

BULLETIN

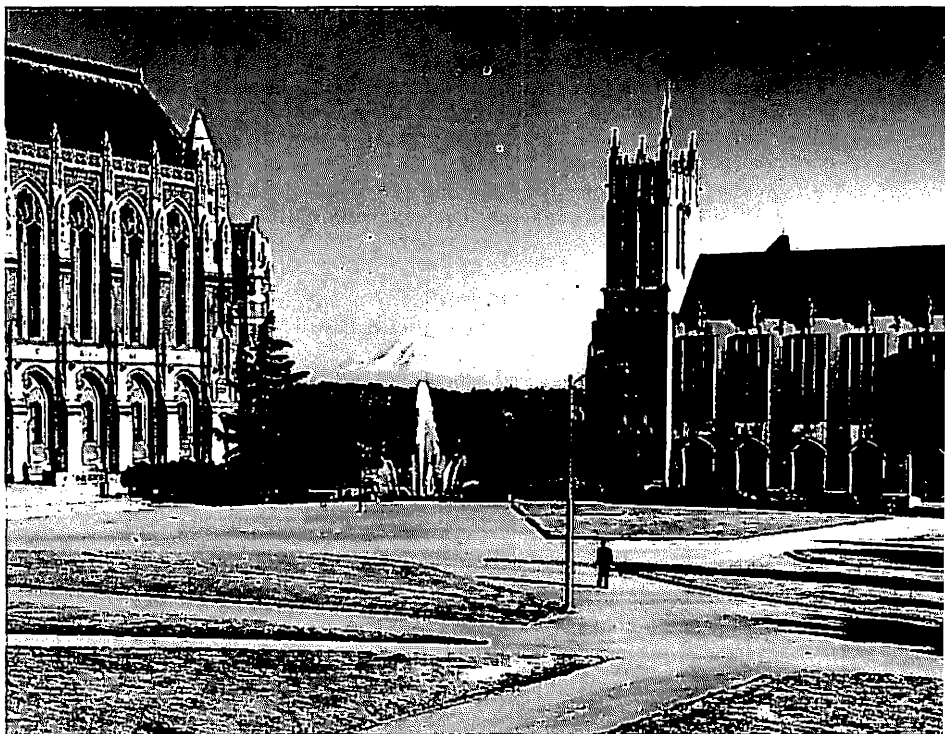


**UNIVERSITY OF
WASHINGTON**

**GRADUATE
SCHOOL**

1963 / 1965

BULLETIN • UNIVERSITY OF WASHINGTON



GRADUATE SCHOOL

1963-1965

BULLETIN, UNIVERSITY OF WASHINGTON is the title of the series of official announcements describing the University's programs. The series includes two general bulletins; bulletins of the colleges and schools; Summer Quarter Bulletin; the bulletin of the Center for Graduate Study at Hanford; and bulletins of the Division of Correspondence Study, and the Division of Evening and Extension Classes.

INTRODUCTION TO THE UNIVERSITY, one of the general bulletins, is especially prepared for new and prospective students. It lists all the University curricula, with their admission requirements, and presents information on other phases of student life, including services for students, student activities, and expenses. HANDBOOK OF SCHOLARSHIPS, another general bulletin, lists the various scholarships available.

Curricula, courses, and scholarship requirements in each field of study are described in the college and school bulletins. Each of these bulletins also discusses services, organizations, and expenses as they relate to students in the particular college or school.

Requests for copies of any of the bulletins should be addressed to the University of Washington Addressograph Service, Seattle 98105.

General Bulletins

INTRODUCTION TO THE UNIVERSITY

HANDBOOK OF SCHOLARSHIPS (Restricted Distribution)

Bulletins of the Colleges and Schools

COLLEGE OF ARCHITECTURE AND URBAN PLANNING

COLLEGE OF ARTS AND SCIENCES

COLLEGE OF BUSINESS ADMINISTRATION

SCHOOL OF DENTISTRY

✓ COLLEGE OF EDUCATION

COLLEGE OF ENGINEERING

COLLEGE OF FISHERIES

COLLEGE OF FORESTRY

GRADUATE SCHOOL

SCHOOL OF LAW

SCHOOL OF MEDICINE

SCHOOL OF NURSING

COLLEGE OF PHARMACY

SCHOOL OF SOCIAL WORK

Other Bulletins

SUMMER QUARTER

CENTER FOR GRADUATE STUDY AT HANFORD

CORRESPONDENCE STUDY

EVENING AND EXTENSION CLASSES

BULLETIN
UNIVERSITY OF WASHINGTON

General Series No. 998

April 1963

Published twice monthly, June, July, August, September, October, and monthly for the remainder of the year, at Seattle, Washington, by the University of Washington. Entered as second-class matter December 18, 1947, at the post office at Seattle, Washington, under the Act of August 24, 1912.

CONTENTS

CALENDAR	5
ADMINISTRATION	14
Board of Regents; Officers of Administration; Directors of Graduate School Administrative Units; Executive Committee of the Graduate School; Graduate Faculty Council and Group Operating Committees	
GENERAL INFORMATION	19
Organization and Administration	19
Philosophy and Objectives	19
Admission to the Graduate School	20
Regular Graduate Student Status; Transient Graduate Student Status; Admission Procedures	
Registration in the Graduate School	24
Regular Graduate Student; Transient Graduate Student; Registration Procedure	
Fees and Expenses	26
Fees for Resident Students; Fees for Nonresident Students; Extra Service Charge; Refund of Fees; Estimate of Yearly Expenses	
Financial Aids: Assistantships, Fellowships, Loans, and Employment	29
Supplementary Information	31
Student Activities and Services; Veterans Information	
THE GRADUATE PROGRAMS	37
General Graduate Degree Program Policies	38
The Graduate Program Adviser; Scholarship; Residence; Continuous Enrollment;	
Graduate Degree Programs Offered and Names of Graduate Program Advisers	40
The Master's Degree	42
Summary of Requirements; Preparation and Advising; Transfer and Extension Credit; Examination; Thesis; Nonthesis Programs; Admission to Candidacy for the Master's Degree	
The Doctor's Degree	44
Summary of Requirements; Preparation and Advising; Appointment of Doctoral Supervisory Committee; Admission to Candidacy for the Doctoral Degree; Dissertation and Final Examination; Publication of Doctoral Dissertations	
Course-Numbering System	46
<i>College of Architecture and Urban Planning</i>	47
Architecture	47
Urban Planning	48
<i>College of Arts and Sciences</i>	49
Anthropology	49
Art	53
Atmospheric Sciences	55
Botany	57
Chemistry	58
Classics	60
Communications	63
Comparative Literature	64
Drama	65
Economics	67
English	70
Far Eastern and Russian Institute	72
Far Eastern and Slavic Languages and Literature	76
Genetics	81
Geography	82
Geology	84
Germanic Languages and Literature	86
History	88
Home Economics	93
Linguistics	94
Mathematics	96
Meteorology and Climatology (See Atmospheric Sciences)	

Music	100	Psychology	113
Oceanography	103	Romance Languages	115
Philosophy	104	Scandinavian Languages	122
Physical and Health Education	106	Sociology	122
Physics	108	Speech	125
Political Science	110	Zoology	128
<i>College of Business Administration</i>	130		
<i>School of Dentistry</i>	139		
<i>College of Education</i>	144		
<i>College of Engineering</i>	150		
Aeronautics and Astronautics	151	Electrical	161
Chemical	154	Mechanical	164
Civil	156	Mineral	168
		Nuclear	173
<i>College of Fisheries</i>	175		
<i>College of Forestry</i>	177		
<i>Graduate School of Public Affairs</i>	180		
<i>Interdisciplinary Programs</i>	182		
Geophysics	182		
Nuclear Engineering	182		
Radiological Sciences	182		
<i>School of Librarianship</i>	184		
<i>School of Medicine</i>	186		
Anatomy	186	Preventive Medicine	193
Biochemistry	188	Conjoint	194
Microbiology	188	Pediatrics	194
Pathology	189	Psychiatry	194
Pharmacology	190	Surgery	195
Physiology and Biophysics	191		
<i>School of Nursing</i>	196		
<i>College of Pharmacy</i>	198		
<i>School of Social Work</i>	201		
SPECIAL SCHOLARLY AND RESEARCH ACTIVITIES AND UNITS	207		
Office of University Research	207		
Intra-University Scholarly and Research Support	207		
Graduate School Research Fund Committee; The Graduate School Research Fund; Agnes H. Anderson Research Fund; The John Danz Lectureships; Walker-Ames and Visiting Professorships; The Gradu- ate School Consultants Fund			
Extra-University Scholarly and Research Support	208		
Gift, Grant, and Contract Research Funds; Research Cooperation With Business or Industry			
Scholarly Facilities of General Importance	209		
Bureau of Governmental Research and Services; Center for Gradu- ate Study at Hanford; Center for Radiological Sciences; Friday Harbor Laboratories; The Institute of Forest Products; Laboratory of Radiation Biology; Office of Scholarly Journals; Research Com- puter Laboratory; University of Washington Pilot School; University of Washington Press			
FACULTY OF THE GRADUATE SCHOOL	217		

CALENDAR

Applications for Admission, Registration Appointments, or Permits received after the deadline for filing will not be considered in the quarter concerned.

Dates in the following Calendar are subject to change without notice. Dates appearing in admission and registration instructions take precedence over those in this Bulletin.

SUMMER QUARTER, 1963**REGISTRATION PERIOD**

General In-Person Registration for ALL students (*by appointment only*):

June 6, 7, and 10
June 17 through 21

New students:

Admission to the University is a prerequisite for registration in Summer Quarter classes. Complete credentials must be filed with the Office of Admissions by May 15 to be considered for admission with Regular standing. See Summer Quarter Bulletin regarding admission as a nondegree Summer Quarter Only Student (undergraduate) or as a Transient Graduate Student. New (entering) students will be mailed Registration Appointments with their Official Notice of Admission.

Students in Residence Spring Quarter, 1963:

Registration Appointments or Permits to register will be issued according to class, only upon presentation of ASUW card in person, at the Registrar's Office as follows:

Seniors and Graduates	Monday, April 22, 8 a.m. to 5 p.m.
Juniors	Tuesday, April 23, 8 a.m. to 5 p.m.
Sophomores	Wednesday, April 24, 8 a.m. to 5 p.m.
Freshmen	Thursday, April 25, 8 a.m. to 5 p.m.

Former Students Not in Residence Spring Quarter, 1963:

Former students not in residence Spring Quarter, 1963, may obtain an Application for Appointment or Permit by writing to, or calling in person at, the Registrar's Office, Room 109, Administration Building, or telephoning 543-5920, beginning April 22 and preferably *no later than May 15*. Registration may be delayed by later application. Registration materials cannot be prepared until an application is received. The application deadline for term "a" and full Summer Quarter is June 17.

All students in the Schools of Law, Dentistry, and Medicine must file an Application for Registration Permit, although no appointment date is necessary.

ACADEMIC PERIOD

JUNE 24—MONDAY	Instruction begins
JUNE 25—THURSDAY	Last day to add a course for the first term
JUNE 28—FRIDAY	Last day to add a course for the full quarter
JULY 4—THURSDAY	Independence Day holiday
JULY 5—FRIDAY	Last day to file applications for master's degrees for Summer Quarter
JULY 24—WEDNESDAY	Final examinations and first term end
JULY 25—THURSDAY	Second term begins
JULY 26—FRIDAY	Last day to add a course for the second term
AUG. 23—FRIDAY	Final examinations and second term end

AUTUMN QUARTER, 1963**REGISTRATION PERIOD**

- MAY 6-29** Advance Registration only for students in residence Spring Quarter, 1963. A service charge of \$15.00 will be assessed any student eligible for Advanced Registration who fails to participate and then applies for In-Person Registration for that quarter.
- SEPT. 10-26** In-Person Registration for students in residence Spring Quarter, 1963, who did not complete Autumn Quarter, 1963, Advance Registration. ALL must pick up a Registration Appointment or Permit to register at the Registrar's Office.
- SEPT. 10-26** In-Person Registration for former students not in residence Spring Quarter, 1963. Appointments and Permits to register may be obtained by writing to or calling at the Registrar's Office. *Deadline for applying for Registration Appointments or Permits is August 15.*
- JULY 15** Deadline for ALL new students to submit Applications for Admission with complete credentials. Registration Appointment will be mailed with Official Notice of Admission.
- SEPT. 1** Deadline for return to Student Health Service (Hall Health Center) of the Health History and Physical Examination report form by all new students and former students who are returning after an absence of one or more calendar years.
- SEPT. 11-26** In-Person Registration for ALL new students.
- SEPT. 26** Last day to register for Autumn Quarter, 1963. Note application deadlines above.
- SEPT. 30-OCT. 4** Change of Registration by appointment only.

ACADEMIC PERIOD

- SEPT. 30—MONDAY** Instruction begins
- OCT. 4—FRIDAY** Last day to add a course
- OCT. 11—FRIDAY** Last day to file applications for master's degrees for Autumn Quarter
- NOV. 11—MONDAY** State Admission Day holiday
- NOV. 27-DEC. 2** Thanksgiving recess (6:30 p.m. to 7:30 a.m.)
- DEC. 9—MONDAY** Last day of instruction
- DEC. 10-17** Final examinations
- DEC. 17—TUESDAY** Quarter ends

WINTER QUARTER, 1964**REGISTRATION PERIOD**

- Nov. 4-22** Advance Registration only for students in residence Autumn Quarter, 1963. A service charge of \$15.00 will be assessed any student eligible for Advance Registration who fails to participate and then applies for In-Person Registration for that quarter.

- DEC. 30-JAN. 2 In-Person Registration for students in residence Autumn Quarter, 1963, who did not complete Winter Quarter, 1964, Advance Registration. ALL must pick up a Registration Appointment or Permit to register at the Registrar's Office.
- DEC. 30-JAN. 2 In-Person Registration for former students not in residence Autumn Quarter, 1963. Appointments and Permits to register may be obtained by writing to or calling at the Registrar's Office. *Deadline for applying for Registration Appointments or Permits is December 1.*
- DEC. 1 Deadline for ALL new students to submit Applications for Admission with complete credentials. Registration Appointment will be mailed with Official Notice of Admission.
- DEC. 20 Deadline for return to Student Health Service (Hall Health Center) of the Health History and Physical Examination report form by all new students and former students who are returning after an absence of one or more calendar years.
- DEC. 30-JAN. 2 In-Person Registration for ALL new students.
- JAN. 2 Last day to register for Winter Quarter, 1964. Note application deadlines above.
- JAN. 6-10 Change of Registration by appointment only.

ACADEMIC PERIOD

- JAN. 6—MONDAY Instruction begins
- JAN. 10—FRIDAY Last day to add a course
- JAN. 17—FRIDAY Last day to file applications for master's degrees for Winter Quarter
- FEB. 22—SATURDAY Washington's Birthday and Founder's Day holiday
- MAR. 11—WEDNESDAY Last day of instruction
- MAR. 12-19 Final examinations
- MAR. 19—THURSDAY Quarter ends

SPRING QUARTER, 1964**REGISTRATION PERIOD**

- FEB. 3-21 Advance Registration only for students in residence Winter Quarter, 1964. A service charge of \$15.00 will be assessed any student eligible for Advance Registration who fails to participate and then applies for In-Person Registration for that quarter.
- MAR. 24-26 In-Person Registration for students in residence Winter Quarter, 1964, who did not complete Spring Quarter, 1964, Advance Registration. ALL must pick up a Registration Appointment or Permit to register at the Registrar's Office.

