabilitation counseling, social service, and other allied services in carrying out the team concept of a complete rehabilitation program. Prerequisite, occupational therapy student.

#### Tests and Measurements in Physical 408 Therapy (4) Sp

HERTLING

Methods of performing, recording, and interpreting test procedures used in physical therapy; measurement of joint motion, evalu-ation of muscle strength through manual tests, and posture evaluation. Laboratory. Required for physical therapy students.

#### University Conjoint 410 Study of Interdisciplinary Evaluation and Management of Handicapped Children (3)

(See Interschool or Intercollege Programs.)

### 414 Psychological Aspects of Disability (3) AŴ

FORDYCE

Psychological processes underlying adjustment to disability; application of behavioral/anal-ysis systems in patient therapy management; effects of intellectual and perceptual deficit on patient performance and treatment strategies. Required for physical therapy students, others by permission. Prerequisite, Psychology 100.

#### 415 Undergraduate Seminar for Physical Therapy Students (1-2-2) AWSp CLAYSON

Basic principles of medical ethics; history, scope of physical therapy; relationships of physical therapy, occupational therapy, nursing, rehabilitation counseling, social service,

and other allied services. Required for physical therapy students; others by permission.

#### 416 Principles of Physical Therapy Administration (3) Sp TROTTER

nature of administration, economic The trends, operational policy, aspects of supervi-sion, ethical and legal influences applicable to a physical therapy department. Required for physical therapy students.

#### 420 Lower Extremity Prosthetics I (6) A SIMONS

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 adjust-able leg and duplication devices, as well as methods of suspension. Required for prosthetics and orthotics majors; others by permission.

#### 421 Lower Extremity Prosthetics II (11) W SIMONS

Instruction in stump casting, cast modifica-tion, socket fabrication, static and dynamic alignment, alignment duplication, and suspension system. Required for prosthetics and orthotics majors; others by permission.

#### 422 Lower Extremity Prosthetics III (6) Sp SIMONS

Instruction in, and experience with, the use of prosthetic components and materials, including casting techniques and alignment procedures used for hip disarticulation patients, and the Symes prosthesis. Required for prosthetics and orthotics majors; others by permission.

#### 423 Lower Extremity Orthotics (11) A SIMONS

Instruction in, and experience with, the use of orthotic components and material, including measurement and fitting of lower-extremity orthoses and shoe modifications to patients. Each student evaluates patients and plans, fabricates, fits, and checks out several ortho-ses. Required for prosthetics and orthotics majors; others by permission.

#### 425 Child Amputee Prosthetics (3) Sp SIMONS

Instruction in, and experience with, the use of special prosthetic components and materials, including measurement and fitting of the patient with congenital anomalies. Required for prosthetics and orthotics majors; others by permission.

### 427-428 Applied Prosthetics and Orthotics I, II (4-7) Sp,S

SIMONS

Further clinical experience in patient evalua-tion, planning, fabricating, and fitting of pros-thetic and orthotic devices, and attendance at prosthetics and orthotics clinics at University Hospital and University-affiliated Seattle hospitals. Experience in immediate postoperative prosthetics. Required for prosthetics and orthotics majors; others by permission.

#### 442 Advanced Kinesiology (4) Sp LEHMANN

Study of joint motion and muscle function in relation to both the normal and abnormal state. Specific technics employed in the field of physical medicine and rehabilitation are analyzed. Required for occupational therapy

and physical therapy students; others by permission.

#### 444-445 ' Function of the Locomotor System (3- or 4-)-(-3 or -4) A,W LEHMANN

Functions of musculo-skeletal system as applied to normal and pathologic patterns of motion. Emphasis on upper extremity, shoulder girdle, lower extremity, and trunk. Anatomy of peripheral-vascular and peripheral-nervous system. Required for occupational therapy students and physical therapy stu-dents; others by permission. Prerequisites, Biological Structure 301, Zoology 208 or 118.

## 446, 447 Anatomy Laboratory for Occupational Therapists (1,1) A,W

permission.

NYSTROM Study of musculo-skeletal, peripheral-vascular, and peripheral-nervous systems from prosected material. Concurrent with 444-445. Required for occupational therapy students; others by permission.

## 451, 452 Anatomy Dissection for Physical Therapists (1,1) A,W

CLAYSON Dissection of musculoskeletal, peripheralvascular, and peripheral-nervous systems. Required for physical therapy students; others by

## 453 First-Year Clinical Elective in Physical

Medicine and Rehabilitation (3) AWSp Emphasis on comprehensive evaluation of the patient, his disability, and the interaction of the patient and his disability with his environment. Experience in the use of physical therapy for various disabilities, discussion of the psychological aspects of disability, and the evaluation of the patient for ability to function will be included. (10 weeks.)

#### Second-Year Clinical Elective in 454 **Physical Medicine and Rehabilitation** (15 or 18) WS MASOCK

Special emphasis on the technique of eliciting historical and physical evidence of ability of the patient to function in his environment. Topics will include transfer abilities, normal and abnormal gait, reambulation, communication disorders, modalities in physical medicine, psychological aspects of disability, learning aspects in chronic disease, vocational evaluation, principles of physical and occupational therapy, educational problems of the disabled, neuromuscular electrodiagnosis, braces, and prosthetics. Patients with stroke, amputation, spinal cord injury, arthritis; and multiple injuries will be followed. Patientcare responsibilities will be assumed by the student appropriate with his level. Prerequisites, Human Biology 423, 432.

#### 455 Neuromuscular Electrodiagnosis (2) AWS KRAFT

Lecture-demonstration of fundamentals of electromyography and peripheral nerve stim-ulation followed by student participation in clinical electrodiagnosis examinations. An effort will be made to develop in the student an awareness of the usefulness of these tests so that he will, in the future, know when such procedures are indicated for his patients and will be able to interpret the results rather than to develop proficiency in performing these examinations. Prerequisite, Human Biology 460.

#### 456 Clinical Biomechanics and Kinesiology (3) Sp LEHMANN

The physical and mechanical properties of the musculoskeletal system will be discussed. Mechanical principles used in the functional replacement using ambulation aids, braces, and prosthesis will be reviewed. Emphasized will be the basic understanding of the biomechanical principles involved, as well as discussion of the clinical application, as they relate to normal and abnormal patterns of motion. The development and correction of deformities is discussed. Prerequisite, Human Biology 460.

#### **Operant Methods in Management of** 457 **Chronic Disease and Chronic Pain** (3) A

FORDYCE

Demonstrates the place of learning concepts in understanding chronic disease and disability, reviews operant theory and methods, and provides limited practicum in their application. Prerequisite, Human Biology 460.

## 460- Beginning Physical Therapy

Procedures (2-) A BERNI, HERTLING

Introductory principles and concepts related to clinical physical therapy. Laboratory and clinical practice of basic physical therapy procedures in hydrotherapy. Application of phy-siological principles to clinical procedures. Prerequisite, physical therapy student.

## -461 Beginning Physical Therapy Procedures (-2) ₩

HERTLING

History of massage, methods of application, indications and contraindications, and physiological effects on various systems of the body. Laboratory. Prerequisite, physical therapy students.

## 463 Modality Treatments (3) Sp

Theory, technique, demonstration, and practice in the use of the physical agents employed in physical therapy which include thermotherapy, actinotherapy, hydrotherapy, low-frequency and high-frequency currents. Re-quired for physical therapy students.

## 466-467 Advanced Biophysical and

## Physiological Effects of Modalities (2-2) A,Ŵ

LEHMANN

Biophysical principles of equipment employed in physical therapy, physiological effects produced. Required for physical therapy students; others by permission.

#### 468 Therapeutic Activities I (1-4) AWSp JOHNSON

Laboratory study of the use of arts, recreation, and audiovisual aids, with emphasis on their therapeutic application to occupational therapy. Prerequisite, occupational therapy student.

#### 469 Therapeutic Activities II (1-3) AWSp JOHNSON

Laboratory study of special skills in occupational therapy adjusted to meet the needs of the individual student. Prerequisite, occupational therapy major.

#### 470-471-472 Therapeutic Exercise (3-5-2) A,W,Sp TROTTER

Methods of application, physiologic and therapeutic effects of exercises commonly used for treatment purposes in physical therapy. Opportunities are provided for supervised clinical practice of skills, and special attention is given to correlation of technics to appropriate age level and handicap. New developments from the field are analyzed and evaluated. Required for physical therapy students.

## 473 Administration and Supervision in Occupational Therapy (3) W

Designed to introduce principles of organizing an occupational therapy department, its basic administrative principles and procedures, and an understanding of the functions of supervision. Prerequisite, occupational therapy student.

## 474 Pre-Vocational Evaluation and Exploration (2) W

NYSTROM

The study of various types of pre-vocational programs; evaluation techniques, training procedures, and other considerations pertinent to job placement. Prerequisite, occupational therapy student.

#### 475 Physical Restoration (4) A HERTLING

Instruction in theory and methods of physical restoration of the severely handicapped patient. Laboratory demonstration, practice, and supervised clinical practice in: selection, care and use of wheelchairs, crutches, canes, walkerettes, and other assistive devices; special' problems in the area of activities of daily living. Required for physical therapy students.

## 476 Prosthetic and Orthotic Evaluation and Use (2) A

SIMONS

Instruction in mechanical component substitution for functional losses. Emphasis is on biomechanical principle, prosthetic components, and alignment and fitting techniques. Required for physical therapy and prosthetics and orthotics students; others by permission.

#### 477 Group Techniques (2) W NYSTROM

Experience in knowledge and understanding of self, group, and organizational behavior through participation in a learning group and through observation of patient groups. Focal point will be directed around the use of activities. Prerequisite, occupational therapy student.

#### 479 Rehabilitation Medicine Information in Speech Pathology (3) A BOLLINGER

Orientation information for speech pathology and audiology students on rehabilitation principles and techniques. Offered jointly with the Department of Speech as Speech 452. Lecture and clinical observation in all areas of rehabilitation, emphasizing cooperation and coordination of various professions in rehabilitation.

#### 481 Principles in Occupational Therapy in Psychiatry (5) Sp

Preparation for defining, evaluating, planning and administering an effective treatment program in psychiatric occupational therapy. Theories, treatment methods and media, and current research are explored. Clinical observations and practice under supervision required. Prerequisite, occupational therapy student.

#### 482 The Process of Development (3) W JOHNSON

Classroom and laboratory study of the development of man from infancy through old age, from the physical, psychosocial, perceptualmotor, cognitive, and cultural aspects. Emphasis is on developmental stages. Prerequisite, occupational therapy student.

#### 483, 484 Principles of Occupational Therapy in Physical Disabilities (4,3) ASp NYSTROM

Emphasizes the total rehabilitation of the physically disabled patient. Includes Jaboratory demonstrations, and practice in assessment techniques, prosthetics, orthotics, and activities of daily living. New developments from the field are analyzed and evaluated. Prerequisite, occupational therapy major.

#### 485 Basic Rehabilitation Medicine (3) AW STOLOV

Combined outpatient, inpatient, and consultation experience, where the human organism is studied as a social being. The concept of disease is broadened to include the external environment. The student learns the functional consequences in the environment of disease of impairment, the need for modifying the environment to support maximal function, and the impact of the illness or the disability on the people around the patient, in his environment. The concern is with the relationship of disability to work, social functioning, and leisure time. Prerequisite, Human Biology 460.

#### 486 Rehabilitation Medicine Clerkship-Pediatrics (6 or 9) AWS STOLOV

Clerkship experience in the specific rehabilitation approaches for the disabling pediatric diseases. Includes school planning, family counseling, and community support services. The 6-credit (four-week) package is an inpatient experience. The 9-credit (six-week) package includes, in addition, a two-week clinic and consultation experience. Prerequisite, Human Biology 460; Pediatrics 465 recommended.

## 487 Rehabilitation Medicine Clerkship-Medical (6 or 9) AWS

STOLOV A clerkship experience for medical students in the specific rehabilitation approaches for the various "non-surgical" diseases. Designed primarily for those interested in the medical, (i.e., nonsurgical) specialties, and tailored to the individual student's requirements. Prerequisite, Human Biology 460.

#### 488 Rehabilitation Medicine Clerkship— Surgical (6 or 9) AWS

A clerkship experience in the specific rehabilitation approaches for the various surgical problems. Designed primarily for those interested in the surgical specialties and tailored to the individual student's requirements. Prerequisite, Human Biology 460. (6 weeks.)

#### 489, 490, 491 Clinical Clerkships in Physical Therapy (2,3,4) A,W,Sp TROTTER

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.

#### 492 Occupational Therapy Clinical Internship—Physical Disabilities (6) AWSpS LUCCI

Three months of directed and supervised clinical practice in Occupational Therapy Clinics of the University Hospital or other affiliated hosiptals. Required for occupational therapy students.

#### 493 Occupational Therapy Clinical Internship—Pediatrics (2) AWSpS LUCCI

Two months of directed and supervised clinical practice in occupational therapy clinics. Required for occupational therapy students.

#### 494 Occupational Therapy Clinical Internship—Psychiatry (1-6, max. 6) AWSpS LUCCI

Three months of directed and supervised clinical practice in Occupational Therapy Clinics of the University Hospital or other affiliated hospitals. Required for occupational therapy students.

## 495 Clinical Affiliation in Physical Therapy (5) S

TROTTER

Twelve to fifteen weeks with 600 minimum working hours. Clinical application of physical therapy techniques under supervision in affiliated hospitals. Required for physical therapy students.

#### 496 Rehabilitation Medicine Outpatient Clinics (3) AW STOLOV

A rehabilitation medicine outpatient clinic experience, two half-days per week, emphasizing continuing care of the patient with chronic disease and disability in order to maintain optimum health and function. Evaluation of new patient for inpatient or outpatient management, and use of physical treatment for ambulatory pain and motion problems also will be stressed. Designed for those interested in family practice and internal medicine. Prerequisite, Human Biology 460.

#### 497 Rehabilitation Medicine Special Electives (\*) AWSpS LEHMANN

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 students of possible opportunities. 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.

## 498 Undergraduate Thesis (\*)

LEHMANN Prerequisite, permission.

#### 499 Undergraduate Research (\*) AWSpS LEHMANN

Students are given the opportunity to participate in clinical and basic research under the direct supervision of an instructor. Topics presently under study are: physiology of the locomotor system, effects of physical agents, and psychosocial-vocational aspects of disability. Common methods of the quantitative approach to basic and clinical problems as used in physical medicine and rehabilitation will be taught. Opportunities are given for the use of these methods in solving a research project. Prerequisite, permission.

## **Courses for Graduates Only**

#### 510 Somatopsychology: Psychological Aspects of Disability (3) Sp FORDYCE

Psychological adjustment to disability; techniques of milieu management; application of conditioning techniques to treatment structuring; effects of intellectual and perceptual deficit; rehabilitation team management. Elective for majors.

#### 520 Seminar (1-5) AWSp

Conferences, seminars, discussions of advanced physical medicine and rehabilitation topics for residents and postdoctoral fellows in physical medicine and rehabilitation. Lectures, discussion, and laboratory work in selected aspects of occupational therapy appropriate to elected area of study for candidates for Master of Occupational Therapy degree. May be repeated for credit.

## 522 Neurophysiological Basis for Neuromuscular Re-education (2) Sp

ANDERSON A review of traditional neurophysical concepts and an exposition of recent advances in neurophysical research related to the practice of physical medicine. The mechanisms underlying facilitation techniques and other techniques used in neuromuscular reeducation will be elucidated, and various techniques will be compared and evaluated. Prerequisites, resident M.D. status and permission.

#### 530 Medical Aspects of Vocational Counseling (3) A MOTT

Introduction to vocational implications of physical and emotional disabilities. Methods, counseling techniques, therapeutic modalities, community resources used in producing vocational assistance for the handicapped. Prerequisite, resident in rehabilitation medicine.

#### 532 Clinical Affiliation for Rehabilitation Counselors (5-6) A

Under the general preceptorship of the rehabilitation counseling professional staff, the student counsels and evaluates patients who have severe physical, emotional, and/or social problems, arranges for and administers vocational testing, obtains placement on job stations and works with community resources in planning for vocational/educational placement after followup, and develops activityoriented schedules. Prerequisite, permission.

#### 533 Clerkship in Psychology of Behavior Change for Occupational Therapists (5, max. 10) A

Clerkship in application of occupational therapy techniques in a nonmedical setting. Prerequisite, permission.

#### 534 Normal Developmental Sequencing in Occupational Therapy (3) A

Study of the motor, perceptual, cognitive, and social skills of the child from birth to ten years. Laboratory experiences include use of assessment tools and techniques, and detection of perceptiveness of parents' concerns. Prerequisite, permission.

## 535 Physical Medicine and Rehabilitation Administration (2-5) AWSpS

Comprehensive analysis of the development of administrative processes in rehabilitation medi-

cine. Theory and application in administrative and supervisory principles. Introduction of practical experience in clinical and academic situations. Offered to residents and postdoctoral fellows in physical medicine and rehabilitation. Offered for Master of Occupational Therapy degree candidates.

## 540 Application of Measurement Systems (2) AWSp

SAND

Introduction to, and clinical application of, basic measurement concepts, pertinent to rehabilitation therapy. Prerequiiste, permission.

#### 542 Assessment and Treatment of the Motor-Delayed Child in Occupational Therapy (3, max. 9) A

Seminar and clinical practicum concerned with the evaluation and therapy of the motor, perceptual, and adaptive skills of neurologically impaired and mentally retarded children. Prerequisites, 414, 540, 534, and permission.

#### 543 Biomechanics Basic to Therapeutics in Physical Medicine (3) Sp LEHMANN, SIMONS

The physical and mechanical properties of the musculo-skeletal system will be discussed. Mechanical principles in the functional, replacement, using ambulation aids, braces, and prosthesis, will be reviewed. Emphasis will be on basic understanding of the biomechanical principles involved, as well as on detailed discussion of clinical application at the level of residents and academician trainees. Prerequisite, resident in rehabilitation medicine; others by permission.

#### 546 Rehabilitation Nursing Seminar I (3)

Analysis of selected theoretical components underlying rehabilitation and utilization of scientific rationale in clinical nursing studies, with emphasis on prevention and maintenance. Library research and field study are required. Offered jointly with the School of Nursing as Nursing 546. Prerequisite, graduate standing.

#### 547 Rehabilitation Nursing Seminar II (3) Reconceptualization of theories of rehabilitation through study of patients with a variety of disabilities, with emphasis on supportive aspects. Library research and field study are required. Offered jointly with the School of Nursing as Nursing 547. Prerequisite, 546.

#### 548 Rehabilitation Nursing Seminar III (3) Assessment of the nursing problems and direction of nursing therapies for groups of patients with a variety of disabilities, with special emphasis on restorative needs. Library research and intra- and interdisciplinary conferences will be included. Offered jointly with the School of Nursing as Nursing 548. Prerequisites, 546 and 547.

## 549 Rehabilitation Nursing Seminar IV (6)

Evaluation of nursing therapies used for rehabilitative problems in a variety of settings. Communication of pertinent rehabilitation nursing interventions. Library research and field study are required. Offered jointly with the School of Nursing as Nursing 549. Prerequisites, 546, 547, and 548.

#### 550 Electromyography for Occupational Therapists (3) AWSp

Introduction to clinical electromyography methods as a research tool through lectures, demonstrations, and practice sessions. Prerequisite, permission.

### 568 Biophysics as Applied to Physical Medicine (2) A

LEHMANN

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 in rehabilitation medicine; others by permission.

## 596 Electromyography and Electrodiagnosis (3) S

KRAFT

Comprehensive didactive course covering all aspects of clinical electromyography and electrodiagnosis. The course is given in two parts, the first covering basic neurophysiology and the second covering clinical electromyography, with emphasis on disease states. Prerequisite, residency in rehabilitation medicine; others by permission.

#### 597, 598, 599 Electromyography and Electrodiagnosis Laboratory (1,1,1) A,W,Sp KRAFT

Elective work in clinical electromyography and other electrodiagnostic methods. Prerequisite, residency in rehabilitation medicine; others by permission.

600 Independent Study or Research (\*) AWSpS

700 Master's Thesis (\*) AWSpS

## SURGERY

#### 465 Clinical Clerkship (\*, max. 16) AWS CANTRELL

Student is introduced to the diagnosis and the management of problems amenable to surgical therapy. A comprehensive program is offered that includes instruction in the physiological basis of surgical care, differential diagnosis and decision making, and the basic principles of surgical management. Active participation in the care of inpatients and outpatients, including participation in the operating rooms, provides practical experience in the application of these skills. Students are assigned to the surgical service of one of the major affiliated hospitals. Approximately twelve hours per week are devoted to seminars, conferences, and teaching rounds. The remainder of the time is spent working with assigned patients on the ward or in outpatient clinics, in the operating rooms, or in study. Students serve a significant role as a part of the total patient-care team. The course is designed to be of value to all students, regardless of their ultimate interests. The information presented serves as a basic fund of knowledge concerning an important therapeutic modality for nonsurgeons, and as a base for further study for prospective sur-geons. Prerequisite, Human Biology 460. (6 weeks, full time.)

## 481 Peripheral Vascular Disease (3 or 6) AWSp

## STRANDNESS

An intensive, in-depth look at peripheral arterial and venous problems. This will include: (1) methods of clinical evaluation; (2) new diagnostic procedures; and (3) the available methods of treatment. The emphasis will be on active student participation in patient workup, performance of diagnostic studies, and presentation of case material to the staff. Two seminars will be held weekly with the staff to discuss the pathophysiology of vascular disease. Texts will be provided on a loan basis to the students. These will cover the entire field and should serve as useful source material for the student. Prerequisite, Human Biology 460.

#### 482 Externship in General Surgery (\*) AWSpS CANTRELL

Permits the student to develop further his knowledge of surgical disease and to enhance his ability to manage comprehensively the problems encountered in surgical patients. Students function at the intern level under close supervision of the staff and house staff. Diagnosis, preoperative care, and postopera-tive care are stressed. The management of surgical emergencies and outpatient follow-up of discharged patients are included. The ex-tern attends all operative procedures on his assigned patients and participates in all rounds and teaching conferences. This course provides an opportunity for the student to perfect his clinical skills in dealing with medical, as well as surgical, problems and permits him to assume added responsibility. It should be of value as preparation for internship. particularly for the surgically oriented student. Prerequisite, 465. (4 or 6 weeks, full time.)

#### 483 Pediatric Surgery (9) AWSp STEVENSON

Students participating in the elective clerkship of pediatric surgery will be based primarily at Children's Orthopedic Hospital and Medical Center. Instruction will stress surgical conditions peculiar to the particular age group. There will obviously be a preponderance of various congenital and neoplastic conditions which are amenable to surgical treatment. It is desirable, therefore, that students who plan to take this elective prepare themselves by acquiring a reasonable background of knowledge in human embryology and genetics. Prerequisite, 465.

#### 484 Trauma and Emergency Care (\*) AWSp HESSEL

Students will be assigned one week in the Emergency Department of Harborview Medical Center and one week in the Emergency Department of either Virginia Mason Hospital or Overlake Memorial Hospital. Patients with acute illnesses or trauma will be evaluated and treated in the initial evaluation and emergency room. Weekly seminars with the surgical faculty will cover the subjects of resuscitation, shock, trauma, and delivery of emergency medical care. Prerequisite, Human Biology 460. (2 weeks, full time.)

#### 485 Cardiovascular Surgery (\*) AWSpS WINTERSCHEID

Students actively engage in the care and treatment of inpatient and outpatient surgical cardiovascular cases. They will work closely with the cardiovascular team on preoperative diagnostic studies, in the operating room, and postoperative patient care. Prerequisite, 465. (6 weeks, full time.)

#### 486 Plastic Surgery Clerkship and Preceptorship (\*) AWSpS DEVITO

Students participate in all activities of plastic surgery service and staff at University Hospital and affiliated services. This includes patient workups, case presentations, operating room experience, and patient contact in the clinic. Prerequisite, Human Biology 460.

#### 497 Surgery Special Electives (\*) AWSpS CANTRELL

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 students of possible opportunities. Students wishing to elect this course should obtain from the dean's office a "Special Assignment" form at least one month before preregistration. Prerequisites, 465 and departmental permission. (4, 6, or 12 weeks, full time.)

#### 498 Undergraduate Thesis (\*) AWSpS CANTRELL

Offered to those students who have engaged in undergraduate research in general surgery. Prerequisite, permission.

#### 499 Undergraduate Research (\*) AWSpS CANTRELL

Provides the student with an opportunity to participate in ongoing research projects in general surgery being carried out by members of the faculty of the Department of Surgery or to carry out an independent research project under supervision. Practical experience in experimental design and execution is provided under the direct supervision of a selected faculty member. Analysis of results and formulation of a report are included. The experience gained in experimental techniques and equipment depends upon the project chosen. This course should be of value to any student, regardless of his goals, but should be of particular importance to academically oriented individuals. Prerequisite, permission.

## **Courses for Graduates Only**

#### 520 General Surgery Seminar (5) AWSpS DILLARD, FLETCHER, MARCHIORO,

MERENDINO, STEVENSON, WINTERSCHEID Conferences, seminars, and round-table discussions of advanced surgical topics, related sciences, and recent literature in the field. Prerequisite, medical student or graduate student. May be repeated for credit.

#### 525 Seminar in Plastic and Maxillofacial Surgery (\*) AWSp DEVITO

One two-hour session per week will be devoted to a discussion of principles, practice, and scope of plastic and maxillofacial surgery. Elective for senior medical students and graduate students. Prerequisite, permission of department.

Conjoint 585 Surgical Anatomy (1-3, max. 12) (See Conjoint Courses.)

#### 590 Surgical Experimental Techniques (5) AWSpS

DE VITO, DILLARD, FLETCHER, MARCHIORO,

MERENDINO, STEVENSON, WINTERSCHEID Basis for graduate research and advanced thesis work including supporting surgical laboratory techniques. Prerequisite, medical student or graduate student. May be repeated for credit.

600 Independent Study or Research (\*) AWSpS

700 Master's Thesis (\*) AWSpS

## UROLOGY

#### 475 Urology Preceptorship (\*) AWSpS MC ROBERTS

Students will follow a preceptor in all of his work in order to better understand the pathophysiology and management of the problems of the urogenital system and to become acquainted with the office management of urological problems. Prerequisite, Human Biology 450. (2 or 4 weeks.)

#### 480 Urology Clerkship (\*) AWSpS MC ROBERTS

Student participates in the full activities of the clinical service, which includes both outand in-patients, principally the latter. Basic principles of urology are emphasized: infection, obstruction, trauma, tumors, stones, male fertility, renovascular hypertension, and pediatric urology. In addition to participation in seminars during the first two weeks, at the end of the clerkship the student will give a ten-minute talk on a urologic subject of his choosing. Prerequisite, Human Biology 450 or Surgery 465. (2 or 4 weeks.)

#### 485 Urology Subinternship (6 or 8) AWSpS MC ROBERTS

Subintern is responsible for patient workups, and for pre- and post-operative care and participates in the operating room at his level of competency and training. He participates in ward rounds and urology conferences at selected hospitals. Participating individuals should be prepared to work hard and, in turn, expect comparable dividends beyond those of the standard clerkship. Prerequisites, Surgery 465 and Medicine 465 or Pediatrics 465.

## 497 Urology Special Electives (\*)

ANSELL

By special 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 students of possible opportunities. 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. (6 or 12 weeks)

#### 498 Undergraduate Thesis (\*) AWSpS MC ROBERTS

Provides an opportunity for medical students to write theses in the area of urology. Prerequisite, permission of sponsor and Department.

#### 499 Undergraduate Research (\*) AWSpS MC ROBERTS

The student participates in current urologic research projects under supervision of fulltime staff. Certain specific problems may be elected by the student. Elective for medical students. Prerequisites, permission of sponsor and department.

# SCHOOL OF

## Courses for Undergraduates (Majors only)

227 Nursing Fundamentals (2) A ATWOOD, GARNER, HARLOW, INNES, KELLOGG, NILAND, SAXON, TRAVIS

INNES, KELLOGG, NILAND, SAXON, TRAVIS Introduction to nursing, the nurse's role, and the possible effects of illness and hospitalization on the patient. Introduction of concepts of medical asepsis and basic human needs with emphasis on selected physiological needs. Concomitant nursing skills are learned with application of body mechanics and work organization. Two hours lecture-demonstration, two hours laboratory weekly. Prerequisite, sophomore standing.

## 228 Nursing Fundamentals (2) W

## ATWOOD, GARNER, HARLOW,

INNES, KELLOGG, NILAND, SAXON, TRAVIS Effects of illness on the person. Selected basic nursing skills to meet the needs of the sick person. Concepts from the social and natural sciences serve as a foundation for learning the selected nursing activities of this course. Nursing knowledge gained in 227 and in this course is applied in nursing care activities with the noncritically ill and convalescent hospital patient. Two hours lecturedemonstration, three hours clinical laboratory weekly. Prerequisites, 227, Conjoint 316, Chemistry 101, 102.

#### 229 Nursing Fundamentals (3) Sp ATWOOD, GARNER, HARLOW,

INNES, KELLOGG, NILAND, SAXON, TRAVIS Continued development of the role of the nurse in meeting patients' needs, including selected technical, interpersonal, and therapeutic nursing activities. Previously learned concepts, principles, and skills are applied throughout the course. Two hours lecturedemonstration, six hours of clinical laboratory weekly. Prerequisites, 227, 228, Conjoint 316, 317-, Microbiology 301, Chemistry 101, 102.

#### 260 Scientific Principles Basic to Nursing (2) Sp

CRAVEN, GOHRKE

Basic principles of pathologic change and implications for nursing. Major units of the course are: introduction to homeostasis in health and disease; circulatory disturbances and resultant body responses; inflammatory response to injury; cellular responses to stress; neoplasms and the body's response; and neuroendocrine response to stress. Prerequisites, sophomore standing in School of Nursing, organic and inorganic Chemistry 101, 102, Microbiology 301, Conjoint 316, 317- (taken concurrently with -318).

#### 298 Introduction to Normal Growth and Development (2) WS

Basic concepts and theories related to the physical, emotional, social, and cognitive development of children from infancy through preschool are considered. The student is directed to apply basic developmental knowledge to observation and assessment of children with concurrent implications of caretaking, and/or child health supervision stressed. Prerequisite, junior standing. Taken concurrently with 368 or 370.

## 299 Introduction to Normal Growth and Development (2) ASp

Basic concepts and theories related to significant physical, emotional, and environmental factors in the developmental period from school age to young adulthood are emphasized. The student is introduced to major developmental deviations associated with learning and behavior. Prerequisites, junior standing, and 298.

## 301 Principles of Patient Teaching (3) WS

Designed to provide the nursing student with

some fundamental concepts of the learning and teaching processes as they apply to nursing practices. The laboratory sections are utilized to assist students in applying the concepts to the planning for teaching patients, family members, or auxiliary nursing personnel. One hour laboratory weekly.

#### 351 Changing Concepts of Professional Nursing (4) ASp CARNEVALI

An exploration of current concepts of nursing and nursing education including present and potential roles, responsibilities and required competencies of professional nurses in our society. Prerequisite, junior year in the registered nurse curriculum pattern.

#### 353 Scientific Basis for Nursing Actions (3) WS

NILAND, SHARP

Homeostasis, particularly as related to fluid and electrolyte balance, is used as an organizing concept in determining nursing actions in preventing, correcting, and controlling disease. Prerequisites, 351, and junior year in the registered nurse curriculum pattern.

## 354 Comprehensive Maternal-Child Nursing (4) ASp

ROSB

Current theories, concepts, and principles applicable to maternal-child nursing. Emphasis on application of relevant principles from the humanities, natural and social sciences, and psychiatric nursing. Prerequisites, junior year in the registered nurse curriculum pattern, and 353. Six hours clinical laboratory weekly.

### 356 Comprehensive Medical-Surgical Nursing (4) WS

CARNEVALI, INNES

Theories, concepts and principles in assessing, planning and evaluating the nursing care of selected adult medical-surgical patients. Emphasis on prevention, rehabilitation, continuity of care, and application of science principles. Six hours of clinical laboratory weekly. Prerequisites, junior year in the registered nurse curriculum pattern, and 351 and 353, or 353 concurrently.

## 358 Psychiatric Concepts for Nursing Actions (4) ASpS

AANDERUD, MINCHIN

Theory and clinical experience in application of selected concepts in interactions with patients with specific emotional problems. Course serves as transition from technical to professional education in application of interpersonal concepts in nursing interventions. Builds on student's knowledge of personality development, psychopathology, and psychodynamics of human behavior including interpersonal relations and communication skills. Student's responsibility for nursing diagnosis and action in meeting the emotional needs of patients is emphasized. Six hours of clinical laboratory weekly. Prerequisites, junior year in the registered nurse curriculum pattern, and 353.

#### 367 Family-Centered Maternal and Infant Nursing (4) AWSpS WILLIAMS

Basic concepts and nursing principles in family-centered maternity care of women before, during, and after childbirth, and infants in the neonatal period. Prerequisites, junior year in the basic nurse curriculum pattern and 368 taken concurrently.

## 368 Laboratory in Maternal and Infant Nursing (5) AWSpS

PERRY, TOTTEN, WILLIAMS, YOUNGBERG Utilization of basic concepts and nursing principles in providing family-centered nursing for women before, during, and after childbirth, and for infants in the neonatal period. Fifteen hours laboratory experience per week. To be taken concurrently with 367.

## 369 Family-Centered Nursing of Children (4) AWSpS

NAKAO Basic concepts and nursing principles in family-centered care of children. Emphasis on health needs of children and families from infancy through adolescence. Includes health supervision and common illnesses and disabilities. Prerequisites, junior year in the basic curriculum pattern and 370 taken concurrently.

#### 370 Laboratory in Nursing of Children (5) AWSpS

BRINTON, BROWN, NAKAO, TRAVIS Utilization of basic concepts and nursing principles in providing family-centered nursing for children in health supervision and during illness and disability. Fifteen hours laboratory experience per week. To be taken concurrently with 369.

#### 371 Principles of Medical-Surgical Nursing (4) WS

BLASCHKE, BOOZER, HAFERKORN Understanding of the scientific and nursing facts and principles that can be used to identify appropriate nursing interventions when caring for patients with selected medical and surgical conditions. Prerequisites, junior year in the basic curriculum pattern, 229, 260, and basic science courses, or permission. To be taken concurrently with 372.

#### 372 Medical-Surgical Nursing Practice (5) WS

AULD, BLASCHKE, BOOZER, BRUNO, CRAVEN,

GARNER, GOHRRE, HAFERKORN, HEATH Application of scientific and nursing principles to the care of adult medical and surgical patients. The problem solving approach is used with the major emphasis placed on helping the student learn how to analyze and interpret information she obtains from her own observations and other sources, decide on a course of action, carry out the plan, and evaluate the outcome. Patient care and clinical conferences are selected to coordinate with the content of 371. When feasible, patients are assigned for a number of days so that changes may be observed and the effect of care evaluated. Three weeks' experience in the operating room in this course or in 374. Prerequisites, junior year in basic curriculum pattern and 371 taken concurrently.

#### 373 Principles of Medical-Surgical Nursing (4) ASp

BLASCHKE, BOOZER, HAFERKORN Understanding of the scientific and nursing principles essential to effective nursing care

principles essential to effective nursing care of patients with selected medical and surgical conditions. The major emphasis is placed upon using knowledge about the patient, his illness, and his treatment to determine actions that can be taken to help the individual patient. Prerequisites, junior year of the basic curriculum pattern, 371 and 372, or permission. To be taken concurrently with 374.

#### 374 Medical-Surgical Nursing Practice (5) ASp

AULD, BLASCHKE, BOOZER, BRUNO, CRAVEN,

GARNER, GOHRKE, HAFERKORN, HEATH The broad aim is to help the student apply scientific and nursing principles to the care of adult medical and surgical patients. The identification of common elements and significant differences in the care of complex medical-surgical patients is stressed. The problem-solving approach is continued. Pa-tient care and clinical conferences are selected to coordinate with the content of 373. Three weeks' experience in the operating room in this course or 372. Fifteen hours weekly clinical laboratory. Prerequisites, junior year in the basic curriculum pattern, 371 and 372, or permission. To be taken concurrently with 373.