Applications for Admission, Registration Appointments, or Permits received after the deadline for filing will not be considered for the quarter concerned.

Dates in this Calendar are subject to change without notice. Dates appearing in admission and registration instructions take precedence over those in this Bulletin.

- MAR. 24-26 In-Person Registration for former students not in residence Winter Quarter, 1964. Appointments and Permits to register may be obtained by writing to or calling at the Registrar's Office. *Deadline for applying for Registration Appointments or Permits is March 1.*
- MAR. 1 Deadline for ALL new students to submit Applications for Admission with complete credentials. Registration Appointment will be mailed with Official Notice of Admission.
- MAR. 15 Deadline for return to Student Health Service (Hall Health Center) of the Health History and Physical Examination report form by all new students and former students who are returning after an absence of one or more calendar years.
- MAR. 24-26 In-Person Registration for ALL new students.
- MAR. 26 Last day to register for Spring Quarter, 1964. Note application deadlines above.
- MAR. 30-APR. 3 Change of Registration by appointment only.

ACADEMIC PERIOD

- MAR. 30—MONDAY Instruction begins
- APRIL 3—FRIDAY Last day to add a course
- APRIL 10—FRIDAY Last day to file applications for master's degrees for Spring Quarter
- MAY 30—SATURDAY Memorial Day holiday
- JUNE 3—WEDNESDAY Last day of instruction
- JUNE 4-11 Final examinations
- JUNE 11—THURSDAY Quarter ends
- JUNE 13—SATURDAY Commencement

SUMMER QUARTER, 1964

REGISTRATION PERIOD

General In-Person Registration for ALL students (*by appointment only*):

June 1 through 4
June 11, 12, 15 through 19

New students:

Admission to the University is a prerequisite for registration in Summer Quarter classes. Complete credentials must be filed with the Office of Admissions by May 15 to be considered for admission with Regular standing. See Summer Quarter Bulletin regarding admission as a nondegree Summer Quarter Only Student (undergraduate) or as a Transient Graduate Student. New (entering) students will be mailed Registration Appointments with their Official Notice of Admission.

Students in Residence Spring Quarter, 1964:

Registration Appointments or Permits to register will be issued according to class, *only upon presentation of ASUW card in person*, at the Registrar's Office as follows:

- Seniors and Graduates.....Monday, April 20, 8 a.m. to 5 p.m.
- JuniorsTuesday, April 21, 8 a.m. to 5 p.m.
- SophomoresWednesday, April 22, 8 a.m. to 5 p.m.
- FreshmenThursday, April 23, 8 a.m. to 5 p.m.

Former Students Not in Residence Spring Quarter, 1964:

Former students not in residence Spring Quarter, 1964, may obtain an Application for Appointment or Permit by writing to, or calling in person at, the Registrar's Office, Room 109, Administration Building, or telephoning 543-5920, beginning April 20 and preferably *no later than May 15*. Registration may be delayed by later application. Registration materials cannot be prepared until an application is received. The application deadline for term "a" and full Summer Quarter is June 15.

ALL students in the Schools of Law, Dentistry, and Medicine must file an Application for Registration Permit, although no appointment date is necessary.

ACADEMIC PERIOD

JUNE 22—MONDAY	Instruction begins
JUNE 23—TUESDAY	Last day to add a course for the first term
JUNE 26—FRIDAY	Last day to add a course for the full quarter
JULY 3—FRIDAY	Last day to file applications for master's degrees for Summer Quarter
JULY 4—SATURDAY	Independence Day holiday
JULY 22—WEDNESDAY	Final examinations and first term end
JULY 23—THURSDAY	Second term begins
JULY 24—FRIDAY	Last day to add a course for the second term
AUG. 21—FRIDAY	Final examinations and second term end

AUTUMN QUARTER, 1964**REGISTRATION PERIOD**

MAY 11-29	Advance Registration only for students in residence Spring Quarter, 1964. A service charge of \$15.00 will be assessed any student eligible for Advance Registration who fails to participate and then applies for In-Person Registration for that quarter.
JULY 15	Deadline for ALL new students to submit Applications for Admission with complete credentials. Registration Appointment will be mailed with Official Notice of Admission.
AUG. 28	Deadline for return to Student Health Service (Hall Health Center) of the Health History and Physical Examination report form by all new students and former students who are returning after an absence of one or more calendar years.
SEPT. 1-24	In-Person Registration for students in residence Spring Quarter, 1964, who did not complete Autumn Quarter, 1964, Advance Registration. ALL must pick up a Registration Appointment or Permit to register at the Registrar's Office.
SEPT. 1-24	In-Person Registration for former students not in residence Spring Quarter, 1964. Appointments and Permits to register may be obtained by writing to or calling at the Registrar's Office. <i>Deadline for applying for Registration Appointments or Permits is August 15.</i>

Applications for Admission, Registration Appointments, or Permits received after the deadline for filing will not be considered for the quarter concerned.

Dates in this Calendar are subject to change without notice. Dates appearing in admission and registration instructions take precedence over those in this Bulletin.

SEPT. 2-24	In-Person Registration for ALL new students.
SEPT. 24	Last day to register for Autumn Quarter, 1964. Note application deadlines above.
SEPT. 28-OCT. 2	Change of Registration by appointment only.

ACADEMIC PERIOD

SEPT. 28—MONDAY	Instruction begins
OCT. 2—FRIDAY	Last day to add a course
NOV. 11—WEDNESDAY	State Admission Day holiday
OCT. 9—FRIDAY	Last day to file applications for master's degrees for Autumn Quarter
NOV. 25-30	Thanksgiving recess (6:30 p.m. to 7:30 a.m.)
DEC. 9—WEDNESDAY	Last day of instruction
DEC. 10-17	Final examinations
DEC. 17—THURSDAY	Quarter ends

WINTER QUARTER, 1965**REGISTRATION PERIOD**

Nov. 2-20	Advance Registration only for students in residence Autumn Quarter, 1964. A service charge of \$15.00 will be assessed any student eligible for Advance Registration who fails to participate and then applies for In-Person Registration for that quarter.
DEC. 1	Deadline for ALL new students to submit Applications for Admission with complete credentials. Registration Appointment will be mailed with Official Notice of Admission.
DEC. 18	Deadline for return to Student Health Service (Hall Health Center) of the Health History and Physical Examination report form by all new students and former students who are returning after an absence of one or more calendar years.
DEC. 28-30	In-Person Registration for students in residence Autumn Quarter, 1964, who did not complete Winter Quarter, 1965, Advance Registration. ALL must pick up a Registration Appointment or Permit to register at the Registrar's Office.
DEC. 28-30	In-Person Registration for former students not in residence Autumn Quarter, 1964. Appointments and Permits to register may be obtained by writing to or calling at the Registrar's Office. <i>Deadline for applying for Registration Appointments or Permits is December 1, 1964.</i>
DEC. 28-30	In-Person Registration for ALL new students.
DEC. 30	Last day to register for Winter Quarter, 1965. Note application deadlines above.
JAN. 4-8	Change of Registration by appointment only.

ACADEMIC PERIOD

JAN. 4—MONDAY	Instruction begins
JAN. 8—FRIDAY	Last day to add a course
JAN. 15—FRIDAY	Last day to file applications for master's degrees for Winter Quarter

FEB. 22—MONDAY	Washington's Birthday and Founder's Day holiday
MAR. 12—FRIDAY	Last day of instruction
MAR. 15-19	Final examinations
MAR. 19—FRIDAY	Quarter ends

SPRING QUARTER, 1965**REGISTRATION PERIOD**

FEB. 1-19	Advance Registration only for students in residence Winter Quarter, 1965. A service charge of \$15.00 will be assessed any student eligible for Advance Registration who fails to participate and then applies for In-Person Registration for that quarter.
MAR. 1	Deadline for ALL new students to submit Applications for Admission with complete credentials. Registration Appointment will be mailed with Official Notice of Admission.
MAR. 12	Deadline for return to Student Health Service (Hall Health Center) of the Health History and Physical Examination report form by all new students and former students who are returning after an absence of one or more calendar years.
MAR. 23-25	In-Person Registration for students in residence Winter Quarter, 1965, who did not complete Spring Quarter, 1965, Advance Registration. ALL must pick up a Registration Appointment or Permit to register at the Registrar's Office.
MAR. 23-25	In-Person Registration for former students not in residence Winter Quarter, 1965. Appointments and Permits to register may be obtained by writing to or calling at the Registrar's Office. <i>Deadline for applying for Registration Appointments or Permits is March 1.</i>
MAR. 23-25	In-Person Registration for ALL new students.
MAR. 25	Last day to register for Spring Quarter, 1965. Note application deadlines above.
MAR. 29-APR. 2	Change of Registration by appointment only.

ACADEMIC PERIOD

MAR. 29—MONDAY	Instruction begins
APRIL 2—FRIDAY	Last day to add a course
APRIL 9—FRIDAY	Last day to file applications for master's degrees for Spring Quarter
MAY 31—MONDAY	Memorial Day holiday
JUNE 4—FRIDAY	Last day of instruction
JUNE 7-11	Final examinations
JUNE 11—FRIDAY	Quarter ends

Applications for Admission, Registration Appointments, or Permits received after the deadline for filing will not be considered for the quarter concerned.

Dates in this Calendar are subject to change without notice. Dates appearing in admission and registration instructions take precedence over those in this Bulletin.

SUMMER QUARTER, 1965

REGISTRATION PERIOD

General In-Person Registration for ALL students (*by appointment only*):

June 1 through 3
June 10, 11, 14 through 18

New students:

Admission to the University is a prerequisite for registration in Summer Quarter classes. Complete credentials must be filed with the Office of Admissions by May 15 to be considered for admission with Regular standing. See Summer Quarter Bulletin regarding admission as a nondegree Summer Quarter Only Student (undergraduate) or as a Transient Graduate Student. New (entering) students will be mailed Registration Appointments with their Official Notice of Admission.

Students in Residence Spring Quarter, 1965:

Registration Appointments or Permits to register will be issued according to class, *only upon presentation of ASUW card in person*, at the Registrar's Office as follows:

Seniors and Graduates	Monday, April 19, 8 a.m. to 5 p.m.
Juniors	Tuesday, April 20, 8 a.m. to 5 p.m.
Sophomores	Wednesday, April 21, 8 a.m. to 5 p.m.
Freshmen	Thursday, April 22, 8 a.m. to 5 p.m.

Former Students Not in Residence Spring Quarter, 1965:

Former students not in residence Spring Quarter, 1965, may obtain an Application for Appointment or Permit by writing to, or calling in person at, the Registrar's Office, Room 109, Administration Building, or telephoning 543-5920 beginning April 19 and preferably *no later than May 15*. Registration may be delayed by later application. Registration materials cannot be prepared until an application is received. The application deadline for term "a" and full Summer Quarter is June 15.

ALL students in the Schools of Law, Dentistry, and Medicine must file an Application for Registration Permit, although no appointment date is necessary.

ACADEMIC PERIOD

JUNE 21—MONDAY	Instruction begins
JUNE 22—TUESDAY	Last day to add a course for the first term
JUNE 25—FRIDAY	Last day to add a course for the full quarter
JULY 2—FRIDAY	Last day to file applications for master's degrees for Summer Quarter
JULY 5—MONDAY	Independence Day holiday
JULY 21—WEDNESDAY	Final examinations and first term end
JULY 22—THURSDAY	Second term begins
JULY 23—FRIDAY	Last day to add a course for the second term
AUG. 20—FRIDAY	Final examinations and second term end

AUTUMN QUARTER, 1965

REGISTRATION PERIOD

MAY 10-28

Advance Registration only for students in residence Spring Quarter, 1965. A service charge of \$15.00 will be assessed any student eligible for Advance Registration who fails to participate and then applies for In-Person Registration for that quarter.

JULY 1	Deadline for ALL new students to submit Applications for Admission with complete credentials. Registration Appointment will be mailed with Official Notice of Admission.
AUG. 27	Deadline for return to Student Health Service (Hall Health Center) of the Health History and Physical Examination report form by all new students and former students who are returning after an absence of one or more calendar years.
AUG. 31-SEPT. 23	In-Person Registration for students in residence Spring Quarter, 1965, who did not complete Autumn Quarter, 1965, Advance Registration. ALL must pick up a Registration Appointment or Permit to register at the Registrar's Office.
AUG. 31-SEPT. 23	In-Person Registration for former students not in residence Spring Quarter, 1965. Appointments and Permits to register may be obtained by writing to or calling at the Registrar's Office. <i>Deadline for applying for Registration Appointments or Permits is August 1.</i>
SEPT. 1-23	In-Person Registration for ALL new students.
SEPT. 23	Last day to register for Autumn Quarter, 1965. Note application deadlines above.
SEPT. 27-OCT. 1	Change of Registration by appointment only.

ACADEMIC PERIOD

SEPT. 27-MONDAY	Instruction begins
OCT. 1-FRIDAY	Last day to add a course
OCT. 8-FRIDAY	Last day to file applications for master's degrees for Autumn Quarter
NOV. 11-THURSDAY	State Admission day holiday
NOV. 24-29	Thanksgiving recess (6:30 p.m. to 7:30 a.m.)
DEC. 8-WEDNESDAY	Last day of instruction
DEC. 9-16	Final examinations
DEC. 16-THURSDAY	Quarter ends

For further information concerning subsequent quarters, inquire at the Registrar's Office.

Applications for Admission, Registration Appointments, or Permits received after the deadline for filing will not be considered for the quarter concerned.

Dates in this Calendar are subject to change without notice. Dates appearing in admission and registration instructions take precedence over those in this Bulletin.