## 409 History and Trends of Nursing (3) AWSp

GRAY, SHARP

History of nursing from antiquity to the present with emphasis on the trends influencing nursing and including study of the professional nurse and her responsibilities in the modern world. Prerequisite, senior standing in the School of Nursing.

#### University Conjoint 410 Study of Interdisciplinary Evaluation and Management of Handicapped Children (3) AWSp

(For course description, see Interschool or Intercollege Programs.)

#### 412 Scientific Principles in Nursing Care (3) AWSpS

BRANDT, HAY, INNES

An undergraduate seminar devoted to critical analysis of selected nursing situations, with identification of the natural and behavioral science principles which guide nursing actions. Prerequisite, senior standing in the School of Nursing.

#### 413 Principles of Psychiatric Nursing (5) AWSpS

GEORGE, POULSEN

Concepts and principles of psychiatric-mental health nursing used in planning care of mentally ill patients. Psychological and socio-cultural dynamics of mental illness. Nursing approaches and interviewing techniques. The classification of mental illness, the signs and symptoms, and the treatment approaches are presented. Prerequisites, senior standing in the School of Nursing, and 414 taken concurrently.

#### 414 Psychiatric Nursing Practice (5) AWSpS BROWN, GEORGE, GRAVES, JOBBAGYI, KENNEY

Application of psychiatric-mental health principles and skills in the care of selected psychiatric patients. Fifteen hours clinical laboratory weekly. Prerequisites, senior standing in the School of Nursing and 413 taken concurrently.

#### **Community Health Nursing Principles** 415 (3) AWSpŠ

AAVEDAL, GOWELL

Concepts and principles of community health nursing used in analyzing and implementing health programs in family and community settings. Prerequisites, senior standing in the School of Nursing and Health Services 323.

## 416 Community Health Nursing Practice (5) AWSpS

COOMBE, GOWELL, JONES,

PESZNECKER, PITTMAN, STANDEVEN

Application of community health nursing

principles and skills in family and community health situations. Problem-solving and interpersonal relationship skills emphasized. Prerequisites, senior standing in the School of Nursing and 415 taken concurrently. Fifteen hours a week, including two hours of conference.

#### 420 Special Fields of Community Health Nursing (3-8) A CORB

Practicum devoted to nursing responsibilities in special fields such as school health nursing or occupational health nursing. Emphasis and credit of course varies with the interest and needs of the student. Weekly conference. Nine to twenty-four hours, including two hours of conference. Prerequisites, 415, 416, or equivalent, post-baccalaureate standing in the School of Nursing.

#### 421 Nursing Leadership (4) AWSp LITTLE

Major focus is directed toward the student's understanding of the leadership role of the professional nurse as a beginning practitioner in organized health care services. The leadership role of the professional nurse, changing trends in organized health care services in our society, and the change agent's role of the professional nurse are emphasized. Prerequisites, senior standing in the School of Nursing, and 422 taken concurrently.

#### Senior Clinical Nursing (6) AWSp 422

FITZGERALD, HEINEMANN, SHARP, WEILER, WORTHY

Experience in providing care for a group of patients with complex nursing care problems. Planning, directing, guiding, implementing and evaluating nursing care as an individual and as a member of the health care team. Eighteen hours clinical laboratory weekly. Prerequisites, senior standing in the School of Nursing, and 421 taken concurrently.

#### 429 Nursing Functions in Gerontology (2) AWSpŠ

BRUNO, BYERLY, STEPHENS

Aging as a normal developmental process; the problems of the aged; the community resources available; and the derivation of implications for nursing care of aged persons from gerontological concepts. Prerequisite, senior standing in the School of Nursing.

#### 499 Undergraduate Research (1-5, max. 5) AWSpS

Supervised individual research on a specific nursing problem. Prerequisites, junior-year standing in the School of Nursing, cumulative grade-point average of 3.00 or better, and permission of instructor.

## **Courses for Graduates Only**

### 430 Field Study in Maternal and Child Nursing (3) W

SPAULDING, VANDEMAN

Guided clinical experience in maternity nursing or in nursing of children with emphasis on the family. Includes diagnosing nursing problems, applying theoretical concepts, and evaluating results. A minimum of seven hours of guided experience weekly.

#### 431 Field Study in Maternal and Child Nursing (3) Sp

SPAULDING, VANDEMAN

The experience may be a continuation in the clinical area chosen in 430 or may be the

alternate area. A minimum of seven hours of guided experience weekly.

### 438 Practice Teaching in Maternal and Child Nursing (3) S

ROSE Guided experience in selected teaching-learning situations in clinical nursing. Identification, analysis, and solution of teaching-learning problems in clinical nursing. A minimum of seven hours of guided experience weekly. Prerequisites, 430, 524, 530.

## 440 Advanced Field Work in Medical-Surgical Nursing (3) AW

CROWLEY, MANSFIELD, WARE

Guided experience in diagnosing nursing problems, identifying rationales for implementing nursing therapy, and evaluating results in selected situations in the clinical specialty. The general aim is to develop abilities in critical analysis of nursing problems of pa-tients, in the design and implementation of plans of care, and systematic evaluation of outcomes of nursing actions. A minimum of seven hours of guided experience weekly.

#### 441 Advanced Field Work in Medical-Surgical Nursing (2) WSpS

CROWLEY, GIBLIN, MANSFIELD, WARE Continuation of 440. Guided experience in selected situations in area of clinical interest. A minimum of seven hours of guided ex-perience weekly. Prerequisite, 440 or permission.

#### 446 Practice Supervision in Nursing Service (3) S

GRAVES

Guided experience in supervisory functions. Identification, analysis, and solution of se-lected supervisory problems in clinical nursing.

#### Practice Teaching in Medical-Surgical 448 Nursing (3) SpS GEITGEY

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. A minimum of seven hours of guided experience weekly.

#### 450 **Advanced Field Work Community** Health Nursing (2) W JONES

Guided experience in identifying nursing problems, identifying rationales for implementing nursing therapy, and evaluating results in selected situations in community health nursing. An application of core concepts pre-sented in 523. A minimum of four hours of guided experience weekly. Prerequisite, 523.

## 451 Advanced Field Work Community Health Nursing (2) S

JÓNES

Continuation of 450, built on concepts from 550. Guided experience in selected situations in community health nursing. Course is planned jointly with students and focuses on the nurse role in community action for health. A minimum of four hours of guided expe-rience weekly. Prerequisites, 450 and 550 (to be taken concurrently).

#### 455 Practice Supervision Community Health Nursing (3) Sp JONES

Guided experience in supervisory functions. Identification, analysis, and solution of selected supervisory problems in community health nursing. A minimum of seven hours of guided experience weekly. Prerequisites, 450 and 451.

#### 456 Nursing Service Administration (3) W GRAVES

Considers philosophies, purposes, and elements of administration as applied to organized nursing services. Concepts related to administrative behavior, the organization and delivery of services, and the management of personnel are explored. Emphasis on critical analysis of current literature and analysis of administrative problems in nursing. Prerequisite, 524.

## 458 Practice Teaching Community Health Nursing (3) Sp

GOWELL

Guided experience in selected teaching-learning situations in community health nursing. Identification, analysis, and solution of teachinglearning problems. A minimum of seven hours of guided experience weekly. Prerequisite, 450.

#### 460 Seminar in Interpersonal Approaches in Nursing (2) W LARSON

Theoretical basis for interpersonal process in the treatment of maladaptive behaviors. Synthesis of nursing intervention, based on concepts in psychiatric nursing and in the social and behavioral sciences. Analysis of social, medical, and educative models for treating behavioral disorders and the rationale for use of medications in psychiatric treatment.

## 461 Behavioral Analysis Through Multi-Media (3) S

MAC ELVEEN

Consideration of various media through which behavior can be observed and recorded, identification of behavioral units and patterns for analysis; implications for therapy, education, and research are included. Laboratory experience focuses on the development and utilization of skills for recording overt behavior. Exploration of new approaches is encouraged.

#### 464 The Community and Mental Health: Theory and Research Foundations (3) A NAKAGAWA

Designed to examine the contributory factors related to mental illness and mental health. Undertaken will be comparison of numerous indices of mental illness and mental health, including those employed in cross-cultural studies. Conceptions of community will be contrasted and critiqued. The content will include the impact upon mental health and mental illness of values, ethnic and racial differences, social status differences, and other defined group dimensions. Natural, social groupings will be investigated and examined as a facet of community structure.

#### 465 Practice Supervision in Psychiatric-Mental Health Nursing (3) A LARSON

Guided experience in practice supervision in psychiatric nursing. Opportunity to supervise a nurse-patient relationship with assessment and written evaluation of the nurse's performance in the relationship. Literature on nursing supervision and consultation. A minimum of six hours of guided experience weekly. Prerequisite, 460.

#### 466 In-Service Education in Nursing (3) GRAVES

Planning, developing, and evaluating in-service programs in various institutions and agencies, seen as a part of continuing education of all nursing personnel. (Not offered 1972-73.)

## 467 Evaluation of Performance in Nursing (3) SpS

#### METZ

Philosophy and rationale of evaluation of nurses with administrative, teaching, and supervisory responsibility in various health agencies. The purposes of evaluation as they relate to guidance of students or staff toward personal satisfaction and growth in one's work, and to improved patient care.

#### 468 Practice Teaching in Psychiatric-Mental Health Nursing (3) A GRAVES

Guided experience in selected teaching-learning situations in clinical nursing. Identification, analysis, and solution of teaching-learning problems in clinical nursing. Evaluation of progress. A minimum of 6 hours of guided experience weekly. Prerequisites, 460 and 464.

## 470 Practicum in Interpersonal Approaches in Nursing (2-6) WSp

LARSON, MINCHIN

Supervised experience in working with individuals to aid them in prevention and resolution of their emotional problems. Guided experiences in individual therapy approaches are oriented toward assisting the individual to identify and alter maladaptive behaviors. Prerequisites, 460 or equivalent, completed or taken concurrently, and faculty member's permission.

#### 488 Effects of Alcohol and Its Relation to Health and Disease (3) ASp HEINEMAN, WOODSON

Intensive inquiry into the effects of alcohol on the total person with emphasis on the physiological effects, utilizing case studies, research reports and audiovisual materials. The focus will be on studying methods used in the assessment of patients, in patient management, and in evaluation of therapeutic intervention. Open to students in other disciplines. Prerequisite, permission.

#### University Conjoint 490 Social Sensitivity in Health Care (3) AWSp

(For course description, see Interschool or Intercollege Programs.)

## 495 Child Rearing, Culture, and Health (3) Sp

#### LEININGER

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 to study socialization practices and their relationship to cultural, social, and health systems of selected cultures. Offered jointly with the Department of Anthropology as ANTH 440. Prerequisite, permission.

#### 502 Applied Group Development Principles (3) AWSp

GEORGE, MINCHIN, POULSEN Evaluation of selected theoretical concepts relating to dynamics operating in groups; analysis of process and development of skills to increase group productivity through class and laboratory sessions.

#### 505 Seminar in Administration of Schools of Nursing (3) GRAY

Application of principles of administration to schools of nursing. Case method with discus-

sion and analysis of situations presented. (Not offered 1972-73.)

#### 506 Seminar in Nursing Service Administration (3) Sp

GRAVES Critical analysis of problems affecting the administration of nursing services. Intensive directed study of selected problems by small groups. Prerequisite, 456.

#### 507 Seminar in Family Treatment (2) AS NAKAGAWA

Analysis of literature on crisis, skills of intervention, and family structure and interaction. The family is seen as one example of a group, and family role relationships, role disruption, and interaction process are basic concepts by which families are to be assessed. Sociocultural forces external to the family are examined.

#### 508 Historical and Contemporary Perspectives in Personality Theories (3)

AW

MINCHIN Social history is examined as it influenced and was influenced by selected personality theories. A comparative analysis of psychoanalytic, learning; and philosophical personality theories with emphasis upon orientations

## 510 Curriculum Development in Nursing Education (3) WSpS

toward health, illness, and treatment.

WOLF

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. Includes developing a curricular plan in a simulated faculty group.

## 511 Psychosomatic Nursing (3) WS

AANDERUD, MINCHIN Seminar and clinical experiences centering on interrelationships of physical and emotional aspects of illness and development of principles of nursing care. A minimum of four hours of guided experience weekly.

#### 512 Community Mental Health: Strategies and Programs (2) W OSBORNE

Community mental health as the study of problems and the implementation of strategies to alleviate, invidious sociopsychological factors that afflict high risk mental illness populations. Preparation for community mental health nursing includes study of multidisciplinary relationships, community organization, and psychiatric traditions that inhibit or potentiate community mental health programs. Evaluation of community mental health programs and social action strategies are examined. Observations of community processes or agency activities relevant to understanding of community mental health nursing.

#### 513 · Seminar in Group Treatment (2) SpS LARSON

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.

#### 514 Practicum for Community Mental Health (2-6) WSp

NAKAGAWA, OSBORNE

Field study in community assessment and
social action relative to mental health. Experiences include the development and evaluation of community mental health programs through participation with community members, community groups, and practicing professionals. Prerequisite, 512.

## 515 Topics in Nursing and Pharmacy (2) Sp GRAVES, E. PLEIN Readings and discussions of assigned topics of

Readings and discussions of assigned topics of current interdisciplinary interest in the fields of nursing and pharmacy. Offered jointly with the College of Pharmacy as Pharmacy 515. Subject matter changes from year to year. Prerequisite, permission.

#### 516 Theory of Child and Adolescent Psychiatric Nursing (3) WSp BROWN, OSBORNE

Extension and refinement of child and adolescent psychiatric nursing; the psychodynamics and psychosocial maladaptions of childhood, adolescence and parenthood; behavior disorders, learning disorders, and organic conditions with concommitant emotional reactions. Seminars, lectures, and discussions will relate to assessing the psychodynamics of the various psychiatric and social disorders.

#### 517 Therapeutic Approaches: Child and Adolescent Psychiatric Nursing (2) SpS JOBBAGYI, NAKAGAWA

Content focuses upon exploration of primary and secondary prevention of emotional disturbances in children and adolescents as well as the role of the nurse in maintenance of mental health in families. Various treatment modalities will be examined. Prerequisite for 518, the theoretical foundation for the practicum, and may be taken prior to or concurrently with 518.

### 518 Practicum in Child and Adolescent Psychiatric Nursing (2, max. 6) SpS BROWN, JOBBAGYI, NAKAGAWA

Opportunity for the student to synthesize and reconceptualize knowledge essential to the care of emotionally disturbed children and adolescents and their families. Field study includes planning and implementing nursing interventions in a variety of community agencies. Prerequisite, 517.

#### 520 Methods of Research in Nursing (3) ASp BATEY, DISBROW, HOFFMAN, NAKAGAWA

Research process as it applies to nursing. Use of the literature in building theoretical rationale. Selection of appropriate methods. Presentation of findings. A minimum of two laboratory hours weekly. Prerequisite, a course in statistics.

## 521 Methods of Research in Nursing (2) WS

BATEY, DISBROW, HOFFMAN, NAKAGAWA Continuation of 520, with emphasis on methods of research applied to the solution of problems in all fields of nursing.

## 523 Seminar in Therapeutic Nursing Process I (3) AS

CROWLEY, JONES, PITTMAN, REEKIE, WORTHY

Analysis and synthesis of concepts relevant to therapeutic nursing based upon consideration of the dignity of man and selected aspects of theories related to the interaction process in nurse-patient relationships. Library research and field study and 2 laboratory hours weekly required.

## 524 Seminar in Nursing Leadership Processes (3) ASp

BENOLIEL, GRAVES

Considers the dynamic processes involved in leadership roles assumed by nurses in a variety of settings. Included in the course is an exploration of the complex human relationships integral to leader functions in the attainment of health goals. A minimum of two laboratory hours weekly.

## 525 Seminar in Therapeutic Nursing Process II (3)

Analysis and synthesis of concepts relevant to therapeutic nursing based upon a consideration of responses to crises and factors in health and illness. Library research and field study and a minimum of two laboratory hours weekly required. (Not offered 1972-73.)

#### 527 Practicum in Family Treatment (2-6) AWS

BROWN, GEORGE, JOBBAGYI, POULSEN Supervised experience as primary therapist or cotherapist in a family. Opportunities for primary and secondary intervention in family crises. Supervision provided by nursing faculty member. Prerequisites, 502, 507, or equivalent, completed or taken concurrently, and faculty member's permission.

## 529 Practicum in Group Treatment (2-6) ASpS

GEORGE, LARSON

Supervised experience working as primary therapist or cotherapist in a group. Opportunity is provided to practice selected therapeutic techniques in therapy groups. Supervision is provided by nursing faculty member. Prerequisites, 502, 513, or equivalent, completed or taken concurrently, and faculty member's permission.

#### 530 Theoretical Framework for Maternal and Child Nursing (4) A VANDEMAN

The theoretical basis for understanding nursing problems is explored in depth. A rationale is developed for making a nursing diagnosis and for assessing the role and function of nursing in the maternal and child nursing field.

## 535 Nursing the Child with Handicaps: Evaluation (3) A

POWELL

Progression from assessing normal growth and development to detection of developmental handicaps of children. Observing and assessing family functioning are integrated. Library research, individual conferences, and intensive field study (a minimum of 4 hours weekly) are further means by which objectives are implemented. Enrollment limited.

#### 536 Operant Techniques in Modification of Deviant Behavior (3) A O'NELL

Designed to help graduate students in nursing and other disciplines understand the principles of operant behavior, and their application to the problems of retardation and other forms of deviant development. In addition to their class work students will spend a short time in the laboratory in the application of principles. Enrollment limited. Prerequisites, a minimum of four laboratory hours weekly and permission.

# 537. Nursing the Child With Handicaps: Care Process (4) WS

Strengthening of competencies in the design.

implementation, and evaluation of the individualized nursing care of selected handicapped children and their families. Through the systematic study of case models and the analysis of specific case content, students seek to synthesize pertinent knowledge from sources in nursing, clinical medicine, and the behavioral and biological sciences, in order to formulate a frame of reference within which each can operate. Library research, individual conferences, and extensive field study (a minimum of eight hours weekly) are means by which objectives are implemented. Prerequisite, 535.