ADMINISTRATION

BOARD OF REGENTS

ROBERT J. WILLIS, <i>President</i>	Yakima
HERBERT S. LITTLE, <i>Vice President</i>	Seattle
E. A. ADDINGTON, M.D.	Seattle
MRS. A. SCOTT BULLITT	Seattle
JOSEPH DRUMHELLER	Spokane
JOHN L. KING	Seattle
HAROLD S. SHEFELMAN	Seattle
HELEN E. HOAGLAND, <i>Secretary</i>	
DON H. WAGEMAN, <i>Treasurer</i>	

OFFICERS OF ADMINISTRATION

CHARLES E. ODEGAARD, Ph.D.	<i>President of the University</i>
FREDERICK P. THIEME, Ph.D.	<i>Vice President of the University</i>
ERNEST M. CONRAD, B.A.	<i>Vice President for Business and Finance</i>
GLENN LEGGETT, Ph.D.	<i>Provost</i>
MARION E. MARTS, Ph.D.	<i>Vice Provost</i>
CARL G. YOUNG, B.S.	<i>Registrar</i>
HAROLD A. ADAMS, M.S.	<i>Director of Admissions</i>
DONALD K. ANDERSON, B.A.	<i>Dean of Students</i>
JOSEPH L. MCCARTHY, Ph.D.	<i>Dean of the Graduate School</i>
HENRIETTA WILSON, M.A.	<i>Assistant to the Dean of the Graduate School</i>
JAMES S. BETHEL, Ph.D.	<i>Associate Dean of the Graduate School</i>
GEORGE W. FARWELL, Ph.D.	<i>Associate Dean of the Graduate School</i>
EDWARD C. LINGAFELTER, Ph.D.	<i>Associate Dean of the Graduate School</i>
EDWARD L. ULLMAN, Ph.D.	<i>Associate Dean of the Graduate School</i>
FRANK T. WATKINS, B.S.	<i>Coordinator of Office of University Research</i>

DIRECTORS OF GRADUATE SCHOOL ADMINISTRATIVE UNITS

RALPH M. BALTZO, M.S.	<i>Radiological Safety Division</i>
KERMIT B. BENGTON, Ph.D.	<i>Center for Graduate Study at Richland</i>
BEN S. BRYANT, D.F.	<i>Institute of Forest Products</i>
DAVID B. DEKKER, Ph.D.	<i>Research Computer Laboratory</i>
BREWSTER C. DENNY, Ph.D.	<i>Graduate School of Public Affairs</i>
LAUREN R. DONALDSON, Ph.D.	<i>Laboratory of Radiation Biology</i>
DONALD R. ELLEGOOD, M.A.	<i>University of Washington Press</i>
ROBERT L. FERNALD, Ph.D.	<i>Friday Harbor Laboratories</i>
EMILY JOHNSON, B.A.	<i>Office of Scholarly Journals</i>
IRVING LIEBERMAN, Ed.D.	<i>School of Librarianship</i>
JOSEPH L. MCCARTHY, Ph.D.	<i>Center for Radiological Sciences</i>
GEORGE A. SHIPMAN, Ph.D.	<i>Institute for Administrative Research</i>
C. R. STROTHER, Ph.D.	<i>University of Washington Pilot School</i>
DONALD H. WEBSTER, Ph.D.	<i>Bureau of Governmental Research and Services</i>

EXECUTIVE COMMITTEE OF THE GRADUATE SCHOOLJOSEPH L. MCCARTHY, *Chairman*ALICE H. HAYDEN, *Group V*J. B. McDIARMID, *Group I*E. H. DILL, *Group VI*RUTH E. PENINGTON, *Group II*E. H. FISCHER, *Group VII*M. G. ARSOVE, *Group III*FLORENCE T. HALL, *Group VIII*W. R. MURPHEY, *Group IV***GRADUATE FACULTY COUNCIL AND
GROUP OPERATING COMMITTEES**

(The combined membership of the eight Group Operating Committees comprises the Graduate Faculty Council—Joseph L. McCarthy, *Chairman*.)

GROUP I.

Edward E. Bostetter, John B. McDiarmid (Chairman), William H. Rey, Victor Erlich, and Andrew R. Hilén, Jr.

GROUP II.

Barnet Baskerville, A. S. Edelstein, Gregory Falls, Ruth E. Penington (Chairman), and Victor Steinbrueck.

GROUP III.

Maynard G. Arsove (Chairman), Allen C. Delacy, G. D. Halsey, M. Rattray, and Edwin H. Uehling.

GROUP IV.

S. W. Bijou, W. Stull Holt, J. Richard Huber, W. R. Murphey (Chairman), and Clarence Schrag.

GROUP V.

Guy G. Gordon, Alice H. Hayden (Chairman), Fred J. Mueller, J. W. McGuire, and J. Rosenzweig.

GROUP VI.

Ellis H. Dill (Chairman), S. P. Gessel, Billy J. Hartz, L. N. Johanson, and Earl C. Roberts.

GROUP VII.

W. H. Akeson, Edmond H. Fischer (Chairman), Neal B. Groman, Lyle H. Jensen, and R. T. Prehn.

GROUP VIII.

Elizabeth C. Giblin, David H. Gronewold, Florence T. Hall (Chairman), L. W. Rising, and Saul Schluger.



GENERAL INFORMATION

GENERAL INFORMATION

THE UNIVERSITY OF WASHINGTON GRADUATE SCHOOL was formally established in 1911 and over the years it has grown steadily in quality, scope, and size.

Programs leading to master's and doctoral degrees are offered in sixty-one departments or other organizational units within twelve schools and colleges of the University. Graduate instruction and the supervision of the research of graduate students is conducted by a Graduate Faculty of some seven hundred senior professors. About thirty-five hundred graduate students are now in residence, seeking their master's or doctoral degrees in the Graduate School at the University of Washington, and some three hundred postdoctoral students are also in residence.

In addition to its primary role in relation to graduate students, graduate faculty, and graduate study programs and degrees, the Graduate School is also responsible for the administration of certain academic or research activities and facilities of general significance in all or many fields of knowledge throughout the University.

ORGANIZATION AND ADMINISTRATION

The Graduate School is administratively responsible for graduate study in whatever division of the University such study is undertaken. This involves supervision of student programs which go beyond formal undergraduate work or the work of the professional schools into areas of advanced training, education, research, and scholarship.

The Graduate School is administered through the Office of the Dean, the Executive Committee of the Graduate School, Group Operating Committees, and the Graduate Faculty Council. The Graduate Faculty Council is composed of representatives elected to eight Group Operating Committees by the members of the graduate faculty, and it and the Executive Committee of the Graduate School serve as the legislative and policy-making bodies of the graduate faculty. The Executive Committee consists of the Dean of the Graduate School and the elected chairman of each of the eight group Operating Committees; it acts as an advisory group to the Dean and as an administrative committee for the Graduate Faculty Council.

PHILOSOPHY AND OBJECTIVES

The Graduate School recognizes major responsibilities in three closely related fields—teaching, research, and public service.

Highly able students who have completed baccalaureate programs are offered the opportunity further to improve their knowledge, understanding, and ability to create and to practice in their chosen fields. Their achievements may be recog-

nized by the award of the degree of Master at the end of one or two years of study, or Doctor at the end of three or more years of study. Students who have completed advanced degree programs usually serve as teachers, research or administrative leaders, or professional practitioners in their respective fields.

In contrast with undergraduate work, graduate study is ordinarily focused quite sharply on some specific field, and the student is expected to develop and demonstrate substantial initiative, mature judgment, and creativeness. Often the graduate student carries on his program in close association with his chosen professor in a tutorial type relationship.

Many diverse programs of graduate study are available. In nearly all of these, two objectives can be distinguished, although their relative importance may differ. In many programs particular emphasis is placed on leading the student to excellence in his ability to teach, and to create new knowledge by research; his achievements are recognized by the award to him of the Master of Arts or the Master of Science degree, or the Doctor of Philosophy degree. In other programs emphasis is placed on leading the student to excellence in his ability to practice the art of his field or profession; in these cases his achievements are recognized by the award to him of a more specifically designated degree such as Master of Nursing or Master of Science in Electrical Engineering or of Doctor of Education.

A program of graduate study normally includes advanced class work and lectures but is particularly characterized by the independent study and research which the graduate student is expected to conduct. The results of this independent study and research are set forth in a master's thesis or a doctoral dissertation. A master's thesis is a modest contribution to knowledge, or a review or a report on knowledge, or a design, or a composition in the student's field. A doctoral dissertation should set forth a significant contribution to knowledge in the student's field, presented in scholarly form and demonstrating that he is now competent to conduct reliable, important, and independent research.

The Graduate School is concerned basically with the fundamental and applied research activities conducted throughout the University, and endeavors to assist in the development of arrangements, funds, and facilities needed to encourage and support the research activities of the professors, students, and other scholars and scientists engaged in investigational work. The Graduate School is also concerned with the maintenance and steady improvement in the public service provided by the University to the state, the region, and the nation, and especially including research cooperation with other institutions and with business and industry.

The primary contributions from the University's Graduate School to the community are to be found in the students who have achieved high levels of competence as evidenced by their completion of programs of advanced study, and in the significant research results obtained by these students, their professors, and other scholars and scientists associated with the University.

ADMISSION TO THE GRADUATE SCHOOL

REGULAR GRADUATE STUDENT STATUS

In general, properly qualified students who are graduates of the University of Washington or of other colleges or universities of recognized rank may be admitted to the Graduate School.

The primary criterion for admission to the Graduate School is the applicant's apparent ability, as decided by the University, to progress satisfactorily in a graduate degree program. The applicant's scholastic record is of major importance and, ordinarily, the applicant should have at least a B or 3.00 grade-point average for the courses taken during the junior and senior years of his undergraduate study. He should also show completion of an undergraduate program appropriate as preparation for graduate study in his chosen field. Con-

sideration will also be given to other evidence which may be available. In some cases, an applicant may give promise of making satisfactory progress in graduate work although his undergraduate grade average may be less than B or 3.00 or his undergraduate preparation may be inadequate; in these cases and other unusual cases an applicant may be admitted to the Graduate School on the favorable written recommendation of the appropriate University of Washington departmental chairman or Graduate Program Adviser with approval by the Dean of the Graduate School. The University will be able to grant admission only if sufficient faculty and facilities are available to provide for the applicant's program.

Admission to the Graduate School usually signifies admission into a particular program of graduate study leading to a master's degree or the equivalent, or into post-master study if the student admitted has already received a master's degree or successfully completed equivalent graduate study. Acceptance of a graduate student into a program of study leading to a doctoral degree is *not* implied by admission to the Graduate School but is usually signified by the appointment of a doctoral Supervisory Committee for a graduate student who has been previously admitted to the Graduate School and has demonstrated the apparent ability, as decided by the University, to progress satisfactorily in a doctoral degree program.

Ordinarily, only students who have been admitted to the Graduate School are permitted to enroll in courses numbered 500 or above and to gain credits applicable to the fulfillment of advanced degree programs.

Admission to the Graduate School provides the opportunity for continuance of graduate study and research only for the period during which the graduate student maintains satisfactory performance and progress toward completion of his graduate degree program, along with a status of physical and mental health approved by the University. The Dean of the Graduate School may alter the status of a graduate student.

TRANSIENT GRADUATE STUDENT STATUS

A student who wishes to enroll for a single summer session or a single quarter in the Graduate School at the University of Washington, and who intends thereafter to return to the graduate school in which he is carrying forward his program of studies for an advanced degree, may be admitted as a *Transient Graduate Student*.

He must have been officially admitted to another recognized graduate school and be in good standing and actively pursuing a graduate program at present or during the past ten years at that institution. He need not submit a full transcript of his credits, but must apply for admission, pay the \$5.00 admission application fee, and ask the dean of his graduate school to certify as to his status on a special form titled "Transient Graduate Student Enrollment Application," which may be obtained by writing to the Dean of the Graduate School or the Director of Admissions at the University of Washington, Seattle, Washington 98105.

Admission to the University of Washington as a Transient Graduate Student *does not guarantee* admission to any particular course of study. A Transient Graduate Student will be permitted to register only in those courses for which he is judged to be eligible by a faculty adviser or the instructor in the course, and if space is available to accommodate his registration.

For any student admitted on this basis, it is understood that his registration shall terminate at the end of the single quarter or the single summer session for which he is enrolled. If at any later time he wishes to apply for admission to the Graduate School of this University to work toward a degree, he must, of course, make formal application and submit complete credentials. If a Transient Graduate Student is later given formal admission and enters upon work toward a degree at the University of Washington, he may petition the Dean of the Graduate School for allowance of credit for courses taken as a Transient Graduate Student to apply to the work for such a degree.

ADMISSION PROCEDURES

Requests for the forms, "Application for Admission to the Graduate School," "Transient Graduate Student Enrollment Application," and correspondence regarding admission should be addressed to the University of Washington, Office of Admissions, Seattle, Washington 98105.

Each application for admission to the Graduate School as a Regular Graduate Student or as a Transient Graduate Student for Winter Quarter, 1964, and for any quarter thereafter is subject to an application fee of five dollars (\$5.00). Payment must accompany the application (U.S. dollars only). This fee is not refundable and is not credited against any other fees charged by the University.

REGULAR GRADUATE STUDENT

The application for admission form, the required transcripts, and the \$5.00 admission application fee must be filed, according to instructions appearing on the application form, with the Office of Admissions prior to the following dates in order to be assured of consideration for admission to the quarter for which application is being made: July 15 for Autumn Quarter; December 1 for Winter Quarter; March 1 for Spring Quarter; May 15 for Summer Quarter. In some cases, departments have an earlier admission deadline which must be observed. Please check in this bulletin the section pertaining to the appropriate department.

When the required application forms, official credentials, and the \$5.00 admission application fee have been received, an evaluation will be made and the applicant will be notified of his admission status.

All records become a part of the official file and can be neither returned nor duplicated for any purpose. A student should obtain an additional copy of his official credentials to keep in his possession for advisory purposes. Failure to submit complete credentials will be considered a serious breach of honor and may result in permanent dismissal from the University.

A leaflet giving general information and instructions for registration is mailed to new students with the notice of admission. In the event of a discrepancy, instructions in the leaflet supersede those found in earlier publications. *The University assumes no responsibility for students who do not apply the information or observe the instructions given in the leaflet or for applicants who come to the campus before they have been officially notified of their admission.*

The admissions credentials of applicants who do not register for the quarter to which they have been admitted are normally retained in the Office of Admissions for a period of one year from the date of application. At the end of this period, credentials on file are discarded unless the applicant has notified the Admissions Office of his continued interest in attending the University or of his enrollment in the Evening and Extension Classes program. Should a student wish to renew his application after the one-year lapse, he must submit a new application and new credentials and pay the \$5.00 admission application fee in advance of the dates given above for the quarter desired.

University of Washington Graduates. University of Washington graduates apply for admission in the same manner, pay the \$5.00 admission application fee, and satisfy the same requirements as students completing their baccalaureate degrees at other schools. They may obtain the appropriate forms from the Office of Admissions. Former students of the University of Washington who were not in residence the preceding Spring Quarter are given until September 15 to file complete credentials for an Autumn Quarter application.

University of Washington students who are within six credits of completing their undergraduate work and who otherwise meet the requirements for admission to the Graduate School may register the quarter just prior to admission to the Graduate School for as many as six credits in graduate courses in addition to their six credits of undergraduate work. This registration and these arrangements must receive prior approval by the Graduate School; however, students concerned will

not be reclassified as graduates until the bachelor's degree has been granted and after their official admission to the Graduate School. Only under these circumstances may graduate work taken as an undergraduate be applied toward an advanced degree. Further registration for graduate work is contingent upon completion of the requirements for the bachelor's degree.

Foreign Students and Students Educated Abroad. Applicants for admission with graduate standing are expected to meet the same general requirements as all other applicants educated in American schools. However, the admission application, official credentials, and the \$5.00 admission application fee must be received in the Office of Admissions at the University of Washington before March 1 to be considered for admission Autumn Quarter, or six months before the opening of another quarter in which they wish to enroll. In addition, applicants must demonstrate a satisfactory command of English and must have sufficient funds available in the United States to meet their expenses.

The \$5.00 fee which must accompany the admission application is payable in currency of the United States in the form of an International Postal Money Order, a bank draft on a United States Bank, or an American Express Check.