#### 538 Nursing the Child with Handicaps: Family Reactions (4) Sp POWELL

Development of evaluation skills for more effective nursing practices with family of the handicapped child. The special problems and conflicts within these families and possible adaptations to their circumstances are studied through systematic observation, assessment and evaluation of family development, patterns of living and coping behaviors. The implications for nursing are derived from the student's clinical experiences as well as from theoretical content and relevant research findings. Library research, individual conferences, and extensive field study (a minimum of eight hours weekly) are required. Prerequisites, 535, 537.

## 539 Nursing the Child with Handicaps: Community (2) S

Seminar focuses on the reconceptualization of the nurse as a clinical specialist who innovates effective nursing practice, provides leadership, and evaluates change. The planning, implementing, and evaluating of nursing practices for individuals or family units are compared and contrasted with programming for groups. Nursing responsibility for evaluating available resources, improving existing services and for activating potential resources will also be examined. Library research, individual conferences, and intensive study (a minimum of four hours weekly) are required. Prerequisites, 535, 537, and 538.

## 540 Seminar in Medical-Surgical Nursing (3) ASp

GIBLIN

Factors influencing the pathophysiology underlying selected manifestations of physical illness. Implications for nursing diagnosis and for nursing therapy.

## 542 Seminar in Cardiovascular Nursing (3) S GIBLIN

Systematic inquiry into the influence of physical and emotional factors on pathophysiology underlying selected cardiovascular conditions. Implications for management. The course is designed for nursing instructors, supervisors, consultants, and clinical specialists. Prerequisite, 540.

543 Seminar in Nursing in Gerontology (3) Gerontological research findings applied to complex nursing problems in maintenance of health and maximum functioning in the aged. Prerequisite, permission.

#### 545 Special Topics in Physiological Nursing (2 or 3, max. 10) AWSpS WALIKE

Guided survey of the experimental literature of major topics in physiological nursing. Course conducted as a seminar with analysis and discussion of selected topics and readings.

# NURSING

Implications for future research and health care will be emphasized.

## 546 Rehabilitation Nursing Seminar I (3) A HICKS

Analysis of selected theoretical components underlying rehabilitation and utilization of scientific rationale in clinical nursing studies, with emphasis on prevention and maintenance. Library research and field study (a minimum of seven hours weekly) are required. Offered jointly with the Department of Rehabilitation Medicine as Rehabilitation Medicine 546. Prerequisite, permission. (Not offered 1972-73.)

## 547 Rehabilitation Nursing Seminar II (3)

Reconceptualization of theories of rehabilitation through study of patients with a variety of disabilities, with emphasis on supportive aspects. Library research and field study (a minimum of seven hours weekly) are required. Offered jointly with the Department of Relabilitation Medicine as Rehabilitation Medicine 547. Prerequisite 546. (Not offered 1972-73.)

548 Rehabilitation Nursing Seminar III (3) Assessment of the nursing problems and direction of nursing therapies for groups of patients with a variety of disabilities, with special emphasis on restorative needs. Library research, field study (a minimum of seven hours weekly), intra- and interdisciplinary conferences will be included. Offered jointly with the Department of Rehabilitation Medicine as Rehabilitation Medicine 548. Prerequisites, 546, 547. (Not offered 1972-73.)

549 Rehabilitation Nursing Seminar IV (6) Evaluation of nursing therapies used for rehabilitative problems in a variety of settings. Communication of pertinent rehabilitation nursing interventions. Library research and field study (a minimum of 14 hours weekly) are required. Offered jointly with the Department of Rehabilitation Medicine as Rehabilitation Medicine 549. Prerequisites, 546, 547, 548. (Not offered 1972-73.)

#### 550 Advanced Community Health Nursing (3) W PIITMAN

Derivation of community health nursing concepts and principles. Identification of current and complex community health problems. Role of the nurse in their solution. Prerequisites, 415, 416, or equivalent, and Health Services 323.

#### 558 Seminar in Advanced Community Health Nursing (3) S PITTMAN

Application of community health nursing concepts, principles, and research findings in analysis and solution of current and complex community health problems. Prerequisite, permission.

#### 560 Implementation of Nursing Curricula (3) A GEITGEY

Implementation of design in planning for curriculum experiences in nursing. Emphasizes evaluation of curricular design, proposing changes, and planning for student learning. Prerequisite, 510 or permission.

#### 562 Implications of Concepts from Anthropology for Nursing (3) A ATKINS

An examination of selected core concepts

from anthropology and an assessment of the implications of these concepts for nursing research. Offered jointly with the Department of Anthropology as Anthropology 562. Prerequisite, permission.

#### 563 Implications of Sociology for Research in Nursing (3) W EMERSON

An examination of principles and concepts from sociology and their implications for nursing research. Prerequisite, permission.

## 564 Implications from Physiology for Nursing (3) A

BRENGELMANN One field from following studied intensively: body temperature regulation, respiration, cardiovascular system, renal system, acid-base balance. Remaining areas considered more briefly. Emphasis on unifying aspects, modern research techniques, implications for nursing care. Prerequisite, permission.

#### 565 Implications from Microbiology for Nursing (2) W HELLSTROM

Examination of selected major fields from microbiology. Exploration of particular aspects of those fields and of current research progress in microbiology. Relevance for nursing. Prerequisite, permission.

# 566 Seminar in Associate Degree Nursing Education I (3) A

Synthesis of teaching-learning theories affecting teaching of nursing in community colleges. Review of research, analysis of factors influencing teaching in relation to learning needs of students. The course is designed to assist the student to apply theoretical knowledge of the teaching-learning process in teaching ADN students. It is planned particularly for post-master's students who are having guided teaching experience or employment in a community college ADN program. Prerequisites, Higher Education EDHED 555, which may be taken concurrently, and permission.

#### 567 Seminar in Associate Degree Nursing Education II (3) W GEITGEY

An examination of principles and concepts of curriculum development and their implications for associate degree nursing education. Utilization of knowledge and understanding of the ADN program and of concepts of curriculum development in constructing specific course designs for ADN programs. Effective utilization of disciplines other than nursing within the community college will be included. Both library study and field work will be required. The course builds on principles of curriculum construction and increases depth through specialized focus on ADN curriculum construction. Prerequisite, 566 or permission.

#### 568 Seminar in Associate Degree Nursing Education III (3) Sp GEITGEY

Philosophy of and problems of design in conducting institutional research in associate degree nursing programs. Application of research findings to teaching. The last in a series of three seminars related to teaching in ADN programs. This seminar is designed to assist students to identify types of institutional research problems which are useful and consistent with the philosophy of the community college and the ADN program. Responsibilities for conducting such research and sharing findings are discussed. Students will be expected to conduct a research project related to teaching in ADN programs in an effort to maintain and support interest and ability in conducting research gained in their pre-master's study. Prerequisites, 567 and permission.

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#### 570 Seminar in Clinical Research in Nursing (3) Sp HOFFMAN

Philosophy, problems of design; use of criterion measures in terms of patient care. Prerequisite, permission.

## 571 Seminar in Nursing and the Social Order (3) W

BYERLY

Changing patterns of nursing service and education in contemporary society. Implications of personal value systems. Prerequisite, permission.

# 572 Theory Building in Nursing (3) S

Designed to help graduate students in nursing gain an increased understanding of the technique of theory construction, problems involved in theory testing, interdependence of theory and research, and implications of these for building a science of nursing. Prerequisite, permission.

#### 575 Death Influence in Clinical Practice (4) WS

#### BENOLIEL

Analysis and study of social, cultural, and psychological conditions that influence human death in modern society. Research finding, selected readings, and direct experience provide direction for examination of philosophic, theoretic, and pragmatic issues underlying choices and decisions in clinical practice. Open to graduate students with permission of instructor. (Limit: 16 students.)

# 576 Operant Techniques in Modification of Behavior (3)

Extends and defines knowledge and skills in the application of operant techniques to the modification of problem behavior of atypical children. Normal basic skills in data collection and management design are assumed. Students may commence a management project during the first week of class. Lectures relate theoretical aspects of behavior analysis to the students' management projects in progress. Prerequisite, 536 or permission.

#### 583 Transcultural Nursing Practices (3) WS LEININGER

Study of transcultural nursing practices in different cultures. Seminar focuses on theoretical formulations and comparative analysis of values, patterns, techniques, and practices of nursing care in different societies. Rituals, myths, taboos, and beliefs will be studied in relation to the subculture(s) of caring and nursing practices.

#### 600 Independent Study or Research (\*)

700 Master's Thesis (\*)

# COLLEGE OF PHARMACY

# PHARMACEUTICAL CHEMISTRY

## **Courses for Undergraduates**

## 325 Quantitative Pharmaceutical Analysis (5) A

KRUPSKI, MC CARTHY

Principles of volumetric and gravimetric analysis with special emphasis on medicinal compounds. Prerequisite, Chemistry 170.

#### 326 Quantitative Pharmaceutical Analysis (4) W

KRUPSKI, MC CARTHY

Physiochemical and special methods used in pharmaceutical analysis. Prerequisite, 325.

#### 400 Biophysical Medicinal Chemistry (3) Sp HUITRIC

Principles of physical organic chemistry relevant to processes of drug distribution, transport, binding, elimination, specificity; and mechanisms of action in general, and their relationships to these processes. Prerequisite, Chemistry 236 or 337.

#### 430 Inorganic Medicinal Products (3) Sp KRUPSKI

Classification, nomenclature, physical and chemical properties of inorganic medicinal compounds. Prerequisite, Chemistry 170.

## 432 Bionucleonics Laboratory (3) Sp SPITZNAGLE

Lectures, experiments, and demonstrations of radionuclide detection equipment and techniques. Experiments will illustrate application of bionucleonics to problems in the pharmaceutical sciences. Prerequisite, permission.

#### 435 Diagnostic Medicinal Chemistry (2) A KRUPSKI, SPITZNAGLE

A presentation of factors considered in clinical diagnostic tests in respect to: biosynthesis, transport, distribution, catabolism, and excretion. The etiology associated with the test and the role of medication upon the clinical test value. Prerequisites, 325, Physiology and Biophysics 360, and Biochemistry 405.

## 440, 441, 442 Medicinal Chemistry (4,4,4) A,W,Sp

TRAGER

Nomenclature, classification, synthesis, properties, structure, and activity of medicinal products. Prerequisite, Chemistry 236 and Physiology and Biophysics 360.

#### 460 Mechanism of Drug Action (3) A NELSON, TRAGER-

Consideration of factors concerning availability of drugs at active sites, e.g., transport, sites of loss, and drug latentiation; molecular mechanisms of drug action; topics in drug de sign. Prerequisites, 442, Biochemistry 442 or 405, Pharmacology 443 or 402, or permission.

#### 480 Advanced Medicinal Chemistry Laboratory (3) A HUITRIC

Synthesis of important medicinal products. Prerequisite, permission. (Offered alternate years; offered 1972-73.)

## 490 Metabolism of Drugs (3) W MC CARTHY

Study of the processes of drug metabolism and

their implications in modern therapy. The influence of metabolism on effect, duration, potency, use, and design of drugs will be considered. Prerequisite, Pharmacology 402.

497 Toxicology (2) W FISCHER

A study of the properties and toxic effects of various substances used in medicine, as well as chemicals employed in industry and as insecticides, rodenticides, and fungicides. Embraces clinical findings from overdosage as well as unusual actions from therapeutic amounts. Includes symptoms and signs, treatment, antidotes, prognosis, and prophylaxis for various classes of poisons. Prerequisite, Pharmacology 402.

499 Undergraduate Research (\*, max. 6) AWSpS

Research problems in pharmaceutical chemistry. Prerequisites, cumulative grade-point average of 2.50 and permission.

## **Courses for Graduates Only**

511, 512 Advanced Pharmaceutical Chemistry (3,3) A,W

' KRUPSKI

Chromatography, gas chromatography, ion exchange, and the use of various instruments for scientific investigations and determination of medicinal agents. (Offered every third year; offered 1973-74.)

#### 520 Seminar (1, max. 5) AWSp

Graduate students attend seminars and make one formal presentation per year while in residence; 1 credit per year is allowed.

## 521, 522 Advanced Medicinal Chemistry (3,3) W,Sp

HUITRIC, MCCARTHY, NELSON, TRAGER 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. Prerequisites, Chemistry 457, 531, and Biochemistry 442, or permission. (Offered alternate years; offered 1972-73.)

600 Independent Study or Research (\*) AWSpS

# PHARMACY AND PHARMACY ADMINISTRATION

## Courses for Undergraduates

204 Orientation (2) A

FISCHER, ORR A study of the profession of pharmacy, its development and its literature.

205 Introductory Pharmacy Laboratory (1) Sp

FISCHER

Introduction to pharmaceutical techniques. Recommended for freshmen. For majors only. Prerequisite, permission.

310 Drugs in Our Society (3) SpS HAMMARLUND

A course designed to develop a general knowledge of drugs and an understanding of their proper use. Discussion of drug problems and methods for their control. For nonmajors only.

## 311 Drugs in Our Society: Special Projects (2) SpS

HAMMARLUND

For nonmajors only. The student undertakes a worthwhile in-depth project on some aspect of drug-abuse prevention or education and submits a satisfactory report in the form of a term paper on the findings of the study. Prerequisites, 310, which may be taken concurrently, and permission.

## 328-329-330 Pharmaceutical Calculations (0-0-1) A,W,Sp

HAMMARLUND

A study of the practical calculations used in pharmacy. Prerequisite, third-year standing.

#### 331, 332 General and Physical Principles (4,4) A,W

HAMMARLUND, SCHOENWALD

A study of pharmaceutical dosage forms including processes, physical principles, and metrology involved in their preparation. Prerequisites, Physics 116 and 119 and Chemistry 236.

#### .350 Fundamentals of Pharmacotherapeutics (2) W

J. PLEIN

Drug information resources; principles of pharmacology; dosage forms and mathematics of drug administration; systems for providing drug therapy; pharmacologic and therapeutic classes of drugs. For nursing students. Prerequisites, Chemistry 102, Conjoint 317-, which may be taken concurrently, or permission.

## 351 Fundamentals of Pharmacotherapeutics (3) Sp

J. PLEIN

Pharmacologic and therapeutic classes of drugs, with emphasis on characteristics of the classes and on important prototype drugs; actions and uses of drugs in treatment of disease. For nursing students. Prerequisites, Pharmacy 350, Conjoint -318, which may be taken concurrently, or permission.

## 362 Fundamentals of Pharmacotherapeutics (3) A

J. PLEIN

Dosage forms; principles of pharmacology; pharmacologic and therapeutic classes of drugs; actions and clinical uses of drugs, with emphasis on the use of drugs in dental patients. For dental hygiene students. Prerequisite, senior standing.

#### 405 Biopharmaceutics and Pharmacokinetics (5) Sp

LEVY, SCHOENWALD

Lectures, conferences, and laboratory experiments on drug release from dosage forms, absorption from different routes of administration and the resulting concentration time curves in blood and urine. Prerequisites, 332 and Pharmacology 401.

## 407 Prescription Practice (4) A

HALL

A study of the supply of drugs through prescription or other types of order. The interaction of the pharmacist with his clientele and other health professionals in the process of ordering, supplying, and encouraging the proper uses of drugs. Prerequisites, 405 and Pharmacology 402.

408 Evaluation of Drug Products (3) W HALL

The study of the process by which choices among various drugs and their products are made. Prerequisites, 407 and Pharmacology 402.

## 410 Clinical Dispensing Pharmacy

(1-3, max. 3) AWSpS

E. PLEIN

Compounding and dispensing of prescriptions originating in the Hall Health Center Pharmacy (Student Health Services) and University Hospital Pharmacy. Laboratory work is under direct supervision of the Student Health Services pharmacist and the University Hospital pharmacists.

#### 412 Drug Products for Autotherapy (2) Sp HALL

Self-medication as a public health problem. An analytical study of the use and abuse of nonprescription remedies by the general public. Prerequisite, 408.

#### 420 Manufacturing Pharmacy (3) AW E. PLEIN

A study of the techniques and equipment used in preparing pharmaceutical products on a small plant scale. Prerequisites, 332 and fifthyear standing.

## 445 Radiopharmaceutics (3) W

SPITZNAGLE

The fundamentals of radioactivity; properties of radiation; instrumentation used in nuclear medicine; problems associated with the formulation, production, and use of radiopharmaceuticals; and radiopharmaceutics currently used for diagnosis and therapy. Prerequisite, 332.

## 450 Pharmacy Laws (3) Sp

A study of the laws regulating the practice of pharmacy. These include federal, state, and municipal laws, and professional ethics. Prerequisite, 408.

## 451 Pharmacy Administration (3) W

The business and management aspects of pharmacy. Economic considerations in independent and chain operations. A study of third-party payment plans for financing pharmaceutical service, government programs, public relations, professional promotion, and ad-vertising. Sick room supplies and surgical and orthopedic appliances will be discussed. Prerequisite, 407.

## 452 Contemporary Problems (1) Sp

An examination of trends in the field of pharmacy as influenced by social and economic factors. The effect of changing patterns of health care on professional practice. Prerequisite, 408.

#### The General Practice of Pharmacy 465 (2, max. 4) AWSp

HALL, KRUPSKI

A study of pharmacy in the community and urban setting. Students spend variable periods under the tutelage of a pharmacist in his day-to-day practice and meet for weekly dis-cussions of their experiences. Prerequisites, 332 and permission.

#### 483 Hospital Pharmacy (3-5) AWSpS E. PLEIN

Introduction to hospital pharmacy. Principles and techniques of hospital pharmacy operation. Laboratory work is conducted in phar-macies of the University Hospital and affiliated hospitals. Prerequisite, permission.

484 Introduction to Clinical Pharmacy (5) AS

IVEY, KRADJAN, E. PLEIN, SMITH

Study of the clinical roles of the pharmacist

and of other health professionals, and study of the more common diseases and their drug therapy. Considered are patient records, drug histories, laboratory tests, drug administration and case method studies of complex drug therapy. Four lectures, one conference, and one laboratory per week. Prerequisites, 405, 407 which may be taken concurrently, Pharmacognosy 414, Pharmaceutical Chemistry 442.