Veterans. Veterans and children of deceased veterans must meet the general admission criteria and follow the general procedures outlined for all applicants. Applications for and questions about government aid should be addressed to the Veterans Administration Regional Office. For additional information, see page 32.

TRANSIENT GRADUATE STUDENTS

The "Application for Admission to the Graduate School" form, the "Transient Graduate Student Enrollment Application" form, appropriately completed and signed by the dean of the applicant's "home" graduate school, and the \$5.00 admission application fee must be filed with the Office of Admissions prior to the following dates: September 15 for Autumn Quarter; December 15 for Winter Quarter; March 15 for Spring Quarter; June 15 for Summer Quarter.

UNCLASSIFIED V STUDENTS

A student admitted to Unclassified V status is *not* in the Graduate School. He must have a bachelor's degree and may be admitted to Unclassified V status in one of the undergraduate colleges to pursue the following objectives: (1) to qualify for a second bachelor's degree, (2) to qualify for a teaching certificate, (3) to strengthen academic record for later application to the Graduate School, or (4) to take additional undergraduate courses for some other purpose.

Ordinarily students in Unclassified V status may not register for courses numbered 500 and above. Courses completed while in the Unclassified V status may not be applied later to an advanced degree in the Graduate School.

SECOND BACHELOR'S DEGREE

Students who wish to obtain a second bachelor's degree register as Unclassified V Students in the undergraduate college from which they expect to obtain the degree, not in the Graduate School.

MEDICAL CLEARANCE

A student entering the University for the first time, or returning to the University after an absence of more than one calendar year, or who has previously attended Summer Quarter classes but is entering regular University classes for the first time, is required to submit to the Student Health Service (Hall Health Center) a form containing his health history and a report of a physical examination by a physician. The form will be sent to new students by the Office of Admissions, and to returning former students by the Registrar. This examination, which is required before a student may register, is taken at the student's expense. A chest X ray, also required of the above students, is given at the Student Health Service without charge.

With the exception of Canadian students, who will follow the above instructions, foreign students must take the required physical examination at the Student Health Service when they arrive on campus.

REGISTRATION IN THE GRADUATE SCHOOL

REGULAR GRADUATE STUDENT

A Regular Graduate Student is a student who fulfills the following requirements: (1) he has been granted regular admission to the Graduate School; (2) his current Program of Studies is satisfactory to the Dean of the Graduate School; (3) he has received medical clearance from the Student Health Service; and (4) he has completed all of the required steps for registration, including paying tuition and fees, the filing of class cards, and the depositing of registration materials at Sections.

Graduate students are required to maintain continuous enrollment from the time of their first registration until completion of the advanced degree. Details of Continuous Enrollment appear on page 39 of this *Bulletin*.

TRANSIENT GRADUATE STUDENT

This classification is designed to accommodate the student actively pursuing an advanced degree program in another recognized graduate school, who wishes to enroll at the University of Washington for a single quarter as a nondegree student. Such students follow regular registration procedures.

REGISTRATION PROCEDURE

ALL students, currently attending the University, who plan to register for a succeeding quarter (Summer Quarter excepted) must register by Advance Registration and pay fees by the stated deadline. Students are held responsible for knowing and observing registration procedures, dates, and deadlines which appear in the bulletins, in "Official Notices," in the *Daily*, and on campus bulletin boards.

New students are given appointments when they are notified of admission, and they receive complete directions for registering at the time of registration.

Students expecting to return to the University after an absence of a quarter or more (excluding Summer Quarter) must register by In-Person Registration. The required registration appointment may be obtained by writing to, calling at, or telephoning the Registrar's Office at the time specified in the Calendar, but in *no case* later than the stated deadline (see pages 5 to 13).

ADVISING

After notification of admission and before registration, the student should confer with his departmental Graduate Program Adviser about the program for his current registration, which must be approved by the Graduate Program Adviser before it is presented to the Graduate School Office. As soon as the student's Supervisory Committee is appointed, he should meet with this Committee and work out plans for his entire graduate program. It is primarily to this Committee, and especially the Chairman of his Supervisory Committee and to the Graduate Program Adviser in his department, that the student must look for individual counsel, guidance, and instruction in the scholarly study and research which characterize graduate work.

REGISTERED CREDITS ALLOWED EACH QUARTER

The maximum load for graduate students is regarded as 15 credits per quarter; 12 credits constitute a normal load. The programs of students employed in the University or elsewhere will be limited. Students who are employed full time may not register for more than 6 credits.

Only courses numbered 400, 500, and 600 can be applied to credit in the

major field for advanced degrees. Courses numbered 300 are not applicable to credit toward advanced degrees except when applied by permission toward the graduate minor or supporting courses.

CHANGES IN REGISTRATION

After students have registered, they cannot change their schedules except with permission of the appropriate Graduate Program Adviser and the Dean of the Graduate School. No student is permitted to make a registration change that involves entering a new course after the first calendar week of the quarter. After that time no student may register without the consent of the Dean of the Graduate School and of the instructor whose class the student wishes to enter.

WITHDRAWAL FROM A COURSE

Official withdrawal from a course is made only under the following conditions: (1) during the first 15 calendar days of a quarter, with the consent of the withdrawing student's adviser; (2) after the first 15 calendar days of a quarter and before the end of the first six calendar weeks of a quarter, with the approval of both the instructor of the course from which withdrawal is sought and of the dean of the college in which the withdrawing student is enrolled; and (3) after the first six calendar weeks of a quarter and before final examination week, only upon certification in writing to the Registrar by the dean of the college in which the withdrawing student is enrolled that, in the judgment of the dean, withdrawal is necessitated by the student's hardship. Withdrawals from courses by any other method are unofficial withdrawals which are entered on a student's record as EW, and are assigned the value of E in the computation of the student's grade-point average. No official withdrawal may be made during final examination week.

Official withdrawals are entered on a student's record as follows: (1) a withdrawal within the first 15 calendar days of a quarter, as W; (2) a withdrawal after the first 15 calendar days of a quarter, and before Final Examination Week, as PW, if the student's work has been satisfactory, and as E, if the student's work has been unsatisfactory. Grades of PW and W are assigned no value in the computation of grade-point averages.

WITHDRAWAL FROM THE UNIVERSITY

The student should obtain at the office of the Dean of the Graduate School the Request for Withdrawal From the University form. The same system of grading applies as that prescribed under Withdrawal From a Course.

CHANGES IN UNIVERSITY REGULATIONS

The University and its colleges and schools reserve the right to change the fees, rules, and calendar regulating admission and registration, instruction in, and graduation from the University and its various divisions, and to change any other regulations affecting the student body. Changes shall go into force whenever the proper authorities so determine, and shall apply not only to prospective students but also to those who at that time are matriculated in the University. The University also reserves the right to withdraw courses at any time.

A graduate student must satisfy the requirements for an advanced degree which are in force at the time the degree is to be awarded.

OBSERVANCE OF UNIVERSITY RULES AND REGULATIONS

It is the University's expectation that a student will follow University rules and regulations as they are stated in the Bulletins. In instances where no appeal procedure is spelled out and the student is persuaded that a special set of circumstances makes appeal reasonable, he may appeal the application of specific rules or regulations to the Office of the Dean of the School or College in which he is enrolled in the case of an academic matter, or to the Office of the Dean of Students in the case of a nonacademic matter. These offices will either render a decision on the appeal or refer the student to the proper office for a decision.

FEES AND EXPENSES

The fee schedules shown on the facing pages for resident and nonresident students, apply to the academic year (Autumn, Winter, and Spring Quarters). Summer fees are listed in the *Summer Quarter Bulletin*.

FEES FOR RESIDENT STUDENTS

A resident is one who has been domiciled in Washington for at least a year immediately prior to registration.

Type of Registration	Example of Autumn, Winter, or Spring Quarter Fees			
	Tuition Fee	Incidental Fee	ASUW Membership Fee ¹	TOTAL FEES
Full-Time Students ² (undergraduate and graduate) except Medical and Dental students ³	\$35.00	\$56.50	\$8.50	\$100.00
Part-Time Students ² (max. 6 credits exclusive of ROTC) ⁴	35.00	39.00	*	74.00
Ex-service personnel of World Wars I and II ⁵ (Chapter 46, Laws of 1945)				
Full-time		56.50	8.50	65.00
Part-time (max. 6 credits) ⁴		39.00	*	39.00
On-Leave Students ⁶ (for graduate students only)		5.00 ⁶		5.00 ⁶
On-Leave Summer Quarter Only Students ⁷ (for graduate students only)				0.00 ⁷
Auditors		39.00	*	39.00

* ASUW Membership and Fee is optional for Part-Time Students, and if desired, ASUW Fee should be added to Part-Time Registration Fee.

¹ Athletic admission ticket is optional for ASUW members and the cost is: Autumn, Winter, and Spring Quarters, \$6.50; Winter and Spring Quarters, \$3.50; and Spring Quarter, \$3.50.

² Full-Time or Part-Time registration of graduate students for work *in absentia* will be permitted only when the graduate student has petitioned and secured the approval of his Supervisory Committee Chairman or Graduate Program Adviser and of the Dean of the Graduate School.

³ Students working toward advanced degrees in dentistry and surgery pay the regular tuition at the schools of Dentistry and Medicine, and miscellaneous fees.

⁴ Load hour equivalents of noncredit courses must be counted in the 6 credits.

⁵ See Veterans Information (page 32) to determine eligibility.

⁶ On-Leave registration must be requested by a graduate student in a petition approved by his Supervisory Committee Chairman or his Graduate Program Adviser and the Dean of the Graduate School, and is appropriate only when the graduate student expects to withdraw temporarily from active work toward his advanced degree and plans to be away from the University and out of contact with the University faculty and facilities for a period of time usually not to exceed three successive quarters. The On-Leave registration fee of \$5.00 provides for a maximum On-Leave registration period of three successive academic quarters or any part thereof and is not refundable. At or before the end of the period of the On-Leave registration, a graduate student must register as a Full-Time or Part-Time Student (or, in unusual cases, secure permission for a further On-Leave registration) or else it will be assumed that the graduate student has resigned from the University.

⁷ On-Leave Summer Quarter Only registration is the same as On-Leave registration except that it is available for *Summer Quarter only* and does not require payment of the fee.

All fees, extra service charges, and rentals are payable in United States dollars at the time of registration. The University reserves the right to change any of its fees and charges without notice.

FEES FOR NONRESIDENT STUDENTS

Prospective students are classified as nonresidents when their credentials come from schools outside Washington. If they believe they are residents, they may petition the Residence Classification Office, 205A Administration Building, for a change of classification.

Type of Registration	Example of Autumn, Winter, or Spring Quarter Fees			
	Tuition Fee	Incidental Fee	ASUW Membership Fee ¹	TOTAL FEES
Full-Time Students ² (undergraduate and graduate) except Medical and Dental students ³	\$105.00	\$86.50	\$8.50	\$200.00
Part-Time Students ² (max. 6 credits exclusive of ROTC) ⁴	105.00	69.00	*	174.00
Ex-service personnel of World Wars I and II ⁵ (Chapter 46, Laws of 1945)				
Full-time	52.50	86.50	8.50	147.50
Part-time (max. 6 credits) ⁴	52.50	69.00	*	121.50
On-Leave Students ⁶ (for graduate students only)		5.00 ⁶		5.00 ⁶
On-Leave Summer Quarter Only Students ⁷ (for graduate students only)				0.00 ⁷
Auditors		39.00	*	39.00

* ASUW Membership and Fee is optional for Part-Time Students, and if desired, ASUW Fee should be added to Part-Time Registration Fee.

¹ Athletic admission ticket is optional for ASUW members and the cost is: Autumn, Winter, and Spring Quarters, \$6.50; Winter and Spring Quarters, \$3.50; and Spring Quarter, \$3.50.

² Full-Time or Part-Time registration of graduate students for work *in absentia* will be permitted only when the graduate student has petitioned and secured the approval of his Supervisory Committee Chairman or Graduate Program Adviser and of the Dean of the Graduate School.

³ Students working toward advanced degrees in dentistry and surgery pay the regular tuition at the schools of Dentistry and Medicine, and miscellaneous fees.

⁴ Load hour equivalents of noncredit courses must be counted in the 6 credits.

⁵ See Veterans Information (page 32) to determine eligibility.

⁶ On-Leave registration must be requested by a graduate student in a petition approved by his Supervisory Committee Chairman or his Graduate Program Adviser and the Dean of the Graduate School, and is appropriate only when the graduate student expects to withdraw temporarily from active work toward his advanced degree and plans to be away from the University and out of contact with the University faculty and facilities for a period of time usually not to exceed three successive quarters. The On-Leave registration fee of \$5.00 provides for a maximum On-Leave registration period of three successive academic quarters or any part thereof and is not refundable. At or before the end of the period of the On-Leave registration, a graduate student must register as a Full-Time or Part-Time Student (or, in unusual cases, secure permission for a further On-Leave registration) or else it will be assumed that the graduate student has resigned from the University.

⁷ On-Leave Summer Quarter Only registration is the same as On-Leave registration except that it is available for *Summer Quarter only* and does not require payment of the fee.

EXTRA SERVICE CHARGE

A registration service charge of \$15.00 is assessed those students: (1) eligible for Advance (mail) Registration who fail to participate; or (2) who, after the established application deadline, are granted Appointments or Permits to register by In-Person Registration by action of the Registration Appeal Board. A late registration charge of \$15.00 is assessed students eligible for In-Person Registration who fail to register before the first day of instruction Autumn, Winter, and Spring Quarters by action of the Registration Appeal Board. A charge of \$5.00 is assessed Autumn, Winter, and Spring Quarters for each change of registration or change of section or number of changes which are made simultaneously, except that there is no charge when the change is made on the initiative of the University.

<i>Athletic Admission Ticket</i> (optional for ASUW members)	3.50-6.50
Autumn, Winter, and Spring Quarters, \$6.50; for Winter and Spring Quarters only, \$3.50; for Spring Quarter only, \$3.50.	
<i>Language Examination</i>	1.00
This charge is assessed for a foreign language reading examination.	
<i>Breakage Ticket</i>	3.00
Required in some laboratory courses; ticket is returnable for full or partial refund.	
<i>Graduate Admission Application Fee</i> (not refundable)	5.00
<i>Quarterly Grade Report</i>	.50
One grade report will be issued each quarter without charge; the charge, payable in advance, is assessed for each additional copy.	
<i>Transcripts</i>	1.00
One transcript is furnished without charge; the charge, payable in advance, is assessed for each additional copy.	
<i>Thesis Binding and Publication</i>	
Master's degree candidates	2.00
The charge covers the cost of binding one copy for the University Library.	
Doctor's degree candidates	25.00
The charge covers the cost of binding manuscript copies for the University Library and the cost of microfilm publication.	
<i>Graduation Exercises Diploma</i>	5.00
<i>Removal of an Incomplete</i>	2.00

REFUND OF FEES

All fees will be refunded in full if complete withdrawal from the University is made during the first three calendar days of the quarter; one-half the amount will be refunded if withdrawal is made during the first thirty calendar days. Fee refunds are not made to students withdrawing under discipline.

Applications for refund may be refused unless they are made during the quarter in which the fees apply.

At least two weeks must elapse between payment and refund of fees, if payment was made by check.

VETERANS FEES

See supplementary information, page 32 this section.

ESTIMATE OF YEARLY EXPENSES

The figures given below are minimum estimates for an academic year, which includes Autumn, Winter, and Spring Quarters. Living costs and personal expenses vary widely with the needs of the individual student.

Tuition, Incidental, and ASUW Membership Fees

Full-time resident student	\$300.00
Full-time nonresident student	600.00

Athletic Admission Ticket (optional) 6.50

Health and Accident Insurance (optional) 17.25

Books and Supplies 90.00

Board and Room

Room and meals in Men's Residence Halls 780.00

Room and meals in Women's Residence Halls 735.00-825.00

Personal Expenses 300.00

FINANCIAL AIDS: ASSISTANTSHIPS, FELLOWSHIPS, LOANS, AND EMPLOYMENT

Students applying for fellowships and assistantships should make certain that complete transcripts and credentials are on file by March 1 (earlier in some departments). Usually awards and appointments are made about April 1 or earlier. Application forms may be secured by writing to the Graduate School.

ASSISTANTSHIPS

The Graduate School provides for the employment of many graduate students as research and teaching assistants and predoctoral associates. Such appointments give students opportunities for self-support and for valuable experience. More than 750 such appointments were made during the past year.

Appointments are granted only to graduate students of high intellectual competence and attainment whose educational goals are clearly defined. An appointment is made only when it is reasonably certain that it will help the student toward the attainment of his goal. Succeeding appointments may be made if the student's progress toward the degree is satisfactory. Maintenance of high scholarship will also be a condition of reappointment.

Students holding appointments are required to render 20 hours of service per week to the University. The appointments may be on a nine-month basis and ordinarily cover the period running from September 16 through June 15. Predoctoral associate appointments and other graduate student assistantships do not provide for paid vacation or sick leave.

Students who accept appointments as predoctoral associates and/or teaching and research assistants must confine their employment to such appointments and **MUST BE REGISTERED FOR A MINIMUM OF 9 CREDITS OF RESEARCH, COURSE, OR THESIS OR DISSERTATION WORK EACH QUARTER DURING THE PERIOD OF THEIR APPOINTMENTS.**

Students holding these appointments pay resident tuition and fees.

Students holding appointments may not also hold foreign student tuition scholarships.

PREDOCTORAL ASSOCIATES. Persons holding such appointments shall hold a master's degree or its equivalent and shall give evidence of good teaching and/or research ability. They must be actively pursuing the doctor's degree. Such persons may be appointed to either teaching or research responsibilities in the University; they do not have faculty status. Appointments are ordinarily on a nine-month basis and normally may not be held for more than three years. The current stipend (1963-64) for a nine-month appointment is \$2,664.

TEACHING ASSISTANTS. The services of teaching assistants will be limited to the supervision and leadership of quiz sections, discussion sections, or laboratory

sections, service as class assistants, and other services strictly comparable to these. No assistant will be given the reading and grading of papers as his whole assignment, but reading may be combined with the duties enumerated. Teaching assistants will not be permitted to be in charge of a course, but will be given some degree of responsibility in the supervision of laboratory or classroom work so that they may be introduced to teaching activities gradually and effectively. The current stipend (1963-64) for a nine-month appointment is \$2,403.

RESEARCH ASSISTANTS. Recipients of research assistantships will engage in research as assistants in research activities for which a faculty member is responsible. The current stipend (1963-64) for a nine-month appointment is \$2,403.

STUDENT ASSISTANTSHIPS. Graduate students may be hired on an hourly basis to assist faculty members in teaching and research. Readers are so classified, as are students who give routine assistance in research.

FELLOWSHIPS AND SCHOLARSHIPS

GRADUATE SCHOOL FELLOWSHIPS. These carry stipends ranging from \$300 to \$2,500 and are available to outstanding graduate students in all fields of study leading to advanced degrees. Application should be made by March 1. These awards are usually made only to students who have successfully completed at least one year of graduate study.

DEPARTMENTAL FELLOWSHIPS. Available in many areas. Stipends range from \$250 to \$3,700. Application should be made by February 15. For information regarding such fellowships, write to the appropriate department.

NATIONAL DEFENSE EDUCATION ACT FELLOWSHIPS. Awarded in a number of areas each year. Applications for TITLE IV PROGRAMS must be received by February 15. TITLE VI MODERN FOREIGN LANGUAGE FELLOWSHIP applications must be received in early January.

NATIONAL SCIENCE FOUNDATION FELLOWSHIPS. Available through the University of Washington under both the Cooperative Graduate Fellowship Program and the Program of Summer Fellowships for Graduate Teaching Assistants. The University also participates in the National Science Foundation Graduate Fellowship Program.

FELLOWSHIPS AND TRAINEESHIPS. Available through participation by the University of Washington in the programs of the Woodrow Wilson National Fellowship Foundation, the National Institutes of Health, the National Aeronautics and Space Administration, the Atomic Energy Commission, and other agencies, foundations, and institutes. Special fellowships are awarded under the terms of specific grants and bequests to the University.

SPECIAL SCHOLARSHIPS. Scholarship grants are usually available only after a student has earned a good record at the University of Washington. Some graduate scholarships are awarded by academic departments from funds available only to their students. The Schools of Drama and Music have such funds.

FOREIGN STUDENT SCHOLARSHIPS. The University of Washington awards 100 tuition scholarships each academic year to worthy students from other countries. These scholarships are not available for the Summer Quarter. The awards are made on the basis of the academic record of the student, recommendations from his professors, his need for such assistance, and the availability of such openings in his department at the University. These scholarships cover tuition only and are administered by the Foreign Exchange Scholarship Committee, International Services Office, University of Washington, Seattle, Washington 98105, U.S.A. Application for these scholarships must be made by March 1 for the following academic year.

LOANS

Emergency and long-term loans are available through the Office of the Dean of Students. Application for a loan should be made at least six weeks before the money is needed.

EMPLOYMENT

Part- and full-time work off campus may be obtained at the University Placement Office, Lewis Hall Annex. Applications are accepted from students or graduates of the University and from the wives or husbands of University students. Application must be made in person after residence has been established in Seattle.

There are many job opportunities on the campus for graduate students. For example, dormitory counselorships are available in the Men's Residence Halls, and skilled technicians are employed in nearly every University activity. Students may apply directly to the department in which they hope to work or to the Personnel Department.

Working students must be sure to correlate their employment with Graduate School regulations governing study loads (see Registration, page 24).

The University offers a number of full-time and part-time employment opportunities in the secretarial, clerical, and technical fields for wives of married students. These positions offer pay comparable to the prevailing salaries in the community and carry fringe benefits such as vacations, sick leave, and opportunities to enroll in University courses. In addition, nonresident students may receive waiver of the nonresident portion of fees if their spouses are full-time employees of the University. Students seeking part-time employment must be on campus before they may secure jobs from one of the University's personnel offices.

SUPPLEMENTARY INFORMATION

STUDENT ACTIVITIES AND SERVICES

HOUSING

Information and applications for residence in University-owned housing for single persons and for childless married graduate students may be obtained by writing to the University of Washington, Manager, Men's Residence Halls, 1201 N.E. Campus Parkway, Seattle 5, or to the University of Washington, Manager, Women's Residence Halls, Seattle 5. Many men graduate students live in Rofcre House in one of the Men's Residence Halls. Preference in assignment to vacancies in the Residence Halls is given to students under twenty-one years of age until August 1; thereafter assignments are made in the order of application. Prospective students may apply for the residence halls prior to their acceptance by the University but not before April 15.

The Office of Student Residences maintains listings of off-campus rooms, rooms with board, housekeeping rooms, apartments, and houses which are available to University students. These listings must, however, be consulted in person.

Information about fraternities or sororities may be obtained by writing to the University of Washington, Interfraternity Council, or the Panhellenic Council, Student Union Building, Seattle 5.

Teaching and research assistants and other part-time sub-faculty personnel are given first priority for assignment to University-owned housing facilities for married students. Second preference for assignment to Union Bay Village or Sand Point Homes is given to graduate, medical, dental, and law students who have children. Prospective students are eligible to apply when they have been accepted for admission. Write to the Office of Student Residences, 4039 15th N.E., for further information and application forms.

A complete statement of University housing policy appears in the *Housing Bulletin*.

HEALTH SERVICES

The University maintains a health service and infirmary to help guard against infectious diseases and incipient ill health. The infirmary receives bed patients at any hour and provides nursing care, medicines, and the attendance of a staff doctor up to one week each quarter free of charge. For a period longer than one week, a charge of \$2.00 a day is made. At their own expense, infirmary patients may consult any licensed physician in good standing.

Health and accident insurance for students is available at the time of registration.

OFFICE OF THE DEAN OF STUDENTS

The Office of the Dean of Students is concerned with the general welfare of students and welcomes correspondence and conferences with both parents and students. This Office works closely with the advisory system of the colleges and schools of the University; it directs students to faculty advisers, the Counseling Center, and other persons and agencies offering information and assistance with personal and social problems. The Office of the Dean of Students also has current information on Selective Service regulations.

The Foreign Student Office operates through the Office of the Dean of Students. The Foreign Student Adviser and his staff offer guidance on all nonacademic problems to students from other countries. Questions about immigration regulations, housing, social relationships, personal problems, finances, minimum course requirements, and employment should be referred to this Adviser. Students who are interested in studying abroad may obtain from him information about schools in other countries and about Fulbright and other scholarships.

COUNSELING CENTER

The Counseling Center, Lewis Hall Annex, offers vocational and educational counseling to students who need help in their adjustments to college. The staff of the Center, which includes vocational counselors and psychologists, works closely with other student services and supplements the academic advisory program.

ASSOCIATED STUDENTS

Membership in the Associated Students of the University of Washington, the central organization which conducts all student activities, is required of all regularly enrolled students. Through the ASUW Board of Control and its various committees and boards, students assume major responsibility in the government of student life. The ASUW helps to finance the programs of athletics, debates, concerts, lectures, and many other activities and facilities, including the University of Washington *Daily* and the Student Union Building.

VETERANS INFORMATION**WORLD WAR I OR II VETERANS**

Veterans and children of deceased veterans should meet the general admission criteria and follow the general procedures outlined for all applicants. Applications for, and questions about, government aid should be addressed to the Veterans Administration Regional Office.

Under certain conditions a veteran of World War I or II who is not eligible for Veterans Administration benefits is fully or partly exempt from tuition charges. Information concerning this exemption may be obtained from the Veterans Division, Safety Division Building.

Exemption must be cleared prior to student's appointment for registration in order to prevent personal payment.

KOREAN VETERANS

A Korean veteran under Public Law 550 should obtain admittance to the University prior to making application for a Certificate for Education and Training, thus eliminating the chance of obtaining a certificate valid for an incorrect degree. If the veteran has any questions regarding application for a certificate, he should consult the Veterans Division, Safety Division Building.

Application for this certificate should be made at least four weeks prior to the beginning of University instruction. If the veteran is eligible, the Veterans Administration will issue him a Certificate for Education and Training which must be presented, along with his Program of Studies, to the Veterans Division, Safety Division Building, as soon as registration is completed. A Korean veteran should be prepared to meet all his own expenses as well as the cost of tuition, fees, and supplies for at least two months, because allowances are not made until after a full month's attendance has been established. Educational allowance payments are made directly to the veteran by the Veterans Administration after the veteran and institution submit a monthly attendance certification.

Graduate Credit Requirements (Public Law 550) 500-level Courses or Above

9 credits.....	Full subsistence
7 to 8 credits.....	Three-fourths subsistence
5 to 6 credits.....	One-half subsistence
4 credits or less.....	Established tuition and fees
or credits $\div 14 \times \$110.00$, whichever is the lesser.	

If a graduate is combining 400-level courses with 500-level courses, he should consult with the Veterans Division, Safety Division Building, to determine the scale of pay.

Termination of Training

A veteran *eligible* under Public Law 550 must complete his training by *eight years* after his release from active service, or by January 31, 1965, whichever is earlier.

DISABLED VETERANS

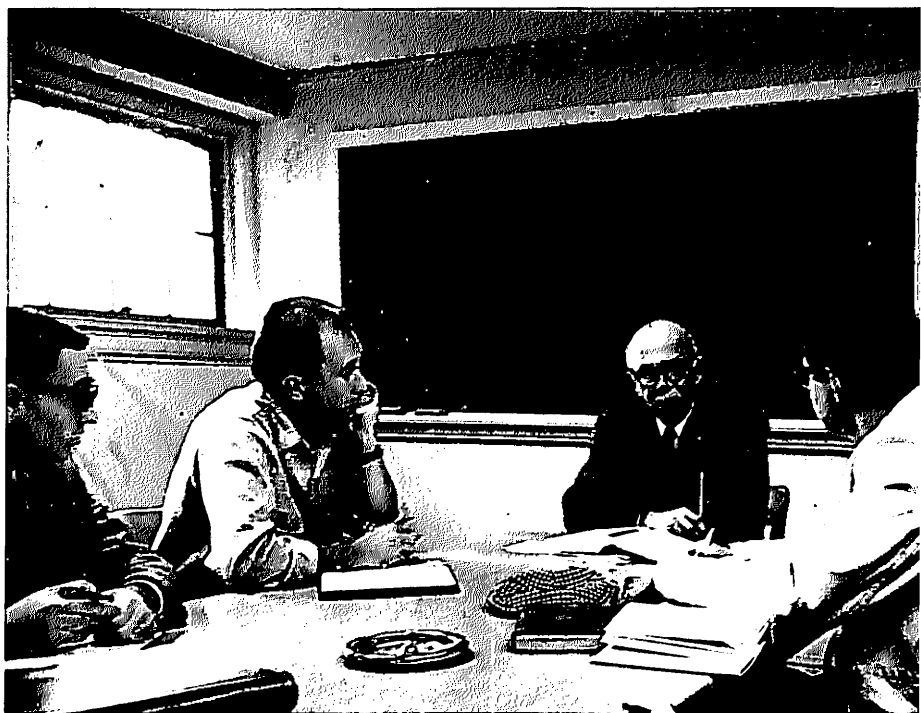
A veteran with a disability may have benefits under Public Law 16, 894, or 815 and should make application to the nearest Veterans Administration Regional Office at least four weeks prior to registration.

CHILDREN OF DECEASED VETERANS

Public Law 634 grants federal benefits to children of deceased veterans of World War I, World War II, or the Korean Conflict who died as a result of injury or disease incurred or aggravated while in the service. Information regarding eligibility under this law should be requested from a Veterans Administration Regional Office.

The Certificate for Education and Training issued to those eligible persons by the Veterans Administration is to be presented, along with the Program of Studies, to the Veterans Division, Safety Division Building, as soon as registration is completed.

Credit requirements for monthly subsistence for Public Law 634 students are the same as those listed for Public Law 550 students; however, Public Law 634 students may not be authorized for less than half-time subsistence.