## 485 Clinical Pharmacy (7) WS

IVEY, KRADJAN, E. PLEIN, SMITH

The pharmacist on the health-care team. Lectures and conferences. Laboratories in various clinical areas of the hospital. Students associate observed symptomology in patients with textbook descriptions of disease states, gain insight into problems of diagnosis and treatment planning, and relate disease states with complex drug therapy. Prerequisite permission; 483 is recommended.

# 486 Clinical Pharmacy (4-10) SpS

IVEY, KRADJAN, E. PLEIN, SMITH The pharmacist on the health-care team. Lectures, conferences, and laboratories in various clinical areas of the hospital and outpatient clinics. Students relate complex drug therapy to disease states and treatment planning. Consideration of the pharmacist's responsibilities for inpatient and outpatient care. Prerequisites, 485 and permission.

#### 495 Special Studies in Pharmacy (\*, max. 6) Sp

Special studies of professional topics in pharmacy. An opportunity to expand the breadth and depth of understanding in specific pharmaceutical areas. Students usually will undertake independent study under the individual direction of a faculty member. Prerequisite, permission.

#### 499 Undergraduate Research (\*, max. 6) AWSpS

Pharmaceutical research problems: Prerequisites, cumulative grade-point average of 2.50 and permission.

## **Courses for Graduates Only**

#### 510 Topics in Pharmaceutics (3, max. 6) Sp HALL, HAMMARLUND, LEVY, E. PLEIN, SCHOENWALD

Reading, conference, and laboratory work in physical pharmacy and biopharmaceutics. Prerequisite, permission.

#### 515 Topics in Nursing and Pharmacy (2) Sp

E. PLEIN, REGAN Reading and discussions of assigned topics of current interdisciplinary interest in the field of nursing and pharmacy. Subject matter changes from year to year. Offered jointly with the School of Nursing as Nursing 515. Prerequisite, permission.

## 520 Seminar (1, max. 5) AWSp

Graduate students must attend seminars and make one formal presentation per year while in residence; 1 credit per year is allowed.

#### 560 Manufacture of Sterile Pharmaceuticals (4) W E. PLEIN

The technology of parenteral preparations, ophthalmic solutions and ointments, and spe-cific problems in formulation of sterile pharmaceuticals. Prerequisite, permission. (Offered stternate years; offered 1973-74.)

## 570 Hospital Pharmacy Administration (5) Sp

## E. PLEIN

The organization and administration of the hospital pharmacy and the responsibility of the director of pharmacy services in a hos-pital. Prerequisite, permission. (Offered alter-nate years; offered 1973-74.)

#### 580 Advanced Manufacturing Pharmacy (5) E. PLEIN

A study of the methods of manufacture of pharmaceutical preparations on a semi-com-mercial scale. Prerequisites, Chemistry 457, which may be taken concurrently, and per-mission. (Offered alternate years; offered 1972-73.)

## 600 Independent Study or Research (\*) AWSpS

# PHARMACEUTICAL SCIENCES

## **Courses for Graduates Only**

700 Master's Thesis (\*) AWSpS

800 Doctoral Dissertation (\*)

## PHARMACOGNOSY

## **Courses for Undergraduates**

## 350 Psychotropic Plants (3) Sp

A lecture course reviewing the ethnobotany, history, chemistry, and physiological activity, of various plants used throughout the world for stimulant and psychotropic purposes. Prerequisites, Chemistry 236 and Biology 212, or equivalents.

## 412, 413, 414 General Pharmacognosy (4,3,2) A,W,Sp

BRADY, ELMER

The study of natural products of plant and animal origin as important medicinals and pharmaceuticals. Sources, processes of isolation, chemical and physiological properties, and uses are described. Prerequisites, Bio-chemistry 405, Biology 212, Chemistry 236, Microbiology 301, 302.

#### 421 Hormones and Glandular Products (2) W BRADY

An advanced study of medicinal products derived from animal exocrine and endocrine glands. Emphasis is placed upon hormones, their chemical nature, and their physiological actions as drugs. Prerequisites, 414 and Physiology and Biophysics 360.

# 425 Alkaloid Biosynthesis (3) Sp

BRADY

A lecture course reviewing the biosynthesis of alkaloids. Alkaloid classes discussed include the phenethylamines, various isoquinolines, amaryllidaceous and ergot alkaloids, simple and monoterpenoid indoles, quinolines, quinolizidines, pyrrolizidines, tropanes, and piperi-dines. Emphasis is given to the chemical capabilities of the organism rather than the isolation and degradation techniques involved in biosynthesis studies. Prerequisites, Biochemistry 405 and permission. (Offered alternate years; offered 1973-74.)

## 426 Medicinal Plants (2) ASp BRADY

A course with variable subject content. Con-

sideration is given to the accomplishments, problems, and value of cultivation of medicinal plants and to the contribution of chemotaxonomy in their commerce and research.

## 499 Undergraduate Research (\*, max. 6) AWSpS

Research problems in pharmacognosy. Prerequisites, cumulative grade-point average of 2.50 and permission.

## **Courses for Graduates Only**

## 520 Seminar (1, max. 5) AWSp

Graduate students must attend seminars and make one formal presentation per year while in residence; 1 credit per year is allowed.

#### 581 Topics in Pharmacognosy (1, max. 2) AWSp BRADY

Discussions and readings of topics of current interest in the field of pharmacognosy. Subject matter changes from year to year. Prerequisite, reading knowledge of German.

## 600 Independent Study or Research (\*) AWSpS

# GRADUATE SCHOOL OF PUBLIC AFFAIRS

## **Courses for Graduates Only**

## PUBLIC ADMINISTRATION

501 The Administrator and the Policy Process (3) A

KAGI, KROLL

Context of public administration from the perspective of the administrator. Through case and research materials, field inquiries and interviews, the manifold roles and functions of the administrator are examined, particularly as he relates himself and his work to the process of implementing, making, and changing public policy. Offered jointly with the Department of Political Science as Political Science 570.

#### 502 Public Policy and Administration (3) W KAGL KROLL

Interaction between the bureaucracy and those institutions, organizations, and groups involved in the policy process. Analysis of current policy problems is made from this perspective. Offered jointly with the Department of Political Science as Political Science 571.

#### 503 Administrative and Executive Leadership (3) Sp

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 the Department of Political Science as Political Science 572.

#### 505 The Law of Public Administration (3) Sp SHIPMAN

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. Primarily for students in the Graduate School of Public Affairs; others by permission.

## 510 Governmental Organizations (3) W SHIPMAN

Survey of the theory, the current practice, and experience relating to governmental organizations and their program objectives. Comprises a synopsis of subject matter covered in 511, 512, and 521. No credit allowed if 511 and 512 are taken for credit.

#### 511 Administrative Problems: Micro-Organization (3) A SHIPMAN

Analysis and solution of problems involving the interaction of individuals and groups within organizations. Emphasis is placed upon the differences between the traditional approach and the behavioral approach to the understanding of the governmental organizations, the motivation of the persons involved in the decision to produce, the nature of the decision to participate, the nature of conflict and innovation, and the limits of rationality. Offered jointly with the Department of Political Science as Political Science 576.

#### 512 Administrative Problems: Macro-Organization (3) W SHIPMAN

Analysis and solution of problems inherent in the characteristics and behavior of large-scale organization and multiagency complexes. Systems approaches are interrelated with social systems theory; functional problems are interrelated with types of organizations resulting from the public purpose served, and information flows are analyzed. Emphasis is given to concepts of organizational effectiveness and change. Offered jointly with the Department of Political Science as Political Science 577.

## 513 Administrative Problems: Program Analysis (3) Sp

SHIPMAN

Applicability of systems approaches and systems modeling to various types of program problems. Emphasis is upon comprehensive program planning, approaches to factoring of alternatives, evaluation of cost-utility relationships, and assessment of alternative options or "trade-offs" in activity components of largescale action programs. Offered jointly with the Department of Political Science as Political Science 578.

#### 521 Public Management: Program Planning and Design (3) A SHIPMAN

Topics include the policy context of planning and programming, the institutionalization of purpose, the planning process, activity design, work scheduling and measurement, and program evaluation. Offered jointly with the Department of Political Science as Political Science 573.

#### 522 Public Management: Budgeting (3) W LYDEN, PEALY

Budgeting as a management process. Study of formulation and administration of government budget, including the role of budgeting in the policy process, the approaches to budget formulation and analysis, the development of the PPB approach, and the aspects of budget administration, such as revenue estimating allotment control, and cost accounting. Offered jointly with the Department of Political Science as Political Science 574.

#### 523 Public Management: Personnel (3) ASp LYDEN

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. Offered jointly with the Department of Political Science as Political Science 575.

## 541 Social Theory and the Public Policy Process (3) A

LYDEN

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 sociopolitical and technological environment.

# 542 Social Research and the Public Policy Process (3) W

Survey of research evidence in the study of complex organizations and their environments, stressing development of analytic skills in the interpretation and the application of research results.

## 543 Systems Theory and the Public Policy Process (3) Sp

LYDEN

Survey of systems theory approaches to the study and the analysis of public organizations and their environments, including systems analysis, cybernetics, information theory, and general and social systems theory.

## 551 Comparative Administrative Systems (3) W

KROLL

Methodological problems of research in comparative administration. Theoretical and substantive aspects of administrative systems in urban-industrial and developing nations. Offered jointly with the Department of Political Science as Political Science 579.

## 552 Administrative Problems of Development (3) Sp

KROLL Problems of administering developing nationstates and regions, including theoretical aspects of development administration, bureaucratic change, administrative-political interaction in policy making, organizational development, political impact of administering major programs. Prerequisites, Political Science 473, 474, or permission.

# 600 Independent Study or Research

(°, max. 15)

# PUBLIC POLICY

500 General Seminar (1) AWSp

## 505 Health Policy and Medical Care (2) Sp BERGMAN

Interdisciplinary seminar designed to survey factors affecting health policy and programs. The subject is viewed by representatives of medicine, sociology, economics, political science, and others. Offered jointly with the School of Public Health and Community Medicine as Health Services PC HS 505. Prerequisite, permission. (Formerly Public Policy 580.)

# PUBLIC HEALTH AND COMMUNITY MEDICINE

#### 534 American Foreign Policy Formation (3) A DENNY

American foreign policy viewed whole, including defense policy, the relationships of foreign policy to domestic policies and priorities, and the full range of historical, constitutional, institutional, political, and theoretical questions related to the formation and the execution of foreign policy in this broad sense. Offered jointly with the Department of Political Science as Political Science 534.

## 535-536 Seminar in American Foreign Policy (3-3) W,Sp

DENNY

Foreign policy and defense policy formation and execution. Administration of national security programs, White House, Congress, State and Defense Departments, special problems, and case studies. Prerequisite, 534.

#### 540, 541, 542 Social Management of Technology I, II, III (3,3,3) A,W,Sp WENK

Analysis of the interaction of technology and society through general principles and case studies of contemporary issues and public policy: the nature of the technological enterprise, its scientific base, ingredients of capital, specialized manpower, organizational structure and management; employment of public and private institutions; policy planning to generate, utilize, and manage technology so as to maximize opportunities and to minimize unwanted consequences; institutional conflicts; development of goals, strategies, program priorities, and policies; legal and economic considerations; processes of public decision making. Prerequisites, permission for 540; 540 for 541; 541 for 542. Offered jointly with the Department of Civil Engineering as CIVE 540, 541, 542.

## 556 Public Policy, Administration, and Democratic Theory (3) Sp

Examines the meaning of democracy in the context of American public policies and administration. The perspective of individual and group participation in the policy process, the individual's role in organizations, the functions of the public servant in the making of policy decisions, and the realities of policy formulation in relation to democratic values. Objective of the course is to enable the student professionally committed to public activity to reflect in a discussion setting upon his or her position as a participant in the society in which he or she works. Students and faculty determine the specific topics to be covered. Prerequisite, permission.

#### 561, 562 Policy Development and Administration: Urban Affairs (3,3) A,W MILLER

A two-quarter graduate course in the structures, functions, and processes of government in cities, with special emphasis on the origin, content, and implementation of public policies. Major focus is on the political process at the municipal level: the distribution of influence, the political actors, the decision-making machinery, and the policy outputs. Of special interest to graduate and professional students preparing for careers in urban government.

## 565 Seminar in Urban Public Policy Analysis (3) Sp

The use of methodology from public administration, political science, and economics to examine urban public policies. Emphasis on the relationships between research and public policy. Prerequisite, Economics 416.

#### 571, 572, 573 Public and Educational Policy Issues in the Development of Human Talent (3,3,3) A,W,Sp WOLFLE

Higher education and the nation's human resources; trends, future projections, policy issues, and national and personal goals in the relations between education and the utilization of professional and specialized personnel. Students may do individual work on topics of special interest. Offered jointly with the College of Education as EDUC 571, 572, 573. Prerequisite, permission.

# 583, 584, 585 Seminar in Science and Public Policy (3,3,3) A,W,Sp

WOLFLE

Issues and problems relating to the interaction of science and scientists with the public policy-making process and public policymakers. Nature and values of 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.

## 590, 591, 592 Midcareer Seminar (3,3,3) A,W,Sp

MILLER

Interdisciplinary seminar in public policy for midcareer executives. Open to participants in the education for the public management program; others by permission.

## 593, 594, 595 Policy Development and

## Administration: Natural Resources

(3.3.3) A.W.Sp

CRUTCHFIELD, PEALY

Interdisciplinary research seminar in natural resources policy development and administration. Major concern is with the processes of natural resources policy formulation and analysis, and the role of various sectors in influencing policy development and administration. Open to graduate and professional students in varied disciplines who are emphasizing preparation in natural resources fields. Prerequisite, permission.

#### 596 Social Policy Analysis (3) Sp WILLIAMS

Examines the techniques and methods required in social policy analysis, including the technical issues in developing, using, and interpreting research relevant for social policy and bureaucratic problems in using research and analysis in the policy process. Designed to aid future administrators and analysis in performing policy analysis and in working with researchers to develop relevant studies and with the agency bureaucracy to integrate research and analysis. Prerequisite, permission for students not in the Graduate School of Public Affairs.

#### 600 Independent Study or Research (\*) AWSpS

# 604, 605, 606 Degree Project (2-6,2-6,2-6)

The following Economics courses serve as an integral part of the Graduate School of Public Affairs curriculum.

#### ECONOMICS

400 Fundamentals of Micro-Theory (3) A Fundamentals of micro-theory with emphasis on applications to public policy. Designed primarily for graduate students majoring in fields other than economics. No credit if 300 has been taken for credit.

401 Fundamentals of Macro-Theory (3) W Fundamentals of macro-theory with emphasis on applications to public policy. Designed primarily for graduate students majoring in fields other than economics. No credit if 301 has been taken for credit.

## 416 Urban Economics (3) ASp

Examines what is happening in urban areas. Use of economic analysis to explain urban trends; urban government organization; and problems of housing and renewal, transportation, poverty and race, and the environment. Offered jointly with the Department of Geography as Geography 416. Prerequisite, 300 or 400, or equivalent.

## 435 Natural Resource Utilization and Public Policy (5) AWSp

BROWN, CRUTCHFIELD Special emphasis on elements of economic theory relating to resource oriented industries. Case studies in the theory and practice of resource management dealing with both stock and flow resources. Benefit-cost analysis and the evaluation of multipurpose projects.

#### 445 Income Distribution and Public Policy (5) W

MC CAFFREE

Income distribution implications and economic effects of public policies toward unemployment, illness, industrial accidents, old age, and discrimination from age, sex, or race. Prerequisites, 200 or 201 or permission.

## 451 State and Local Public Finance (5) W or Sp

The theory of public finance with special reference to nonfederal governments and particularly to the problems of the urban area. Prerequisite, 300 or 400 or equivalent or permission.

#### 452 Economic Approaches to Political Analysis (5) W

Systematic introduction to the use of individual choice models to analyze collective behavior, with emphasis on political action and public policy analysis. Use of models of these types provides students with an analytic capability for dealing with complex institutional problems. Also ties theory to current public policy problems. Offered jointly with the Department of Political Science as Political Science 416. Prerequisites, 200 or 201 or permission.

#### 553 Economic Analysis and Government Programs (3) Sp MC CAFFREE

Application of economic analysis to public enterprises and programs. Prerequisites, 400, 401, or equivalent.

# SCHOOL OF PUBLIC HEALTH AND COMMUNITY MEDICINE

## BIOSTATISTICS

## **Courses for Undergraduates**

- 410 Principles of Communicable Disease Control and Biostatistics (2) AWSp HALL, PERRIN, STAFF
- Vital statistics, measure of central tendency

and dispersion, introduction to interpreting statistical data, and control of communicable disease. Required of senior nursing students in the basic nursing curriculum. Offered jointly with Department of Epidemiology and Inter-national Health as PC EP 410. Prerequisite, PCHS 323. (Formerly Preventive Medicine 410.)

## 472 Applied Statistics in Health Sciences (3) AWSp

FEIGL, PERRIN, WAHL

Application of statistical techniques to biological and medical research; design and in-terpretation of experiments. (Formerly Preventive Medicine 472.)

476 Sample Survey Techniques (3-5) Sp Methods appropriate to conducting and analzing results of sample surveys. Offered when demand is sufficient. (Formerly Preventive Medicine 476.)

#### 477 Statistical Methods in Biological Assay (3) ₩ FBIGL

Statistical principles of experimental design applied to biological assay. Techniques of analysis of dose-response data. Prerequisite, PC BS 472 or permission. (Formerly Preventive Medicine 477.)

#### 478 Application of Vital and Health Statistics (2) Sp LER

Analysis of routinely collected data on the health status and the care of populations, with emphasis on the potential and the limitations of this approach. Stressed are the importance of such data for the development and the evaluation of programs and the recognition of new hazards. Students acquire a firm grasp of the technical problems of vital data and make a personal interpretation of a problem. Offered jointly with the Department of Epidemiology and International Health as PC EP 478. Prerequisite, PC BS 472 or equivalent or permission.

497 Biostatistics Special Electives (\*) AWSpS

Off-campus course for medical students.