THE GRADUATE PROGRAMS

THE GRADUATE PROGRAMS

THE GRADUATE SCHOOL offers programs leading to the master's degree through the following schools and colleges: *Architecture and Urban Planning; Arts and Sciences*: anthropology, art, atmospheric sciences, botany, chemistry, classics, communications, drama, economics, English (including comparative literature), Far Eastern and Slavic languages and literature, genetics, geography, geology, Germanic languages and literature, history, home economics, linguistics, mathematics, music, oceanography, philosophy, physical education, physics, political science, psychology, Romance languages and literature, Scandinavian languages and literature, sociology, speech, and zoology; *Business Administration; Dentistry; Education; Engineering*: aeronautics and astronautics, chemical, civil, electrical, mechanical, and mineral engineering; *Fisheries; Forestry; Librarianship; Medicine*: anatomy, biochemistry, microbiology, pharmacology, physiology and biophysics, and surgery; *Nursing; Pharmacy; Public Affairs; and Social Work*. Interdisciplinary programs in *Nuclear Engineering* and in *Radio-logical Sciences* are administered by special interdisciplinary groups of the Graduate School.

Programs leading to the Doctor of Philosophy degree are offered through the following schools and colleges: *Arts and Sciences*: anthropology, atmospheric sciences, botany, chemistry, classics, economics, English (including comparative literature), Far Eastern and Slavic languages and literature, genetics, geography, geology, Germanic languages and literature, history, linguistics, mathematics, music, oceanography, philosophy, physics, political science, psychology, Romance languages and literature, sociology, speech, and zoology; *Education; Engineering*: aeronautics and astronautics, ceramic, chemical, civil, electrical, mechanical, and metallurgical engineering; *Fisheries; Forestry; Medicine*: anatomy, biochemistry, microbiology, pathology, pharmacology, and physiology and biophysics; and *Pharmacy*. An interdisciplinary program in *Nuclear Engineering* is administered by a special interdisciplinary group of the Graduate School.

A program for the degree of Doctor of Musical Arts, a professional degree primarily for students preparing for college teaching with emphasis in performance or composition, is offered through the School of Music.

A program leading to the degree of Doctor of Business Administration is offered

through the College of Business Administration. This is a professional degree primarily for students preparing for teaching and research positions in business administration and for administrative and policy-making positions in business.

A program for the degree of Doctor of Education, a professional degree primarily for teachers and school administrators, is offered through the College of Education.

GENERAL GRADUATE DEGREE PROGRAM POLICIES

In the sixty-one departments or other organizational units offering graduate programs leading to master's and/or doctor's degrees, students have a wide variety of opportunities for advanced study and research. The general philosophy and objectives of graduate study, policies regarding admissions, financial aids, registration, etc., are set forth in the General Information section of this *Bulletin*. In the following pages, general policies and regulations are given for these master's and doctor's degrees.

THE GRADUATE PROGRAM ADVISER

The graduate student is guided in his initial work at the University by the Graduate Program Adviser in his field. This adviser is a senior member of the faculty who provides or arranges for the provision of responsible advice, guidance, and assistance to students working for advanced degrees in the program or programs offered by the faculty in his department, school, or University unit. He maintains close familiarity with policies and procedures in the Graduate School and provides over-all coordination for the activities within his department. In his absence, these responsibilities are carried by an Alternate Program Adviser. Following on pages 40 and 41 is a listing of the Graduate Degree Programs offered and the names of the Graduate Program Advisers and Alternate Graduate Program Advisers.

SCHOLARSHIP

If students are to make satisfactory progress toward advanced degrees, high achievement in their courses of study must be assumed. To be eligible for a degree in the Graduate School, a student must have an average of B (3.00) in *all* courses numbered 300 and above. Students whose work is not of approved quality may be asked by the Dean of the Graduate School to withdraw.

On the Quarterly Grade Report and on each student's permanent transcript all courses numbered 100 through 700, with the grades earned, are listed. However (effective Summer Quarter 1962), *grade points* are *not* extended for 100- and 200-level courses and such courses are *not* included in quarter or cumulative grade-point averages. *Only* courses numbered 300 and above are included in the total quarter and cumulative credit and grade points, and in the computation of the grade-point average for students in the Graduate School. (No retroactive calculations have been made.)

RESIDENCE

The residence requirement for the master's degree is one year (three full-time quarters). The requirement for the doctor's degree is three years, two of them at the University of Washington. Since one of the two years must be spent in continuous full-time residence (three out of four consecutive quarters), the residence requirement for the doctor's degree cannot be met solely with summer study.

Although the normal load in graduate work is 12 credits, a full quarter of residence is granted for any quarter in which at least 9 credits in graduate course, research, or thesis work are acceptably completed. Courses numbered below 300 are not applicable to residence or course credit for advanced degrees.

Residence credit for students carrying less than 9 credits per quarter is figured on the basis of a total of 12 credits or more for the part-time quarters combined to make a full residence quarter equivalent.

CONTINUOUS ENROLLMENT

A Graduate Student, from the time of his first enrollment in the Graduate School at the University of Washington, is required to enroll and be registered each quarter, including summer quarter, until the completion of all requirements for the graduate degree for which he is working, including the filing of the thesis or dissertation, the passing of the Master's or Doctor's Final Examination and the awarding of the degree. A Graduate Student must be enrolled and registered as a *Full-Time Student* or as a *Part-Time Student*, or enrolled as an *On-Leave Student*. Registration for courses through the Division of Evening and Extension Classes or the Division of Correspondence Study at the University does not satisfy the Continuous Enrollment requirement.

Failure to maintain continuous enrollment as a *Full-Time*, a *Part-Time*, or an *On-Leave Student* will be taken by the University to signify the student's resignation from the Graduate School. Should he later wish to resume his studies, he must file an Application for Readmission to the Graduate School in person or by mail by the regularly published deadlines for the quarter and register during the usual registration period. If he has attended any other institution during the period when he was not registered at the University of Washington, official transcripts in duplicate of his work must be submitted. An Application for Readmission will carry no preference and will be treated in the same manner as an application for initial admission, including the requirement of payment of the five-dollar Application Fee.

A student must be registered as a regular *Full-Time* or *Part-Time Student* at the University for the quarter in which the degree is conferred.

Regular Full-Time or Part-Time Graduate Students

If a graduate student is enrolled and registered as a *Full-Time Student* or a *Part-Time Student*, he pays the usual fees and is ordinarily engaged in course and/or research work on the campus as a regular student supervised by the Graduate Program Adviser or his representative in his field, or by the Chairman of his Supervisory Committee.

In unusual cases, a graduate student may need to work in *absentia* at a place distant from the campus and yet actively continue in correspondence or conferences with his professors and proceed with his graduate study and research. In this situation he enrolls and registers as a *Full-Time Student in absentia* or a *Part-Time Student in absentia* and pays the usual fees for a *Full-Time Student* or a *Part-Time Student*, after previously having had his petition for *in absentia* work approved by his Graduate Program Adviser or his Supervisory Committee Chairman, and by the Dean of the Graduate School. Ordinarily only credits for research may be earned in *absentia*. Periods of *in absentia* registration are not counted toward completion of the requirements for residence by graduate students on the campus of the University.

On-Leave Students

If a graduate student in good standing plans to be away from the University and out of contact with the University faculty and facilities for a period of time, usually not to exceed three successive quarters, he must enroll and register as an *On-Leave Student* after he has had his petition for *On-Leave* status approved by his Graduate Program Adviser or his Supervisory Committee Chairman and by the Dean of the Graduate School. This type of enrollment maintains a place for the student as a member of the Graduate School, and permits him to use the University Library and to sit for foreign language competence examinations, but does not entitle him to any of the other University privileges of a regularly enrolled *Full-Time Student* or *Part-Time Student*. An *On-Leave Student* registers in the usual way in a no-credit status, and he pays a non-refundable fee of five dollars (except for Summer Quarter only) for enrollment as an *On-Leave Student*; this fee covers three successive academic quarters or any single part thereof. For

GRADUATE DEGREE PROGRAMS OFFERED AND NAMES OF GRADUATE PROGRAM ADVISERS

<i>Field</i>	<i>Graduate Degrees</i>	<i>Graduate Program Adviser</i>	<i>Alternate Graduate Program Adviser</i>
Aeronautics and Astronautics	M.S.E.; M.S.A.&A.; M.A.&A.; Ph.D.	R. J. H. Bollard	
Anatomy	M.S.; Ph.D.	E. C. Roosen-Runge	L. H. Jensen
Anthropology	MA.; Ph.D.	Kenneth E. Read	Isabel S. Caro
Architecture	M.Arch.	R. H. Dietz	N. J. Johnston
Art	M.F.A.	Wendell Brazeau	Boyer Gonzales
Atmospheric Sciences	M.S.; Ph.D.	R. G. Fleagle	F. I. Badgley
Biochemistry	M.S.; Ph.D.	Earl W. Davie	Hans Neurath
Botany	M.S.; Ph.D.	Richard B. Walker	C. Leo Hitchcock
Business Administration	M.A.; M.B.A.; D.B.A.	Kermit O. Hanson	Austin Grimshaw
Ceramic Engineering	M.S.Cer.E.; M.S.Cer.; M.S.E.; Ph.D.	Drury A. Pifer	James I. Mueller
Chemical Engineering	M.S.E.; M.S.Ch.E.; Ph.D.	R. W. Moulton	L. N. Johanson
Chemistry	M.S.; Ph.D.	George W. Cady	Victorian Sivertz
Civil Engineering	M.S.E.; M.S.C.E.; Ph.D.	S. Sergev	E. P. Richey
Classics	M.A.; Ph.D.	J. B. McDiarmid	W. C. Grummel
Communications	M.A.Com.	W. E. Ames	Henry Ladd Smith
Comparative Literature	M.A.; Ph.D.	Frank W. Jones	
Dentistry	M.S.Den.	Saul Schluger	A. W. Moore
Drama	M.A.	Gregory A. Falls	Donal Harrington
Economics	M.A.; Ph.D.	D. A. Worcester	J. B. Gillingham
Education	M.A.; M.Ed.; Ph.D.; Ed.D.	Gordon C. Lee	Frederic T. Giles
Electrical Engineering	M.S.E.; M.S.E.E.; M.E.E.; Ph.D.	W. E. Rogers	A. V. Eastman
English	M.A.; Ph.D.	Andrew R. Hilen, Jr.	A. C. Hamilton
Far Eastern and Slavic Languages and Literature	M.A.; Ph.D.	George E. Taylor	K. C. Hsiao
Fisheries	M.S.; Ph.D.	Richard Van Cleve	A. C. DeLacy
Forestry	M.F.; M.S.F.; Ph.D.	David R. M. Scott	Stanley P. Gessel
Genetics	M.S.; Ph.D.	H. L. Roman	
Geography	M.A.; Ph.D.	J. C. Sherman	Donald Hudson
Geology	M.S.; Ph.D.	Howard A. Coombs	V. S. Mallory
Germanic Languages and Literature	M.A.; Ph.D.	William H. Rey	Ernst Loeb
History	M.A.; Ph.D.	Jon M. Bridgman	Scott H. Lytle

Home Economics
 Librarianship
 Linguistics
 Mathematics
 Mechanical Engineering
 Metallurgical Engineering

Microbiology
 Mineral Engineering
 Music
 Nursing
 Nuclear Engineering

Oceanography
 Pathology
 Pharmacology
 Pharmacy
 Philosophy

Physical and Health Education (Men)
 Physical and Health Education (Women)
 Physics
 Physiology and Biophysics
 Political Science

Psychology
 Public Affairs
 Radiological Sciences
 Romance Languages and Literature
 Scandinavian Languages and Literature

Social Work
 Sociology
 Speech

Surgery
 Urban Planning
 Zoology

M.A.; M.S.; M.A.H.Ec.; M.S.H.Ec.
 M.Lib.; M.Law Libr.
 M.A.; Ph.D.
 M.A.; M.S.; M.S.Math.Stat.; M.A.T. Ph.D.
 M.S.E.; M.S.M.E.; Ph.D.
 M.S.Met.E.; M.S.Met.; M.S.E.; Ph.D.

M.S.; Ph.D.
 M.S.Min.E.; M.S.CoalMin.E.; M.S.E.
 M.A.; M.A.Music; Ph.D.; D.Mus.Arts
 M.Nur.; M.A.
 M.S.E.; Ph.D.

M.S.; Ph.D.
 Ph.D.
 M.S.; Ph.D.
 M.S.; Ph.D.
 M.A.; Ph.D.

M.S.Phys.Ed.; M.S.
 M.S.Phys.Ed.; M.S.
 M.S.; Ph.D.
 M.S.; Ph.D.
 M.A.; Ph.D.

M.S.; Ph.D.
 M.Pub.Admn.
 M.S.Rad.Sci.
 M.A.; Ph.D.
 M.A.

M.Soc.Wk.
 M.A.; Ph.D.
 M.A.; Ph.D.

M.S.
 M.UrbanPlan.
 M.S.; Ph.D.

Mary L. Johnson
 Irving Lieberman
 Sol Saporta
 D. G. Chapman
 Blake D. Mills
 Drury A. Pifer

Howard C. Douglas
 Drury A. Pifer
 Demar Irvine
 Katherine Hoffman
 Albert L. Babb

J. S. Creager
 Earl P. Benditt
 J. M. Dille
 Jack E. Orr
 Arthur Smullyan

Russell K. Cutler
 Marion R. Broer
 J. S. Blair
 Thelma T. Kennedy
 Hugh A. Bone

Eugene Galanter
 George Shipman
 L. Donaldson
 William C. E. Wilson
 Sverre Arestad

J. L. Kelley
 E. Barth
 Horace Rahskopf
 (General)
 James A. Carrell
 (Speech and Hearing Therapy)

H. N. Harkins
 M. R. Wolfe
 Aubrey Gorbman

Florence T. Hall
 L. D. Bevis
 Carroll Reed
 V. L. Klee, Jr.
 C. J. Kippenhan

N. B. Groman
 D. L. Anderson
 John Verrall
 Mary S. Tschudin
 K. L. Garlid

M. Grant Gross, Jr.
 E. C. Alvord
 A. Horita
 A. C. Huitric
 R. Richman

G. S. Reeves
 Ruth M. Wilson
 E. M. Henley
 H. D. Patton
 Kenneth C. Cole

George P. Horton
 Brewster C. Denny
 Ralph Baltzo
 A. E. Creore
 W. Johnson

C. J. Macdonald
 R. E. L. Faris
 Laura I. Crowell

L. M. Nyhus
 Thomas Norton
 A. J. Haggis

Summer Quarter only, he petitions and enrolls and registers in the usual manner as an *On-Leave Student* and pays no fee. *On-Leave Students* returning to the University on or before the termination of the period of their leave should register in the usual way as *Full-Time Students* or *Part-Time Students* and by this registration will cancel any remaining leave period. If circumstances require a later leave of absence, the student must petition and proceed again in the same manner as for an initial leave of absence.

THE MASTER'S DEGREE

SUMMARY OF REQUIREMENTS

All candidates for the master's degree must meet the following requirements:

1. Under a thesis program, a minimum of 36 credits (27 course credits and, ordinarily, 9 credits of thesis) must be presented. Under a nonthesis program, a minimum of 36 credits of course work is required.

2. Half of the 36 credits for the master's degree must be for work numbered 500 and above.

3. A minimum of three full-time quarters of residence credit must be earned. (Part-time quarters may be accumulated to meet this requirement.)

4. A certificate of proficiency in a foreign language is required (unless specifically excepted for a particular degree). The language presented normally should be one related to the student's field of study.

5. A thesis, approved by the Supervisory Committee, must be prepared (unless specifically excepted in a particular program). Students must register for thesis.

6. Any additional requirements imposed by the Graduate Program Adviser in the student's major department or by his Supervisory Committee must be satisfied.

While every master's student is expected to take some work outside his major department, the Graduate Program Adviser in his major department or his Supervisory Committee determines the requirements for supporting courses. The student should consult with his Supervisory Committee in planning requirements for the minor.

7. The graduate student must make application for the master's degree at the Graduate School Office within the first two weeks of the quarter in which he expects the degree to be conferred, in accordance with "Admission to Candidacy for the Master's Degree" as described below.

8. The graduate student must be registered as a *Full-Time* or *Part-Time Student* at the University for the quarter in which the degree is to be conferred.

9. All work for the master's degree must be completed within six years. This includes applicable work transferred from other institutions.

10. Students must satisfy the requirements for the degree which are in force at the time the degree is to be awarded.

Candidates are urged to attend Commencement exercises.

PREPARATION AND ADVISING

Graduate students are expected to be appropriately prepared for the graduate program into which they are admitted and should confer with the Graduate Program Adviser in their field, or with his representative, in planning their program and frequently thereafter during the course of their graduate study.

TRANSFER AND EXTENSION CREDIT

Up to 9 graduate credits taken while a graduate student in the graduate school of another credited institution may be applied toward the master's degree with the approval of the Graduate Program Adviser and the Dean of the Graduate School. Six credits of work taken through the Division of Evening and Extension Classes may be similarly applied, but only if taken at the University of Washington,

after the student has been officially admitted to the Graduate School here. A combination of transfer and extension work not exceeding 9 credits may be applied to the master's degree. The minimum residence requirement of three quarters at the University of Washington may not be reduced by transfer or extension credits. Neither correspondence credit nor credit by examination is acceptable.

EXAMINATION

As soon as is appropriate, but not later than the time when the student's application for the degree has been approved, the faculty in his major department appoints a Supervisory Committee consisting of not less than three members, including a member from the minor department, if any. The chairman of this committee arranges the time and place of the Final Examination, the results of which must be reported by the Graduate Program Adviser to the Graduate School Office at least two weeks before the date on which the degree is to be conferred. The examination may be oral or written, and all members of the Supervisory Committee must certify its results. If the examination is not satisfactory, the Committee may recommend to the Dean of the Graduate School that the student be allowed to take another examination after an interval of further study.

THESIS

The master's thesis should be evidence of the graduate student's ability to carry out independent investigation and to present the results in clear and systematic form. Two copies of the thesis, with forms signed by the members of the Supervisory Committee from the major department, must be deposited in the Graduate School Office at least two weeks before the degree is to be conferred. The faculty in the department may require the candidate to present an additional copy for its own use. Instructions for the preparation of theses in acceptable form may be obtained at the Graduate School Office.

NONTHESIS PROGRAMS

Some departmental faculties have arranged programs for the master's degree which do not require the preparation of a thesis. These programs normally include a more comprehensive plan of course work or more extensive examinations than thesis programs, or they may include some approved research activity in lieu of a thesis.

A student on a nonthesis master's degree program who has completed all requirements for the degree with the exception of (1) the removal of an Incomplete or (2) the taking of the Final Master's Examination, and who plans no other course registration must register for "Degree Final" for 6 credits and pay the regular Part-Time fees the quarter the degree is to be awarded. Credits for Degree Final do not apply to residence or toward satisfaction of the total credit requirements for the particular degree.

ADMISSION TO CANDIDACY FOR THE MASTER'S DEGREE

The student must make application for the master's degree at the Graduate School Office *within the first two weeks of the quarter in which he expects the degree to be conferred*. When the application is received, the Graduate School will review the student's record and his current registration and will notify him and the Graduate Program Adviser in his department promptly as to whether or not he will have satisfied the requirements for the degree at the end of the quarter. The previous work taken by the student, together with his current registration as planned with the approval of the Graduate Program Adviser in his department, must meet the requirement for the degree if the application is to be approved. Failure to meet the requirements of the Graduate School or of the faculty in his Department will necessarily prolong the student's candidacy for his degree. The student and his departmental Graduate Program Adviser should be thoroughly acquainted with the requirements for the particular degree.

THE DOCTOR'S DEGREE

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

SUMMARY OF REQUIREMENTS

In order to qualify for the doctor's degree, the candidate must meet the following minimum requirements:

1. Complete a program of study and research as planned by the Graduate Program Adviser in his major department or college, and his Supervisory Committee. Half of the total program, including the dissertation, must be credits numbered 500 or above. While every student is expected to take some work outside his major field, the Supervisory Committee determines the requirements for minors and supporting courses.

2. Present a minimum of three academic years of resident study, two of them at the University of Washington with at least one year in continuous full-time residence. (The continuous year may be satisfied with three out of four consecutive full-time quarters.)

3. Demonstrate a reading knowledge of two foreign languages related to the major field of study. (Language requirements for the Doctor of Business Administration and the Doctor of Education degrees are slightly different.)

4. Prepare a dissertation which is a significant contribution to knowledge and which clearly indicates training in research. Credit for the dissertation ordinarily should be at least one-third of the total credit.

5. Pass creditably a General Examination in the major field and, when a part of the program, in the minor field or supporting courses.

6. Pass creditably a Final Examination, which is usually devoted to the dissertation and the field with which it is concerned.

7. All work for the doctor's degree must be completed within ten years. This includes applicable work from the master's degree and work transferred from other institutions.

8. Must be registered as a regular *Full-Time* or *Part-Time Student* at the University for the quarter in which the degree is to be conferred.

9. Students must satisfy the requirements which are in force at the time the degree is to be awarded.

Candidates are urged to attend Commencement exercises.

PREPARATION AND ADVISING

Graduate students are expected to be appropriately prepared for the graduate program into which they are admitted.

Admission to the Graduate School usually signifies admission into a particular program of graduate study leading to a master's degree or the equivalent, or into post-master study if the student admitted has already received a master's degree or successfully completed equivalent graduate study. Acceptance of a graduate student into a program of study leading to a doctor's degree is *not* implied by admission to the Graduate School but is usually signified by the appointment of a doctoral Supervisory Committee for a graduate student who has been previously admitted to the Graduate School and has demonstrated the apparent ability, as decided by the University, to progress satisfactorily in a doctoral degree program.

On initial admission to the Graduate School, a graduate student should confer immediately with the Graduate Program Adviser in his field, or with his representative, in planning his program. Frequent conferences should be held thereafter during the course of his graduate study.

APPOINTMENT OF DOCTORAL SUPERVISORY COMMITTEE

As soon as is appropriate, but not later than one quarter prior to the time the warrant for the General Examinations is presented for approval to the Dean of the Graduate School, the Graduate Program Adviser will request the Dean of the Graduate School to appoint a Supervisory Committee, which will include a Graduate Faculty representative, to assume general sponsorship of the graduate student. Establishment of a doctoral Supervisory Committee is taken by the Dean of the Graduate School to mean that, in the opinion of the faculty in the graduate student's field, the graduate student's background of study and preparation is sufficient to justify his entering into doctoral study and research under the guidance and supervision of a specific committee of members of the Graduate Faculty.

ADMISSION TO CANDIDACY FOR THE DOCTORAL DEGREE

At the end of two years of graduate study, and after a successful demonstration of proficiency in two foreign languages, the chairman of the Supervisory Committee may present to the Dean of the Graduate School for approval a warrant permitting the student to take the General Examinations for admission to candidacy for the doctoral degree. This is taken by the Graduate School to mean that, in the opinion of the Committee, the student's background of study and preparation is sufficient to justify his undertaking the examinations. The warrant should indicate the time, place, and manner of examination, and must be received at least two weeks prior to the proposed examination date. The warrant is approved by the Dean of the Graduate School only after the prescribed requirements of residence and study have been met. If the examination is oral, a majority of the examining committee must be present during the entire examination.

If the student's performance in his General Examinations is judged by his Supervisory Committee to be satisfactory, then a warrant certifying the successful completion of his General Examinations is filed in the Graduate School Office by the Chairman of his Supervisory Committee.

Thereafter, the student is identified and designated as a Candidate for a doctoral degree and ordinarily devotes his time primarily to the completion of research for his dissertation and to preparation for his Final Examination.

Normally, a student must be registered at least two quarters at the University of Washington after he passes his General Examinations and before a warrant is authorized for the Final Examination.

DISSERTATION AND FINAL EXAMINATION

The candidate must present a dissertation demonstrating original and independent investigation and achievement; it should reflect not only his mastery of research techniques but also his ability to select an important problem for investigation and to deal with it competently. Instructions for the preparation of the dissertation in acceptable form may be obtained from the Graduate School.

When the Supervisory Committee believes that the doctoral candidate is prepared to take his Final Examination, the Dean of the Graduate School is asked to designate a Reading Committee from among the members of the Supervisory Committee. Using forms provided by the Graduate School, the Reading Committee prepares a report briefly summarizing the distinctive achievement of the research, the methods used, and the results. If the report is favorable and is presented at the Graduate School Office two weeks before the Final Examination date, and if the candidate has met all other requirements, a warrant authorizing the Final Examination is issued by the Dean of the Graduate School.

The Reading Committee report is not binding upon the Supervisory Committee,

but is intended to insure that, except for minor alterations, the dissertation is ready for final presentation. The Dean of the Graduate School returns the Reading Committee report to the Supervisory Committee, together with the warrant for the Final Examination, and upon approval by the Supervisory Committee at the time of the Final Examination, it is bound with the dissertation.

If the Final Examination is satisfactory, the Supervisory Committee signs the Graduate School's warrant and returns it at least two weeks before the end of the quarter in which the degree is to be conferred. If the examination is unsatisfactory, the Supervisory Committee may recommend that the Dean of the Graduate School permit a second examination after a period of further study.

Publication of Doctoral Dissertations

All doctoral dissertations are published in full on microfilm. Two weeks before the end of the quarter in which the degree is to be conferred, the candidate must present two copies of his dissertation at the Graduate School Office. Each copy is to be accompanied by a copy of the Reading Committee report and an abstract, not exceeding six hundred words in length, which has been approved by the Supervisory Committee at the time of the Final Examination. A receipt for the \$25.00 publication charge must be shown when the dissertation is presented.

Abstracts are published in full in the publication *Microfilm Abstracts*, and the manuscript copies of the dissertations are kept on file in the University Library. A positive of each microfilmed dissertation is sent to the Library of Congress to be entered in its subject and author file, and the negative is retained by University Microfilms, of Ann Arbor, Michigan, which provides additional microfilm copies on order.

The candidate signs the necessary publication agreement at the time he presents his dissertation at the Graduate School Office, and if he wishes he may apply for a copyright. Publication in microfilm does not preclude other forms of publication.

COURSE-NUMBERING SYSTEM

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 are listed in this Bulletin and, when acceptable to the Supervisory Committee, and the Graduate School, may be part of the graduate program. The Graduate School accepts credit in approved 300-level courses for the minor or supporting fields only; 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.

Hyphens between course numbers mean that credit is *not* granted until the series of courses is completed. 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 class hour a week 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. Courses to which the letter J is appended are joint courses in two or more departments and as such grant credit in one of the departments.

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 Schedules*.

COLLEGE OF ARCHITECTURE AND URBAN PLANNING

Dean: ROBERT H. DEITZ, 204 Architecture Hall

ARCHITECTURE

Acting Chairman: VICTOR STEINBRUECK, 204 Architecture Hall

Graduate Program Adviser: ROBERT H. DIETZ, 204 Architecture Hall

The program leading to the degree of Master of Architecture stresses professional consultation, with emphasis on the analysis of the forces which shape architecture, such as economics, structure, history, mechanical and electrical equipment, aesthetics, and social and psychological influences. Seminars and research focus upon a study of the interaction of these forces and their resultant effect upon architecture. The student is permitted to select his study in various areas of interest with special emphasis on civic design, planning, and building organization in education and health facilities. Such supplementary courses will be offered from those listed in the *Graduate School Bulletin* as the graduate adviser deems appropriate to an individual's program.

A student seeking admission to the graduate program in Architecture must satisfy the requirements of admission as outlined in the *Graduate School Bulletin* of the University of Washington. In registering, he must show evidence of having attained a Bachelor of Architecture degree, or the equivalent, from an accredited college or school of Architecture in the United States or any other country. In addition, he must produce scholastic evidence of his proficiency in design, planning, structures, mechanics, aesthetics, and history to the Supervisory Committee of the faculty of the College of Architecture and Urban Planning. All deficiencies, or lack of necessary academic subject material required to secure the degree of Bachelor of Architecture from the College of Architecture and Urban Planning of the University of Washington, must be corrected before admission will be considered. If deficiencies are evident the student must satisfy any additional requirements which are deemed necessary.

A degree of Master of Architecture will be awarded upon satisfactory completion of 36 or more credits, including 9 credits for a master's thesis. A foreign language is not required. A minimum of one school year (three quarters of full-time registration or the equivalent) in residence is required of students seeking a degree of Master of Architecture. The master's thesis may be prepared and presented during the three quarters' residence period; however, such procedure will not be encouraged in order that more time and effort can be devoted to required subject material during the academic year.

Further inquiries regarding the program should be addressed to: Prof. Robert H. Dietz, Dean, College of Architecture and Urban Planning.

REQUIRED PROFESSIONAL COURSES

Architecture 524, 525, 526 Advanced Architectural Studies (6,6,6)

Studies to provide a comprehensive knowledge for solving problems dealing with architecture.

Architecture 560, 561, 562 Graduate Seminar (3,3,3)

Advanced analysis and interpretation of the forces influencing architecture.

Architecture 700 Thesis (*)

ELECTIVES

Architecture 450 Landscape Seminar (2)

Architecture 468 Professional Practice (2)

Urban Planning 479 The Urban Form (2)

Urban Planning 480 Urban Planning Analysis I (3)

Urban Planning 482 Urban Community Facilities (2)

Urban Planning 485 Housing (2)

Urban Planning 490 City Planning Design (7)

Economics 350 Public Finance and Taxation I (5)

Political Science 375 Problems of Municipal Government and Administration (5)

Real Estate 301 Urban Land Economics and Real Estate Institutions (5)

URBAN PLANNING

Chairman and Graduate Program Adviser: MYER R. WOLFE,
205 Architecture Hall

Advisory Committee: EDGAR M. HORWOOD, Civil Engineering; CALVIN F. SCHMID, Sociology; JOHN C. SHERMAN, Geography; DONALD H. WEBSTER, Political Science; BAYARD O. WHEELER, Business Administration

The professional degree Master of Urban Planning is awarded for demonstrated competence in urban studies and urban planning methodology. The program is administered by the Department of Urban Planning in the College of Architecture and Urban Planning, but also involves a number of other academic departments which are represented in the Advisory Committee listed above.