## 498 Undergraduate Thesis (\*) AWSpS

499 Undergraduate Research (\*) AWSpS

## **Courses for Graduates Only**

## 511, 512, 513 Medical Biometry I, II, III (3,3,3) A,W,Sp

BRESLOW, FEIGL, KRONMAL

Application of mathematical and statistical techniques to the problems of advanced medical and epidemiological research. Prerequisite, permission. (Formerly Preventive Medi-cine 530, 531, 532.)

## 571, 572, 573 Special Topics in Advanced Biostatistics (3, max. 6, 3, max. 6, 3, max. 6) A,W,Sp

PERRIN, STAFF

Covered are multivariate analysis, clinical trials, health-survey design and analysis, Bayesian decision procedures, regression and classification techniques, stochastic models in biology and medicine, and other advanced statistical methods. Prerequisite, permission. (Formerly Preventive Medicine 591, 592, 593.)

## 580 Seminar in Biostatistics (\*, max. 5) AWSn

BRESLOW

Presentation and discussion of special topics and research results in biostatistics. Speakers include resident faculty, visiting scientists, and advanced graduate students. Required for students in the Department of Biostatistics training program. Prerequisite, permission. (For-merly Preventive Medicine 590.)

#### Seminar in Biostatistics Applied to 582 Health Services Research (1, max. 5) AWSpS DIEHR

Presentation and discussion of special topics and research results in health services that have a strong methodological and/or statistical component. Participants include visiting scientists, resident faculty, and graduate students. Required of students in the biostatisticshealth services graduate training program. Offered jointly with the Department of Health Services as PCHS 582. Prerequisite, permission.

#### 583 Epidemiology and Biostatistics Research Seminar (1) AWSp FOX, THOMPSON

Promotes critical reading of scientific papers and increases knowledge and understanding of principles and methods in epidemiology. Offered jointly with the Department of Epidemiology and International Health as PC EP 583. Prerequisite, permission. (Formerly Preventive Medicine 523.)

#### 590 **Biostatistics Consulting (3, max. 9)** AWSpS

FEIGL

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 de-sign and analysis. Required for students in biostatistics graduate program.

#### 599 **Biostatistical Experience in Health** Service Agency (\*, max. 6) AWSpS DAY, THOMPSON

Supervised biostatistical work in health services agency under the direction of a preceptor. Students are exposed to the research needs of the agency, and, under direction, are given an opportunity to develop a research protocol and to carry it to completion. This activity may well form the basis for the thesis required for the M.S. or Ph.D. degree required for students in the program training biostatisticians for health services research. Prerequisite, permission.

## ENVIRONMENTAL HEALTH

## **Courses for Undergraduates**

## 411. Introduction to Environmental Health (3) W

HATLEN

Relationship of man to his environment, how it affects his physical well-being and what he can do to influence the quality of the environment and to enhance the protection of his health. Emphasis on environmental factors involved in transmission of communicable dis-

eases and hazards due to exposure to chemical and physical materials in our environment. (Formerly Preventive Medicine 422.)

#### 440 Water and Waste Sanitation (4) A HATLEN

Advanced study of the pollution factors, the sanitary control of water supplies, and sewage and refuse disposal, with emphasis on the knowledge and skills utilized by the sani-tarian. (Formerly Preventive Medicine 440.)

#### 441 Food and Milk Sanitation (4) W HATLEN

Advanced study of the sanitary control of the production, processing, and distribution of food, including milk, and control of foodborne diseases. (Formerly Preventive Medicine 441.)

## 442 Vector Control and Housing Sanitation (3) Sp

HATLEN

Advanced study of the impact and the control of rodents and arthropod vectors of disease; or programs and problems associated with housing, institutions, schools, and rectea-tion areas. (Formerly Preventive Medicine 442.)

#### 450 Measurement and Control of Air Pollution (2) A

BOVEE, BREYSSE

Description of methods for air pollution research and control, including field-survey techniques, stack sampling, continuous monitoring, and use of control equipment. Administrative problems are also discussed. (Formerly Preventive Medicine 450.)

#### 453 Industrial Hygiene and Safety (3) W BOVEE, BREYSSE

Review of occupational health and safety hazards, including causes, effects, evaluation, and prevention, and of legislation. (Formerly Preventive Medicine 453.)

#### 457 Noise and the Environment (2) Sp BRYSSE

Examination of urban community noise problems, including sources, effects, and control, and of legislation.

#### 460 Accident Prevention (2) A

CARTER, DISCHER Discussion of the accident process and the classification of accidents, including epidemiologic indices. Analysis of accident statistics and research studies relating to control planning; survey of existing programs and legislation. Term field project and report.

#### 462 Laboratory Management and Safety (1) w

BREYSSE, HIBBARD

Designed for laboratory management safety, to consider chemical and physical hazards; their control and management. (Formerly Preventive Medicine 456.)

#### 480 Environmental Health Problems (\*, max. 6) AWSpS

HATLEN, STAFF

Individual projects involving library, laboratory, or field study of a specific environmental health problem. (Formerly Preventive Medicine 480.)

#### 482 Field Experience—Technology (2-6) AWSpS

HATLEN, STAFF

Assignment to a local health department for

supervised application of public-health practices and environmental control techniques. (Formerly Preventive Medicine 482.)

## 483 Field Studies—Program Planning (6) AWSpS

HATLEN, STAFF

Assignment to a local health department for practice in program planning. (Formerly Preventive Medicine 483.)

#### 484 Field Studies—Community Resources (3) AWSpS

HATLEN, STAFF

Assignment to a local health department for training in the utilization of community resources. (Formerly Preventive Medicine 484.)

## 497 Environmental Health Special Electives (\*) AWSpS

Off-campus course for medical students.

#### 498 Undergraduate Thesis (\*) AWSpS MC CARROLL

(Formerly Preventive Medicine 498.)

#### 499 Undergraduate Research (\*) AWSpS HATLEN, STAFF

Individual research on a specific topic in environmental health upon which specific conclusions, judgments, or evaluation can be made or facts can be presented. (Formerly Preventive Medicine 499.)

## **Courses for Graduates Only**

#### 511 Environmental Health (3) A MC CARROLL

General survey of all physical environmental factors affecting human health and functioning, including general community, special occupational, and exotic environments. Considered are effects of heat, cold, light, circadian rhythms, ionizing and nonionizing radiation, air pollution, water resources, pesticides, food additives, solid-waste disposal, accidents, hyperbaric environments, and specific industrial hazards. (Formerly Preventive Medicine 540.)

#### 521 Environmental Components (3) A HATLEN

Examination of the physical components that influence man's health and his efficiency of performance. Major components are defined, then examined individually and in concert with the total environment. Interrelationships of the physical environment and social, cultural, and economic influences are considered.

# 522 Environmental Programs (3) W

Environmental programs are examined with regard to determination of needs, establishment of controls, and the legal and organizational framework within which they exist. The operational aspects of programs are explored, considering organization, planning, staffing, financing, and evaluation. Agencies are visited and studied, and a report is presented.

## 553 Industrial Hygiene Instrument Laboratory (2) W

BREYSSE, HIBBARD

Laboratory course involving the utilization of field sampling and of devices for detecting occupational contaminants.

## 555 Industrial Hygiene Chemistry Laboratory (2) Sp

BOVEE

Laboratory course dealing with the principles

of chemical analysis for qualitative and quantitative determinations of occupational contaminants.

## 577 Control of the Industrial Environment (3) Sp

BREYSSE, HIBBARD

Principles of control of the industrial environment, including noise and hazardous chemicals, with special emphasis on design of exhaust-ventilation systems. (Formerly Preventive Medicine 455.)

## 568 Occupational Health and Safety Program (3) W

DISCHER

Description of occupational health and safety services involving broad variety of disciplines. Discussion of ways in which roles of various professionals interact; of ways that services affect community health and environmental control, and of ways that managers in this field plan for health maintenance and safety.

## 571 Occupational Physiology and Toxicology (3) W

DISCHER, MILNER

Study of the function of bodily systems in relationship to potential occupational disease, including methods used to evaluate potentially toxic or hazardous exposures and their known effects.

#### 572 Etiology of Neoplastic Diseases in Man (2) A LEE

Human cancer and its etiology; the techniques involved and the results, so far, are examined in the light of future prospects. Offered jointly with the Department of Epidemiology and International Health as PC EP 572. Prerequisite, 200-level biology course or medical student with Human Biology 412 or permission.

#### 573 Medical Management of Environmental Injuries (2) Sp MILNER

Considers the methods of prevention and treatment of environmental trauma. Major emphasis is on environmental abnormalities encountered in the Pacific Northwest during sporting activities. Specific topics include frostbite, heatstroke, high-altitude disease, SCUBA problems, etc.

## 580 Environmental Health Seminar (1, max. 6) AWSpS

Current environmental health research and environmental control programs.

## 581 Environmental Reading Seminar (1, max. 6) AWSpS

Critical reading of selected basic and applied research publications on environmental health problems and programs.

# 590 Selected Topics (1-6) AWSpS

In-depth study of a current environmental health topic.

599 Field Studies (2-6, max. 6) AWSpS Assignment to an environmental research or service program for application of evaluating techniques.

# EPIDEMIOLOGY AND INTERNATIONAL HEALTH

## 410 Principles of Communicable Disease Control and Biostatistics (2) AWSp HALL, PERRIN, STAFF

Vital statistics, measures of central tendency

and dispersion, introduction to interpreting statistical data, and control of communicable disease. Required of senior nursing students in the basic nursing curriculum. Offered jointly with the Department of Biostatistics as PC BS 410. Prerequisite, PC HS 323. (Formerly Preventive Medicine 410.)

## 420 Principles of Epidemiology (3) A HALL, STAFF

Descriptive, analytic, and experimental epidemiology, as presented in examples from infectious and chronic noninfectious disease. Includes descriptive statistics as applicable in epidemiology. Prerequisite, PC HS 323, Microbiology 301 or permission, or graduate standing. (Formerly Preventive Medicine 420.)

# 478 Application of Vital and Health Statistics (2) Sp

Analysis of routinely collected data on the health status and the care of populations, with emphasis on the potential and the limitations of this approach. Stressed are the importance of such data for the development and the evaluation of programs and the recognition of new hazards. Students acquire a firm grasp of the technical problems of vital data and make a personal interpretation of a problem. Offered jointly with the Department of Biostatistics as PC BS 478. Prerequisite, PC BS 472 or equivalent or permission.

497 Epidemiology and International Health Special Electives (\*) AWSpS

Off-campus course for medical students.

**498** Undergraduate Thesis (\*) AWSpS Prerequisite, permission. (Formerly Preventive Medicine 498.)

499 Undergraduate Research (\*) AWSpS Prerequisite, permission. (Formerly Preventive Medicine 499.)

## **Courses for Graduates Only**

511 Principles of Epidemiology (3) A FOX

Lectures and discussions covering evolution and meaning of epidemiology, concepts of disease causation, basic epidemiologic methods, and descriptive, analytic, and experimental epidemiology. A term paper on the epidemiology of a selected disease is required. Prerequisite, permission.

# 512 Epidemiology of Chronic Diseases (3) W

Study of the principles and practices of epidemiology as applied to the noncommunicable diseases. Prerequisite, 200-level biology course, or medical student with Human Biology 412, or permission. (Formerly Preventive Medicine 521.)

#### 513 Epidemiology of Acute Diseases (3) Sp ALEXANDER

Study of the principles and the practices of epidemiology, as derived from a study of communicable diseases. Prerequisite, PC EP 511, imedical student with Human Biology 412, or permission. (Formerly Preventive Medicine 520.)

#### 531 Problems in International Health (3) W EMANUEL

Introduction to the unique political, cultural, social, anthropologic, and economic characteristics of underdeveloped areas of the world, and to the relating of disease occurrence and health-care solutions to these characteristics. Prerequisite, graduate or medical student, or permission. (Formerly Preventive Medicine 492.)

#### 572 Etiology of Neoplastic Diseases in Man (2) A LEB

Human cancer and its etiology; the techniques involved and the results, so far, are examined in the light of future prospects. Offered jointly with the Department of Environmental Health as PC EH 572. Prerequisite, 200-level biology course or medical student with Human Biology 412, or permission.

#### 583 Epidemiology and Biostatistics Research Seminar (1) AWSp FOX, THOMPSON

Promotes critical reading of scientific papers

and increases knowledge and understanding of principles and methods in epidemiology. Offered jointly with the Department of Biostatistics as PC BS 583. Prerequisite, permission. (Formerly Preventive Medicine 523.)

#### 590 Selected Topics in Epidemiology or International Health (2-6, max. 6) AWSpS

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. Prerequisites, PC EP 511 or equivalent, and permission.

#### 598 Teaching Methods in Epidemiology and/or Preventive Medicine (1-3) Sp FOY

Supervised teaching experience in public health and in epidemiology. Student formulates an outline for a course in epidemiology or related subject. He makes one or more formal presentations to class and is encouraged to use modern educational methods and teaching media. He constructs test questions on lecture subjects. Prerequisite, Educational Psychology EDPSY 449 or equivalent.

#### 599 Practice of Epidemiology (\*) AWSp PETERSON

Participation in the field investigations of acute or chronic disease occurrence. Prerequisite, permission.

#### 600 Independent Study or Research (\*) AWSpS

700 Master's Thesis (\*) AWSpS

800 Doctoral Dissertation (\*) AWSpS

# HEALTH SERVICES

323 Introduction to Public Health Principles and Practices (3) AWSpS WILKEY

Survey of principles, practices, and agencies concerned. Required of all preventive medicine majors. (Formerly Preventive Medicine 323.)

## 424 Public Health Programs (3) Sp

HALL Current problems and programs of major concern in maternal and child health, accident prevention, mental health, chronic diseases, and medical economics. (Formerly Preventive Medicine 424.)

## 426 Field Training in Health Education (5) S MILLS, REEVES

Four and one-half weeks of full-time super-

vised work experience in the health-education division of a local official health agency. Offered jointly with the College of Education as Educational Curriculum, and Instruction EDC&I 426. (Formerly Preventive Medicine 426.)

## 461 School and Community Health Programs (3) ASpS

MILLS

Organizational structure, function, and services of official and nonofficial community and school health agencies, with particular attention to the interrelated roles of teachers, physicians, nurses, and sanitarians. (Formerly Preventive Medicine 461.)

#### 497 Health Services Special Electives (\*) AWSpS

Off-campus course for medical students.

498 Undergraduate Thesis (\*) AWSpS

499 Undergraduate Research (\*) AWSpS

# **Courses for Graduates Only**

## 505 Health Policy and Medical Care (2) Sp BERGMAN

Interdisciplinary seminar designed to survey factors affecting health policy and programs. The subject is viewed by representatives of medicine, sociology, economics, political science, and others. Offered jointly with the Graduate School of Public Affairs as Public Policy 505. Prerequisite, permission. (Formerly Preventive Medicine 580.)

511 Health Services and Medical Care (4) W Intensive introduction to the subject, including measurement of need and demand, the resources for health care, private and public efforts to provide health services, elements of medical care, program planning and evaluation, the biological basis of organized public health activities, public health programming, health behavior and its modification, social science applications in health services and medical care, and related topics. Prerequisite, graduate student status or permission. (Formerly Preventive Medicine 490.)

# 512 Medical Care (3) Sp

Intensive treatment of all aspects of medical care, including access, quality, financing and supply, institutional and provider arrangements, patient and consumer behavior, evaluation and measurement of outcomes, private and public programs to supply care, and related issues. Prerequisite, PCHS 511 or equivalent or permission.

# 513 Program Planning and Evaluation (2) A DAY,

Study and discussion of the methods of program planning and resource allocation in the health services area. Cost benefit and cost effectiveness, program budgeting, and other techniques are explored in relationship to the methodology for measuring health benefits and efficiency. The evaluation of programs, methods for such investigation and analysis, and related topics are included. Prerequisite, PC HS 511 or equivalent or permission.

# 519 Health Services Seminar (\*, max. 4) A

Presentations predominantly by students, primarily health services majors, emphasizing detailed examination of aspects of medical care, medical administration, public health programs, and allied topics. Prerequisites, PC HS 511, 512, and 513 or concurrent registration, and permission.

# 521 Community Health Education (3) A

Basic concepts related to community health education with emphasis on the psychosocial and cultural factors related to health and health education practice. Emphasis is on the determinants of health behavior at the individual, group, and community level, and on the role of health education as an instrument of planned change. Prerequisite, health education concentration or permission.

## 522 Community Organization for Health (4) W

## ANDERSON

Emphasis on the diagnosis of community health problems and various organizational practices utilized for effective solution. Review and analysis of the community organization process, role of the community health workers, relationship to the practice of community health education. One-half day of field work required. Prerequisites, health education concentration and permission.

## 530 Community Medicine (3) WSp GILSON

One-half day field and two hours seminar experiences weekly in community agencies delivering and planning health services. Visits may be made to neighborhood clinics, comprehensive health planning bodies, group medical practices, public health agencies, special problem (drug, alcohol, sexuality) clinics, mental health facilities, environmental services, and others. Related subjects are discussed in weekly seminars by students, faculty, and guests. Prerequisite, medical student; others, permission.

# 531 Independent Field Studies in Community Medicine (2-15) AWSpS

In-depth experience in variable time blocks in one or more community health services. Sites may include neighborhood clinics, comprehensive health planning bodies, medical practice settings, public health agencies, special problem clinics and facilities, environmental programs and services. Related subjects are discussed in weekly seminars by students, faculty, and guests. Prerequisite, PC HS 530 or permission.

# 546 Economic Studies of Health Care (3) A MC CAFFREE

Examination of topics related to the economics of health care, including supply and demand factors, financing of care, efficiency and cost of delivery, and allied areas. Offered jointly with the Department of Economics as Economics 546. Prerequisite, graduate standing in the School of Public Health and Community Medicine; others, permission.

## 551 Health Services Management I (3) A RICHARDSON

Examination of goals, organization, and internal operations of the voluntary hospital. Included are methods of resource management and quality control applied specifically to the hospital setting. Prerequisites, PC HS 511, 512, and permission.

#### 553 Health Services Management II (3) Sp RICHARDSON

8

Second in a two-course sequence dealing with the management of health services institutions and programs. Topics include health services law, hospital and program policy decisions, financial planning, and hospital design and architecture. Prerequisite, PC HS 551.

580 Health Services Research Seminar (1) W Presentations of current research programs of faculty, students, and selected guest investigators. Topics include quality evaluation, measurement of health benefits, program design and evaluation, and related issues. Prerequisite, graduate standing in the School of Public Health and Community Medicine; others, permission.

581 Health Services Reading Seminar (1) Sp Review of current literature in health services, introduced topically, covering major areas of health policy, health services research, medical care and public health programs, and related areas. Prerequisite, graduate standing in the School of Public Health and Community Medicine; others, permission.

#### 582 Seminar in Biostatistics Applied to Health Services Research (1, max. 5)

AWSpS

DIEHR

Presentation and discussion of special topics and research results in health services that have a strong methodological and/or statistical component. Participants include visiting scientists, resident faculty, and graduate students. Required of students in the biostatistics-health services graduate training program. Offered jointly with the Department of Biostatistics as' PC BS 582. Prerequisite, permission.

#### 599 Field Practice in Public Health (\*) AWSpS

Individually assigned and supervised student field placements in agencies and programs related to areas of concentration. Health education, medical care organization and administration, public health program areas, and associate placements are developed, depending on student interest and educational needs. Prerequisite, graduate standing in the School of Public Health and Community Medicine; others, permission.

# PATHOBIOLOGY

## **Courses for Graduates Only**

521 Mammalian Cell Culture as a Tool for Virus Research (\*, max. 3) A KENNY

General concepts and techniques of cell culture, as applied to problems of virus isolation and propagation. Prerequisite, permission. (Formerly Preventive Medicine 506.)

#### 522 Antigenic Analysis of Micro-organisms (\*, max. 3) W KENNY

Theory and techniques for antigenic analysis of micro-organisms (bacteria, mycoplasmata, and viruses.) Prerequisite, permission. (Formerly Preventive Medicine 507.)

## 523 Pathobiology of Viruses (\*, max. 4) Sp COONEY, WENTWORTH.

Laboratory course for study of biological characteristics of pathogenic human viruses. Prerequisite, permission.

## 524 Methods for Ultrastructure of Micro-organisms (2) W

BOATMAN

Specific methods for the investigation of the ultrastructure of micro-organisms are de-

scribed following discussion of the design and operation of the electron microscope. Lectures cover the morphology and structure of bacteria, mycoplasmata, and bacterial and animal viruses. Instruction will be given in operating the electron microscope, in the examination of specimens, and in producing photographic data. Prerequisite, permission.

#### 580 Pathobiology Seminar (1, max. 9) AWSpS

Research reports from both students and faculties are presented and discussed. Topics include immunochemistry, viruses, membranes, infectious diseases, immune response. Prerequisite, permission.

598 Didactic Pathobiology (\*, max. 12) AWSp

Supervised lecture and laboratory teaching experience for Ph.D. candidates. Teaching will be in the PC PB 521-524 sequence, depending on interests of the student. Prerequisite, permission.

# RESERVE OFFICERS TRAINING CORPS AEROSPACE STUDIES

# Courses for Undergraduates

# 101, 102, 103 Aerospace Studies 100 (1,1,1) A, W, Sp

Examines the role of United States military forces in the conter-porary world, with particular attention to the United States Air Force, its organization and mission. The functions of strategic offensive and defensive forces, general purpose, and aerospace support forces are covered. One classroom hour and one hour of Corps Training per week.

#### 211, 212, 213 Aerospace Studies 200 (1,1,1) A,W,Sp

Air Forces related to national defense policy, with respect to general and limited war, alliances, and strategies and policies of the United States, the Soviet Union, and China. An introduction to United States defense organization and decision-making processes and their contribution to national objectives. One classroom hour and one hour of Corps Training per week. Prerequisites, 103 or equivalent for 211; 211 for 212; 212 for 213.

#### 321, 322, 323 Aerospace Studies 300 (3,3,3) A,W,Sp

A study of the history, growth, and development of aerospace power. The Air Force today, with emphasis on policy formulation and current doctrine; the United States space program, discussing purpose, achievements, benefits, and technology. Three classroom hours and one hour of Corps Training per week. Prerequisites, 213 or equivalent for 321; 321 for 322; 322 for 323.

#### 430 Flight Instruction Program Ground · School (2) Sp

Ground school to supplement flight training for Air Force ROTC cadets in light aircraft; includes weather, navigation, and Federal Aviation Agency regulations. Prerequisite, permission.

## 431, 432, 433 Aerospace Studies 400 (3,3,3) A,W,Sp

A study of Air Force leadership and manage-

ment. Includes professional responsibilities, military justice system, leadership theory functions and practices, management principles and functions, and problem solving. Three classroom hours and one hour of Corps Training per week. Prerequisites, 323 or equivalent for 431; 431 for 432; 432 for 433.

# **MILITARY SCIENCE**

## **Courses for Undergraduates**

## 101, 102, 103 Military Science I—Basic (1,1,1) AWSp, AWSp, AWSp

Study of the history, organization, and mission of the United States Army and the ROTC program and the relationship of the program to the citizens' military and civilian obligation; to develop an understanding of the function and organization of the defense establishment of the United States and the interrelations among the services under the Department of Defense; background on the evolution of warfare to include the meaning and scope of the principles of war and the development of weapons and associated equipment utilized in warfare. One hour of leadership laboratory per week is required during the year.

## 201, 202, 203 Military Science II—Basic (3,2,1) AWSp, AWSp, AWSp

Foundations in the principles of the art of warfare as they are exemplified in American military history. Tactical lessons and leadership techniques demonstrated in the most significant American campaigns and engagements. Fundamentals and techniques of small-unit tactics, emphasizing the importance of firepower, movement, and communications. Understanding of the duties, responsibilities, and methods of employment of basic military units. One hour of leadership laboratory per week is required during the year.

## 301, 302, 303 Military Science III—Advanced (3,3,3) AWSp, AWSp, AWSp

Develops the student's proficiency in presenting and evaluating oral presentation; identifies and illustrates effective leadership traits. Provides the student with an understanding of the factors affecting human behavior; affords opportunities to apply leadership and management techniques. Roles of the various branches in the overall mission of the Army and their functions in support of field forces are explained. Explains the role of the leader in directing and coordinating individual and military units in the accomplishment of missions from squad- to battalion-size units; as well as principles of command control, leadership techniques, and communications systems used in the Army. Three classroom hours and one hour of Leadership Laboratory per week. Two weekend field trips and one academic substi-tute are required during the year. A tax-free stipend of \$100 per month is paid to contract students enrolled in the advanced program.

## 401, 403 Military Science IV—Advanced (2,2) AWSp,AWSp

Examination of the factors influencing world change to provide a more informed analysis of the relations between the United States and other nations. The position of the United States in the contemporary world scene will be analyzed for its impact on leadership and management problems of the military service. A developmental study designed to provide an awareness of the personal responsibilities and official relationships of an army officer. A comprehensive study of the organization and functions of the command and staff relationships. The processes by which the administration, logistics, and planning are coordinated into successful military operations. An introduction to the basic concepts of the legislative and executive authority establishing the Uniform Code of Military Justice. A comprehensive study of the problem-solving techniques employed by the small unit leader with emphasis on coordination and detailed planning by the junior officer. The process of planning successful military operations is analyzed and discussed. Two classroom hours and one hour of leadership laboratory per week in 401 and 403. During Spring and Winter Quarters, a course in military law will be offered by the Division of General and Interdisciplinary Studies for all junior and senior cadets. The course will replace Military Science 402; however, one hour of leadership laboratory per week will be required. Two academic substitutes are required during the year. A tax-free stipend of \$100 per month is paid to contract students enrolled in the advanced program.

# NAVAL SCIENCE

## Courses for Undergraduates .

## '111 The Naval Service (3) A

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.

## 112 Naval Ship Systems I (3) W

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.

# 113 Naval Ship Systems II (3) Sp Continuation of 112.

## 221 Psychology of Leadership (3) A

Introduction to the theory and the techniques of naval leadership based upon those principles of behavioral science that are pertinent to understanding individual and group behavior of adults. It introduces midshipmen 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.

#### 212 Sea Power Practicum I (2) W

Seminar-type course in which discussion centers on 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).

# 213 Sea Power Practicum II (2) Sp Continuation of 212.

#### 311 Navigation (3) A

Comprehensive study of the science of terrestrial navigation, including dead reckoning, piloting, and electronic means. The laws for prevention of collision at sea (rules of the nautical road) are covered.

## 312 Celestial Navigation (3) W

Theory and practice of celestial navigation. The student performs the complete "day's work" of the ship's navigator.

## 313 Naval Operations (3) Sp

Introduction to naval operations, the employment of naval forces, naval tactics, formulation of operations plans and orders, employment of detection equipment, and meteorology. The subject of operations analysis as a tool for decision making is introduced.

#### 411 Naval Weapon Systems (3) A

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.

## 412 Naval Organization and Management I (3) W

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.

# 413 Naval Organization and Management II(3) Sp

Continuation of 412.

## MARINE CORPS OPTION COURSES

## 321 Evolution of Warfare I (3) A

Introduction to the art of war, the evolution of warfare from the earliest recorded battles to the present day.

## **322 Evolution of Warfare II (3) W** Continuation of 321.

## 323 Marine Corps Operations (3) Sp

Introduction to the basic tactics employed by the Marine Corps. Covers the roles and the missions of the Marine Corps, its relationship to the other services, and its employment in the implementation of national policy. Familiarizes the student with Marine Corps organization.

## 421 Amphibious Warfare I (3) A

Historic review of the great amphibious operations conducted in the Pacific theater of operations during World War II and of the doctrine for amphibious warfare that evolved.

#### 422 Amphibious Warfare II (3) W

Continuation of 421, covering the amphibious operations in the European theater of operations during World War II, the Korean War, Lebanon, Cuba, Santo Domingo, and Vietnam. Planning for amphibious operations, including command relationships, task organization, and other aspects.

#### 423 USMC Leadership and Administration of Justice (3) Sp

Concepts, objectives, characteristic qualities, and practical techniques of leadership as exercised by the Marine Corps officer are studied. The specific application of the Uniform Code of Military Justice to the Marine Corps is investigated. Emphasis is placed on the leadership and management role of the junior officer in the fleet marine forces.

# SCHOOL OF SOCIAL WORK

# **Courses for Undergraduates**

## 300 Field of Social Welfare (5) AWSp BERLEMAN, DUPLICA, PARSONS

Origin, development, and present status of social service programs, with particular emphasis on the relationship of program resources, human needs, and the methods through which services are provided. Prerequisite, upper-division standing.

## 409 Readings in Social Welfare (1-4, max. 12) AWSp

Prerequisite, permission.

## 410- Beginning Social Work Practice (2-) A DIXON, PEPPER, REISS

Introduction to social work practice that develops a conceptual framework for the responsible delivery of a social service, provides an overview of traditional social work methods (casework, group work, and community organization), and explores an array of techniques, skills, and methods for use in beginning practice. Prerequisites, Social Welfare major, 300 and upper-division standing. To be taken concurrently with -415-.

## -411- Beginning Social Work Practice (-2-) W

DIXON, PEPPER, REISS

Continuation of concepts and methods initiated in 410-, with emphasis on service methods. Prerequisites, 410- and 415-. To be taken concurrently with 416.

# -412 Beginning Social Work Practice (-2) Sp

DIXON, PEPPER, REISS Elaboration of concepts and methods developed in 410- and -411- Prerequisites, 410-411and 415-416-. To be taken concurrently with -417.

#### 415- Beginning Field Instruction (3-) A

Students are placed in selected social service agencies and accept beginning social service assignments under the supervision of competent agency personnel. Prerequisites, Social Welfare major, and 300. To be taken concurrently with 410-.

## -416- Beginning Field Instruction (-3-) W

Continuation of student placements in assigned social service agencies. Students assume increasing responsibility for particular service assignments. Prerequisites, 410- and 415-. To be taken concurrently with -411-.

## -417 Beginning Field Instruction (-3) Sp

Continuation of student placements in social service agencies. Students complete service assignments and work through termination process. Prerequisites, 410-411- and 415-416-. To be taken concurrently with -412.

Note: Social Work 410-411-412 and 415-416-417 must be taken during the student's senior year. The sequences must be completed in order for the student to receive credit for any one of the courses.

## **Courses for Graduates Only**

The graduate curriculum is undergoing major revision. Therefore, the following

courses are subject to change. For more information, contact the School of Social Work.

#### 502, 503, 504 Social Welfare Organization (2,2,2) A,W,Sp

DEAR, DUPLICA, PARSONS, PATTI

Historical origins of concepts, policies, and social welfare institutions; critical analysis of current public and private programs at all jurisdictional levels; use of social welfare concepts in planning.

# 505 Social Welfare Organization (2) AWSp

Series of courses designed to further the use of knowledge, to develop assessment skill and professional viewpoint through identifying, analyzing, and appraising social work as a profession relevant to social policies that condition the authorization, the financing, and the programming of social welfare services. It includes a series of specific courses dealing with such topics as the social welfare process, the correctional process, change, minority groups, and population. Prerequisite, permission.

# 509 Readings in Social Work (\*) AWSpS Prerequisite, permission.

510 Social Casework (1-3, max. 3) HOFFMAN, S. MILLER, MUNDT, NELSON, REISS

The casework process studied from a conceptual and value base together with generic principles which form the foundation of the methodological process. Consideration is also given to basic interviewing principles and the use of understanding concerning the motivations in human behavior as these apply to the casework process and its goals. To be taken concurrently with 521.

511 Social Casework (1-3, max. 3) W HOFFMAN, S. MILLER, MUNDT, NELSON, REISS

Continuation of generic casework theory, with emphasis on diagnosis and casework treatment. Prerequisite, 510. To be taken concurrently with 522.

512 Social Casework (1-3, max. 3) Sp HOFFMAN, S. MILLER, MUNDT, NELSON, REISS

Elaboration and intensification of basic casework concepts and their application in practice to various types of agencies. Prerequisite, 511. To be taken concurrently with 523.

515 Field Instruction (4-8, max. 12) AWSp Prerequisite, permission.

520 Seminar (2) AWSp

Prerequisite, permission.

521 Social Group Work (1-3, max. 3) AW

HOFFMAN, S. MILLER, MUNDT, NELSON Introduction to social group work as a method of social work. Special emphasis upon a beginning understanding of factors involved in helping individuals with their problems in the group. To be taken concurrently with 510.

#### 522 Social Group Work (1-3, max. 3)

HOFFMAN, S. MILLER, MUNDT, NELSON The social group worker's helping role in problem solving. Special emphasis upon the study and appraisal of individuals within the group and their total psycho-social-cultural developmental background. Study of formulating a working diagnosis on individual clients and the formulation of treatment goals. Prerequisite, 521. To be taken concurrently with 511.

## 523 Social Group Work (1-3, max. 3) Sp

HOFFMAN, S. MILLER, MUNDT, NELSON The social group worker's activity in utilizing group processes and structure to treat individuals within a group. Integration of study, diagnosis, and treatment in the processes of providing social work services. Prerequisite, 522. To be taken concurrently with 512.

#### 524 Advanced Social Group Work (2) A MAIER

The use of programming as a means of diagnosis and treatment in the practice of social group work. The analysis and purposeful use of program media. Prerequisite, 523.

#### 525 Advanced Social Group Work (2) W MAIER

The application of the social group work method with an emphasis upon differential treatment of individuals with psycho-social problems. Social group work within the context of a group living setting. The use of marginal interview. Collaborative and team work with other disciplines. Prerequisite, 524.

526 Advanced Social Group Work (2) Sp MAIER

The continuum of treatment with a review of beginning, central, and terminal phases of social group work. History and current trends in social group work. Prerequisite, 525.

## 530 Advanced Social Casework (2) A

R. MACDONALD, MAIER, MUNDT, NELSON, REISS, WHITTAKER

Intensive study of the casework process to deepen and broaden the caseworker's knowledge and understanding of the dynamics of human behavior and to enable him to develop greater skill in interviewing. Prerequisite, 512.

#### 531 Advanced Social Casework (2) W

R. MACDONALD, MAIER, MUNDT, NELSON, REISS, WHITTAKER

Continuation of intensive study of case material, with particular emphasis on workerclient relationship reactions as these affect the diagnostic and treatment processes. Prerequisite, 530.

# 532 Advanced Social Casework (2) Sp

R. MACDONALD, MAIER, MUNDT, NELSON, Reiss, Whittaker

Intensive drill in case analysis, seeing the case as a whole, achieving a balanced perspective on the relationship between inner and outer forces, and planning appropriate treatment. Prerequisite, 531.

## 533, 534 Trends in Social Work Practice (2,2) AWS,AWS

DE LANGE, HUNT; MAIER, S. MILLER, REISS Generic and differential factors in understanding and utilizing various administrative settings in social work practice. Study of developments and trends in social work practice. Prerequisite, permission.

## 535 Advanced Field Instruction

(4-8, max. 12) AWSp Prerequisite, 515.

## 550, 551, 552 Human Growth and Behavior (2,2,2) AWSp,AWSp,AWSp ANDERSON, FARBER, HERRICK, ISHISAKA,

MAIER, PEPPER, RESNICK

The study and examination of man's social functioning through analysis of selected as-

pects of physical, emotional, social, and cultural influences upon normal growth and behavior. Prerequisite, permission.

## 570 Social Community Organization

(2) AWSp ELLIS, PATTI, STIER

Understanding the social forces of the community, the process of community organization, and the role of the social worker in implementing community organization. Prerequisite, permission.

## 571, 572 Social Community Organization (2,2) W,Sp

STIER

Methods courses designed to provide concepts about professional practice of application of knowledge, skills, and values in community change situations. The content includes background knowledge, goals of community action, and introduction to community organization work. Prerequisites, 570 and 571. To be taken concurrently with 515.

#### 573 Advanced Social Community Organization (2) A MELD

Intensive study of community action situations involving social welfare program development, community welfare planning, and neighborhood citizen action to deepen the student's capacity for problem-solving in the community context. Prerequisites, 572 and permission.

#### 574 Advanced Social Community Organization (2) W MELD

Study of traditional and newer planning and financing mechanisms for linking programs at the various levels: neighborhood, metropolitan area, state, national. Appropriate methods for effecting change in social conditions through the use of these mechanisms will be studied. Prerequisite, 573.

## 575 Advanced Social Community Organization (2) Sp

MELD

Intensive study of the methods for: assessing resistant and supportive forces, creating action systems representative of appropriate segments of the community, sustaining a relationship with an action system over a period from identification of a problem to action, and evaluation of the outcome. Prerequisite, 574.

## 580 Administration of Social Agencies (2) BRINK, PARSONS

Importance of social work administration to social work practice; administrative behavior as it affects practice. Administrative organization and techniques that permeate all levels of staff, including pressures from within and without the social agency. Prerequisite, permission.

#### 587 Law and Social Welfare (2) W GRONEWOLD

The basis of law, its philosophy and development, its broad principles, and the procedure by which it operates; specific aspects of law pertinent to social work orientation, including law in relation to the family, children, guardianships, and acts against society, and property laws. Prerequisite, permission.

#### 590 Social Work Research (1-3, max. 3) AWSp

GRISWOLD, HERRICK, JAFFEE,

NORTHWOOD, STRESHINSKY

An introduction to the logic of scientific

method with reference to techniques used in social research. Examples drawn from problems and practices in social work and social welfare.

## 591 Group Research Project (2, max. 6) AWSp

Field practice in a group project in lieu of an individual thesis (except for students in the special program). Includes development of research design, collection of data, tabulation and analysis, and report writing. Prerequisite, 590 or its equivalent.

## 592 Organization and Administration of Applied Research (2) W

Theories, methods, and strategies for conduct of social welfare research involving conceptualization, design, funding, administration, publication, integration, with practice. Prerequisite, 590.

# 593 Field Research Practicum (8) S

Research techniques and strategies employed in social work are examined in seminar and through specialized, supervised training in agencies and programs engaged in such work. For the Special Program in Social Work Research apply to Dean, School of Social Work. Implementation of the application is dependent upon the availability of resources. Stipends for the summer study may be available. Prerequisite, permission.

## 594-595 Advanced Social Work Research (2-2) 594- AW; -595 WSp

The sequence describes (a) specific research

techniques and (b) how they are applied in social work. Each technique is placed in methodological and theoretical context by the examination of published research monographs, which show its use and limits. Prerequisite, 590 or equivalent.

596-597 Field Research Methods (2-2) A,W Research organization, methodology, and theory associated with field practice for social work students having research service major. Prerequisites, 590 plus 592, or 590 plus 594 and 595. Concurrent registration in 535 and 700 required.

700 Master's Thesis (\*) AWSp

# DEFINITIONS OF ABBREVIATIONS

Listed below are abbreviations that are frequently associated with references to academic administrative units or that are used as course number prefixes. Following each abbreviation is its definition, the name of the department or other subordinate administrative unit responsible for the abbreviation, and the parent school, college, or other major administrative unit.

A A:	Aeronautics and Astronautics (Engineering)	CSEE:	Continuing Studies—Electrical Engineering (Continuing
ACCIG:	Accounting (Business Administration)	CEENC.	Studies)
ADMIN: AKKAD:	Administration (Business Administration) Akkadian, Near Eastern Languages and Literature	CSENG: CSHSS:	Continuing Studies—Engineering (Continuing Studies) Continuing Studies—Humanistic-Social Studies (Continuing
ANEST:	(Arts and Sciences) Anesthesiology (Medicine)	CSIE:	Continuing Studies—Industrial Engineering (Continuing
A ORG:	Administrative Theory and Organizational Behavior	CSME:	Continuing Studies—Mechanical Engineering (Continuing
ARAB:	(Business Administration) Arabic, Near Eastern Languages and Literature	CSMET:	Studies) Continuing Studies—Metallurgical Engineering (Continuing
ARAM:	(Arts and Sciences) Aramaic, Near Eastern Languages and Literature	CSMIN:	Studies) Continuing Studies—Mining Engineering (Continuing
ARCH:	(Arts and Sciences) Architecture (Architecture and Urban Planning)	CSNE:	Studies) Continuing Studies—Nuclear Engineering (Continuing
ARCHY: ART:	Archaeology, Anthropology (Arts and Sciences) Art. Art (Arts and Sciences)	CSREH:	Studies; Continuing Studies—Rehabilitation Medicine (Continuing
ART H:	Art History, Art (Arts and Sciences) A grospace Studies (Reserve Officers Training Programs)	CZECH	Studies) Czech Slavic Languages and Literature (Arts and Sciences)
ASIAN:	Asian Languages and Literature, Asian Languages and Literature (Arts and Sciences)	CLLCII.	
ASTR:	Astronomy, Astronomy (Arts and Sciences)	DAN	Denich Seardingular Languages and Literature (Arts and
ATM S:	Sciences)	DAN:	Sciences)
		DANCE:	Dance (Drama) (Arts and Sciences)
BA:	Business Administration (Business Administration)	DAKI:	Drama Arts (Interdisciplinary Graduate Programs)
BA RM:	Research Methods (Business Administration)	DENT:	Dentistry (Dentistry)
B CMU:	Business Communications (Business Administration)	DRIG:	Drama Drama (Arts and Saiences)
B CON:	Building Construction (Architecture and Urban Planning)	DRAMA:	Diama, Diama (Arts and Sciences)
B ECN:	Business Economics (Business Administration)		
BG&S:	Business, Government, and Society (Business Administration)		
BIOC:	Biochemistry (Medicine)	EAM:	Experimental Animal Medicine (Medicine)
BIOEN:	Bioengineering (Interschool or Intercollege Programs)	EASIA:	East Asia, Institute for Comparative and Foreign Area
BI HS:	Biomedical History (Medicine)		Studies (Arts and Sciences)
BIOL:	Biology, Biology (Arts and Sciences)	ECON:	Economics, Economics (Arts and Sciences)
BMATH:	Biomathematics (Interdisciplinary Graduate Programs)	EDADM:	Educational Administration (Education)
BOT:	Botany, Botany (Arts and Sciences)	EDC&I:	Educational Curriculum and Instruction (Education)
B POL:	Business Policy (Business Administration)	EDEPS:	Educational Policy Studies (Education)
B STR:	Biological Structure (Medicine)	EDHED:	Higher Education (Education)
BULGR:	Bulgarian, Slavic Languages and Literature (Arts and	EDPSY:	Educational Psychology (Education)
	Sciences)	EDSPE:	Special Education (Education)
		EDUC:	(Teaching Prostigum) (Education)
CATA:	Catalan, Romance Languages and Literature (Arts and	E E.	(Teaching Practicum) (Education)
	Sciences)	E E:	Electrical Engineering (Engineering)
CER E:	Ceramic Engineering (Engineering)	ENDU:	English (Arts and Sciences)
CESM:	Structural Engineering and Engineering Mechanics, Civil Engineering (Engineering)	ENGR:	Engineering, College Courses (Engineering)
CETC:	Transportation, Construction, and Geotechnical Engineering; Civil Engineering (Engineering)		
CEWA:	Water and Air Resources, Civil Engineering (Engineering)	EAMED.	Esmily Medicine (Medicine)
CH E:	Chemical Engineering (Engineering)	FAMED:	Family Medicine (Medicine)
CHEM:	Chemistry, Chemistry (Arts and Sciences)	FD SC:	Finance (Pusiness Administration)
CHIN:	Chinese, Asian Languages and Literature (Arts and Sciences)	FINN.	Finnish Scandingvign Languages and Literature (Arts and
CIVE:	Civil Engineering Core Courses (Engineering)	1 11414.	Sciences)
CL AR:	Classical Archaeology, Classics (Arts and Sciences)	FISH.	Fisheries (Fisheries)
CLAS:	Classics, Classics (Arts and Sciences)	FOR R.	Forest Resources (Forest Resources)
C LIT:	Comparative Literature, Comparative Literature (Arts and Sciences)	FREN:	French, Romance Languages and Literature (Arts and Sciences)
CL LI:	Classical Linguistics, Classics (Arts and Sciences)		561611003/
CMU:	Communications, Communications (Arts and Sciences)		
COM D:	Community Dentistry (Dentistry)		
CONJ:	Conjoint (Medicine)	GENET:	Genetics, Genetics (Arts and Sciences)
C PHY:	Comparative Physiology (Interdisciplinary Graduate Programs)	GEOG: GEOL:	Geography, Geography (Arts and Sciences) Geological Sciences, Geological Sciences (Arts and Sciences)
CSAA:	Continuing Studies—Aeronautics and Astronautics (Continuing Studies)	GERM:	Germanic Languages and Literature, Germanic Languages and Literature (Arts and Sciences)
CSCER	<sup>1</sup> Continuing Studies—Ceramic Engineering (Continuing Studies)	013:	Interdisciplinary Studies (Arts and Sciences)
	Studies)	GPHYS:	Geophysics, Geophysics (Arts and Sciences)
CSCHE:	Continuing Studies—Chemical Engineering (Continuing	GRK:	Greek, Classics (Arts and Sciences)
	Studies)	G ST:	General Studies, General and Interdisciplinary Studies
C SCI:	Computer Science (Interdisciplinary Graduate Programs)		(Arts and Sciences)

HD UR:	Hindi-Urdu, Asian Languages and Literature (Arts and	PEDS:	Pediatrics (Medicine)
UEDD.	Sciences) Hohman Near Fostern Longuages and Literature (Arts	PERIO:	Periodonics (Denusury) Pharmacy and Pharmacy Administration (Pharmacy)
HEBR:	and Sciences)	PH CH:	Pharmaceutical Chemistry (Pharmacy)
H EC	Home Economics, Home Economics (Arts and Sciences)	PHCOG:	Pharmacognosy (Pharmacy)
H ED:	Health Education, Physical and Health Education (Arts	PHCOL:	Pharmacology (Medicine)
	and Sciences)	PHIL:	Philosophy, Philosophy (Arts and Sciences)
HRSYS:	Human Resource Systems (Business Administration)	PHSCI:	Pharmaceutical Science (Pharmacy)
HST:	History, General, History (Arts and Sciences)	PHY A:	Physical Anthropology, Anthropology (Arts and Sciences)
HSS:	Humanistic-Social Studies (Engineering)	PHYS:	Physics, Physics (Arts and Sciences)
HSIAA:	History of the Americas, History (Arts and Sciences)	POL S:	Political Science, Folitical Science (Arts and Sciences)
HSIAM:	Ancient and Medieval History, History (Arts and Sciences)	POLSE:	Polish, Slavic Languages and Literature (Arts and Sciences)
HSTAS.	History of Asia. History (Arts and Sciences)	IONI.	Sciences)
HUBIO:	Human Biology (Medicine)	P PSY:	Physiology Psychology (Interdisciplinary Graduate Programs)
HUM:	Humanities, Humanities (Arts and Sciences)	PROS:	Prosthodontics (Dentistry)
HUNGR:	Hungarian, Slavic Languages and Literature (Arts and	PROV:	Provencal, Romance Languages and Literature (Arts and
	Sciences)		Sciences)
IASIA:	Inner Asia, Institute for Comparative and Foreign Area	PRSAN:	Persian, Near Eastern Languages and Literature (Arts and
	Studies (Arts and Sciences)		Sciences)
I BUS:	International Business (Business Administration)	PSYC:	Psychiatry (Medicine)
ICEL:	icelandic, Scandinavian Languages and Literature (Arts	PSICH:	Psychology, Psychology (Arts and Sciences) Bhusical Thatanu (Medicine)
INDIC	and Sciences) Indic Asian Languages and Literature (Arts and Sciences)	P 1;	Physical Therapy (Medicine)
IPHD:	Individual Doctor of Philosophy Degree Program	OMETH	Quantitative Methods (Business Administration)
	(Interdisciplinary Graduate Programs)	O SCI	Quantitative Science (Interschool or Intercollege Programs)
ITAL:	Italian, Romance Languages and Literature (Arts and	OUAT:	Qualititative Science (Interdisciplinary Graduate Programs)
	Sciences)	Quan	Quaterning) etacles (interenselynning) Streesure : roßranns)
1000 <b>-0</b> 11		RADGY:	Radiology (Medicine)
JAPAN:	Japan, Asian Languages and Literature (Arts and Sciences)	RAD S:	Radiological Sciences (Interdisciplinary Graduate
	1		Programs)
KOR:	Korean, Asian Languages and Literature (Arts and Sciences)	RECPL:	Recreation Planning and Administration, Physical and
			Health Education (Arts and Sciences)
LAB M:	Laboratory Medicine (Medicine)	REEU:	Russia and East Europe, Institute for Comparative and
LARC:	Landscape Architecture (Architecture and Orban Planning)	DELLAD.	Foreign Area Studies (Arts and Sciences)
LAL:	Laun, Classics (Arts and Sciences)	REHAD:	Renabilitation Medicine (Medicine)
LING.	Linguistics (Arts and Sciences)	RES D: D INS	Restorative Dentistry (Dentistry) Dick and Insurance (Duciness Administration)
LING.	Linguistics (Arts and Sciences)	D MNI	Risk and Insurance (Dusiness Administration)
MATH:	Mathematics, Mathematics (Arts and Sciences)	/ Kully.	Sciences)
ME:	Mechanical Engineering (Engineering)	ROM:	Romance Linguistics and Literature (Arts and Sciences)
MED:	Medicine (Medicine)	ROMAN:	Romance Languages and Literature, Romance Languages
MED P:	Medical Practice (Medicine)		and Literature (Arts and Sciences)
MED T:	Medical Technology (Medicine)	ROMN:	Romanian, Slavic Languages and Literature (Arts and
MET E:	Metallurgical Engineering (Engineering)		Sciences)
MICRO:	Microbiology, Microbiology (Arts and Sciences)	RUSS:	Russian, Slavic Languages and Literature (Arts and
MICKU:	Microbiology (Medicine)		Sciences)
MINE:	Mining Engineering (Engineering)	CASTA.	South Asia Institute for Comparative and Estation Area
MANG:	Marcelling (Dusiness Automistration) Mongolian Asian Longuages and Literature (Arts and	SASIA:	South Asia, Institute for Comparative and Poreign Area
MONO.	Sciences)	SCAND	Scandinavian Scandinavian Languages and Literature (Arts
M SCI:	Military Science (Reserve Officers Training Programs)	JCAND.	and Sciences)
MUSAP:	Music Applied, Music (Arts and Sciences)	SCND:	Scandinavian Languages and Literature, Scandinavian
MUSIC:	Music, Music (Arts and Sciences)		Languages and Literature (Arts and Sciences)
		SER C:	Serbo-Croatian, Slavic Languages and Literature (Arts and
NE:	Near Eastern Languages and Literature (Arts and Sciences)		Sciences)
NORW:	Norwegian, Scandinavian Languages and Literature (Arts	SLAV:	Slavic, Slavic Languages and Literature (Arts and Sciences)
	and Sciences)	SLAVC:	Slavic Languages and Literature, Slavic Languages and
NK:	Neurological Surgery (Medicine)	SNKDT.	Literature (Arts and Sciences)
N SCI:	Navai Science (Reserve Officers Training Programs)	SINKKI	Sanskrit, Asian Languages and Literature (Aris and
NUCE.	Nursing (Nursing)	SOC	Sociology Sociology (Arts and Sciences)
NORS.	rausing (rausing)	SOC S	Social Science, Social Science (Arts and Sciences)
OB GY:	Obstetrics and Gynecology (Medicine)	SOC W:	Social Work (Arts and Sciences, and Social Work)
OCEAN:	Oceanography, Oceanography (Arts and Sciences)	SO JU:	Society and Justice. Society and Justice (Arts and Sciences)
ODTP:	Oral Diagnosis and Treatment Planning (Dentistry)	SPAN:	Spanish, Romance Languages and Literature (Arts and
O ENG:	Ocean Engineering (Engineering)		, Sciences)
OPHTH:	Opthalmology (Medicine)	SPCH:	Speech, Speech (Arts and Sciences)
OPSYS:	Operations and Systems Analysis (Business Administration)	SURG:	Surgery (Medicine)
ORALB:	Oral Biology (Dentistry)	SWED:	Swedish, Scandinavian Languages and Literature (Arts and
ORTHO:	Orthodontics (Dentistry)		Sciences)
ORTHP:	Oral Surgery (Dentistry)	TAMIL.	Tomil Asian I anguages and I iterature (Arts and Science)
03.	Occupational Therany (Medicine)	THAL.	Their Asian Languages and Literature (Arts and Sciences)
OTOL:	Otolaryngology (Medicine)	TIR	Tibetan, Asian Languages and Literature (Arts and Octonecs)
			Sciences)
PATH:	Pathology (Medicine)	TKIC:	Turkic, Asian Languages and Literature (Arts and Sciences)
PB AD:	Public Administration (Public Affairs)	TKISH:	Turkish, Near Eastern Languages and Literature (Arts and
P BIO:	Physiology and Biophysics (Medicine)		Sciences)
PB PL:	rublic Policy (Public Affairs)	TRANS:	Transportation (Business Administration)
rL:	rubic realth and Community Medicine (Public Health	LICONT	Liniuspitu Canigint (Internet1 on Internetion Decomes)
PC pc.	and Community Medicine) Biostatistics (Public Health and Community Medicine)	UCONJ:	University Conjoint (Interschool or Intercollege Programs)
PC EH	Environmental Health (Public Health and Community		Ligaritic Near Eastern Languages and Literature (Arts and
	Medicine)	JUAN:	Sciences)
PC EP:	Epidemiology and International Health (Public Health and	UKR:	Ukrainian, Slavic Languages and Literature
	Community Medicine)		(Arts and Sciences)
PC HS:	Health Services (Public Health and Community Medicine)	URB P:	Urban Planning (Architecture and Urban Planning)
PC PB:	Pathobiology (Public Health and Community Medicine)	UROL:	Urology (Medicine)
PE:	Physical Education, Physical and Health Education (Arts		
DEDNO	and Sciences)	WLF S:	Whidhte Sciences (Interschool or Intercollege Programs)
PEDNU:	Dedodontics (Deptister)	7001	Zoology Zoology (Arts and Salaman)
	· caoaonnes (Dennishy)	2001:	Looidky, Looidky (Arts and Sciences)



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