Students are admitted to the curriculum after meeting general admission requirements of the Graduate School, the Department, and the Advisory Committee. Applicants may possess a bachelor's degree in the social sciences, humanities and applied arts, sciences or professions. The curriculum fosters general competence in the broad aspects of urban planning but it also permits some specialization, depending on the student's academic background and objectives. Therefore, in addition to requirements leading to a general framework of study, certain arrangements of course work may provide for an emphasis existing in the field: administrative-managerial, research, or physical planning-design. Certain courses within the curriculum are also oriented toward offering a minor to graduate students majoring in related fields.

The degree will be awarded upon satisfactory completion of specified courses, a thesis, and an oral examination. The curriculum is divided into *foundation* courses, which include urban study and background courses, and *professional* courses, the core of the program. The varying background of training and experience found among students working for this degree requires individual adjustment of each student's program initially. The Urban Planning Curriculum Prospectus (available upon request) lists in detail the *foundation* course requirements, some of which may be satisfied before entrance to the graduate curriculum. The required *professional* courses are listed below. No foreign language is required.

Further inquiries regarding the program should be addressed to: Prof. M. R. Wolfe, Graduate Program Adviser and Chairman, Department of Urban Planning, College of Architecture and Urban Planning.

FOUNDATION COURSE REQUIREMENTS (Some may be met in undergraduate curricula)

- A. Survey or introductory courses in sociology and economics.
- B. Introductory courses in urban planning and in housing. (See Professional Course Requirements below.)
- C. Urban Studies. In counseling, certain courses are assigned within the following categories (the candidate covers all categories which he has not studied before): (1) economic determinants of urban land use; (2) social aspects of urban areas; (3) public policy issues in the metropolis; (4) physical aspects of the city; (5) techniques and methods useful in urban studies.

PROFESSIONAL COURSE REQUIREMENTS

- Urban Planning 400 Introduction to Urban Planning (3)**
(Or equivalent. See Foundation Course Requirements above.)
- Urban Planning 479 The Urban Form (2)**
- Urban Planning 480, 481 Urban Planning Analysis I and II (3,3)**
- Urban Planning 482 Urban Community Facilities (2)**
- Urban Planning 485 Housing (2)**
(Or equivalent. See Foundation Course Requirements above.)
- Urban Planning 590, 591, 592, 593 Urban Planning Problems (5,5,5,5)**
Typical planning problems using the city as a laboratory. Emphasis on urban research, evaluation of basic data, planning proposals, and presentation techniques. Prerequisite, graduate student in urban planning.
- Urban Planning 600 Research (*)**
(For three quarters accompanying Urban Planning Problems)
- Urban Planning 700 Thesis (9)**
- Civil Engineering 521 Seminar in Urban Transportation Planning (2)** **Horwood**
Prerequisite, civil engineering or urban planning graduate student, or permission.
- Political Science 581, 582 Seminar in Metropolitan and Urban Planning Problems (3,3)** **Webster**
- Sociology 530 Advanced Human Ecology (3)** **Schmid**
Prerequisite, 230 or 430, or permission.
- or 531 Demography (3)** **Schmid**
Prerequisite, 331 or permission.
- Real Estate 520 Seminar in Real Estate and Urban Land Economics (3)** **Seyfried**
Prerequisite, permission.
- or Geography 510 Research Seminar: Settlement and Urban Geography (3)** **Ullman**

**SUPPORTING AND MINOR COURSES FOR GRADUATE STUDENTS
IN OTHER DEPARTMENTS**

- A. Substantive aspects of urban planning: Urban Planning 400 Introduction to Urban Planning (3), may be followed by further amplification in 479 The Urban Form (2), 482 Urban Community Facilities (2), and 485 Housing (2).
- B. Procedural aspects of urban planning:
Urban Planning 480, 481 Urban Planning Analysis I and II (3,3)

COLLEGE OF ARTS AND SCIENCES

Dean: SOLOMON KATZ, 122 Thomson Hall

ANTHROPOLOGY

Chairman and Graduate Program Adviser: KENNETH E. READ, 345 Savery Hall

The Department offers programs leading to the degrees of Master of Arts and Doctor of Philosophy.

In addition to the information requested on the application for admission to the Graduate School, each applicant is expected to secure letters of recommendation from two professors under whom he has studied. These letters are to be mailed directly to the Graduate Program Adviser, Department of Anthropology. All applications, together with their supporting documents and letters of recommendation, are considered by the Department as well as by the Graduate School of the University.

The requirements for both advanced degrees include the following: the student must demonstrate a basic proficiency in all fields of anthropology in the First Year Examination given during Spring Quarter of each year and normally taken by a student during the third quarter of full residence. The fields are: general ethnology, archaeology, linguistics, physical anthropology, and social anthropology.

In addition, students working for advanced degrees are expected to acquire proficiency in three fields of concentration. One of these fields must be general ethnology; the other two are selected by the student. A part of the graduate work may, with permission, be devoted to a minor in a related field.

Students who lack an adequate background in anthropology will be required to take such additional undergraduate courses as the Graduate Program Adviser may determine.

MASTER OF ARTS. Candidates must complete an approved program of courses and readings, submit an acceptable thesis, and pass an oral examination. The examination will cover general ethnology and the two other fields of concentration, as well as the subject of the thesis. The thesis must be in one of the three fields of concentration.

The requirements for a minor in anthropology for the master's degree are 18 credits in courses numbered 400 or above, 9 of which must be Anthropology 500, 501, and 502. The remaining 9 credits may be selected by the student. In addition, the student must pass a written examination covering the course work taken. By special permission the required credits may be reduced to no less than 12.

DOCTOR OF PHILOSOPHY. Students must complete an approved program of courses and, in addition to the First Year Examination, must pass successively a written qualifying examination, an oral General Examination for admission to candidacy, and a Final Examination. Both the qualifying examination and the General Examination cover the field of general ethnology and the two other fields the student has selected for concentration.

The qualifying examination is normally taken at the end of the second year of graduate study, and the General Examination is taken as soon as possible after passing the qualifying examination. Passing the General Examination constitutes admission to candidacy for the Ph.D.

The foreign language requirements must be satisfied at least three quarters before the General Examination.

Field work is required of all students working for the Ph.D. The dissertation, normally based on field research, will be in one of the candidate's three fields of concentration, and the Final Examination, which is an oral examination, is devoted to the dissertation and the field with which it is concerned.

Special permission is required for a student to proceed directly to the doctorate without taking a master's degree.

Requirements for a minor in anthropology for the doctor's degree are the same as those stated above for a minor in anthropology for the master's degree, with the additional requirement that the student complete an approved reading program. The written examination will cover the reading program as well as the course materials.

COURSES

311 Indian Cultures of the Pacific Northwest (3)	Garfield
314J Peoples of Central and Northern Asia (3)	Pritsak
Offered alternate years jointly with the Far Eastern and Russian Institute; offered 1964-65.	
315 Peoples of the Far North (3)	Garfield
317 Ethnology of Southeast Asia (3)	Harper
320 Primitive Technology (5)	Gunter
332 The Religions of Primitive Peoples (3)	Read, Fogelson
350 Basis of Civilization (3)	Watson
355 Introduction to Language (3)	Jacobs
370 Methods and Problems of Archaeology (5)	Greengo
371 Analysis of Archaeological Data (3)	Greengo
380 Primate and Human Evolution (3)	
415 The Character of Eskimo Life (3)	Ray

- 417 Middle American Civilization (3) Greengo
- 418 Ethnology of Meso-America (3) Ray
- 425 Applied Anthropology (3) Ottenberg
- 431 Primitive Literature (3) Garfield
- 432 Magic, Religion, and Philosophy (3) Ray
- 433 Primitive Art (3) Gunther
- 434 Comparative Morals and Value Systems (3) Read
- 435 Primitive and Peasant Economic Systems (3)
- 437 Primitive Political Institutions (3) Ray
- 438 The Analysis of Kinship Systems (3) Read
- 441 Culture and Personality (5) Spiro
- 442 Childhood and Society (3) Spiro
- 451J, 452J, 453J Phonetics and Phonemics (3,3,3) Thompson
Offered jointly with the Department of Linguistics.
- 455 Areal Linguistics (3, maximum 6) Jacobs
- 454J Methods in Comparative Linguistics (3) Jacobsen
Offered jointly with the Department of Linguistics.
- 455J Areal Linguistics (3, maximum 6) Jacobsen
Offered jointly with the Department of Linguistics.
- 457J Historical Social Structure of Japan (5)
Offered jointly with the Far Eastern and Russian Institute.
- 458J Social and Cultural Changes in Contemporary Japan (5)
Offered jointly with the Far Eastern and Russian Institute.
- 460 History of Anthropological Theory (3) Jacobs
- 462J, 463J Morphology and Syntax (3,3) Thompson
Offered jointly with the Department of Linguistics.
- 470 Culture History of Austronesia (3) Greengo
(Offered 1963-64.)
- 475 The Prehistoric Near East (3) Fairservis
- 476 The Character of Ancient Egyptian Civilization (3) Fairservis
- 477 The Character of Early Mesopotamian Civilization (3) Fairservis
- 480 Physical Anthropology: Anatomy (3)
- 481 Physical Anthropology: Structure and Function (3)
- 482 Physical Anthropology: Genetics (3)
- 500, 501, 502 Preceptorial Reading (3,3,3)
A "core" course for the beginning graduate student in which the fields and problems of contemporary anthropology are systematically surveyed.
- 505 Field Techniques in Ethnography (3) Ottenberg
The techniques of collecting, recording, ordering, and utilizing ethnographic data in the field. Problems of rapport, sample, interview, observation, and interpretation.
- 510 Seminar on North American Indians (3) Fogelson
An advanced comparative treatment of selected aspects of the Indian cultures and societies of North America. (Offered 1963-64.)
- 511 Cultural Problems of the Northwest Coast (3, maximum 6) Garfield
The major ethnological questions of the region are examined. (Offered 1964-65.)
- 512 Seminar on Oceania (3) Valentine
An advanced comparative treatment of selected aspects of the cultures and societies of Oceania. (Offered 1963-64.)
- 513 Seminar on Africa (3) Ottenberg
An advanced comparative treatment of selected aspects of the cultures and societies of Africa. (Offered 1964-65.)
- 515 Seminar on South America (3) Watson
An advanced comparative treatment of selected aspects of the cultures and societies of South America. (Offered 1965-66.)
- 517 Seminar on South and Southeast Asia (3) Spiro, Harper
An advanced comparative treatment of selected aspects of the cultures and societies of South and Southeast Asia. (Offered 1963-64.)

- 518 Seminar on Middle America (3)** **Ray**
An advanced comparative treatment of selected aspects of the cultures and societies of Middle America. (Offered 1964-65.)
- 519J Seminar on Asia (3, maximum 6)**
The large cultural regions of the continent are studied in succession with special reference to anthropological problems. Offered alternate years, jointly with the Far Eastern and Russian Institute (offered 1964-65).
- 521 Native American Culture History (4)** **Garfield**
An historical interpretation of the geographical distribution of critical aspects of North and South American Indian cultures. (Offered 1965-66.)
- 522 Cultural Problems of Western America (3)** **Ray**
Analysis of the components of representative Indian cultures west of the Rocky Mountains and research on selected problems. (Offered 1965-66.)
- 524 Seminar in Cultural Problems of Arctic and Sub-Arctic (3, maximum 6)** **Garfield**
Cultural relationships across the North Pacific; culture history of Arctic regions, Asiatic and American; cultural factors in cold-land adaptation and adjustment. (Offered 1965-66.)
- 525 Seminar in Culture Processes (3, maximum 6)** **Valentine**
The concept of process and its application to the study of culture.
- 527 Acculturation (3)** **Ottenberg**
Systematic analysis of psychological, social, and cultural implications of the contact of peoples.
- 530 Structures and Functions of Oral Literature (3)** **Jacobs**
- 531 Analysis of Oral Literature (3, maximum 6)** **Garfield**
Various approaches to the study of folklore and myth.
- 532 Content Analysis of Oral Literature (3)** **Jacobs**
Analysis of oral literatures for main themes, relationships, personalities, tragedy, humor, values, world view, and their sociocultural connections.
- 537 Non-Western Political Systems (3)**
Ethnic manifestations, methodological problems and theoretical implications of polity in a wide range of cultures.
- 541 Seminar in Psychological Aspects of Culture (3)** **Spiro**
Selected problems in the relation of culture and personality types.
- 542J Personality Patterns in Japanese Culture (3)**
The nature and content of Japanese social life as it bears upon Japanese character. Prerequisite, permission. Offered jointly with the Far Eastern and Russian Institute.
- 553J Analysis of Linguistic Structures (3, maximum 6)** **Jacobs, Li**
Offered jointly with the Department of Linguistics.
- 557J Seminar on Japanese Society (3-6)**
Analysis of selected critical problems for the understanding of Japanese society; and an introduction to the social-historical, social-economic and social-anthropological literature. Offered jointly with the Department of Anthropology. For advanced students. Prerequisite, permission.
- 559 Seminar in Language and Culture (3)** **Jacobs**
Theoretical and methodological problems in language and culture.
- 561 Seminar in Methods and Theories (3, maximum 9)** **Watson, Ray**
- 563 Structural-Functional Analysis (3-9)** **Read, Spiro**
- 565, 566, 567 History of Anthropological Sciences (3,3,3)**
A "core" course for beginning graduate students, in which the growth and development of anthropological science is analyzed.
- 570 Seminar in Archaeology (3)** **Greengo**
(Offered 1964-65.)
- 571 Field Course in Archaeology (5)** **Greengo**
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.)
- 580 Anthropology in Contemporary Problems (3)** **Gunter**
(Offered 1965-66.)
- 581 Anthropological Migration and Population Study (3)**
(Offered 1964-65.)
- 582 Seminar in Race and Genetics (3)**
- 600 Research (*)**
- 700 Thesis (*)**

ART

Director: BOYER GONZALES, 102 Art Building
Graduate Program Adviser: WENDELL BRAZEAU, 202 Art Building

The School of Art offers courses leading to the degree of Master of Fine Arts. In addition to Graduate School general admission requirements (see page 20), students desiring to pursue a course of study leading to the Master of Fine Arts degree must have a grade average of B or better in the undergraduate art major and must have completed the equivalent of our undergraduate degree requirements. The applicant must also prepare a student show indicating the scope and proficiency of his undergraduate work, which will be voted upon by the faculty of the School of Art before his admission is fully approved.

The student's program of studies will be determined by his committee from the direction of work needed for his thesis and from the needs indicated by his background and his level of achievement in graduate study. The committee may require additional work beyond the basic minimum if it feels it is necessary for the student to make up deficiencies or inadequacies.

Students accepted for admission will be required to complete a program of a minimum of 36 credits of scheduled class work and 9 credits of thesis for a total of 45 credits for the degree. A maximum of 9 credits (if approved) may be transferred from other schools. An acquaintance with the general field of art and proficiency in performance will be expected of each recipient of the degree of Master of Fine Arts.

The thesis is in the nature of a project, such as a series of paintings, prints, sculpture, or ceramic objects, designs in metal, fabric, or other equivalent project executed with a background of research. In most cases the thesis is not finished during the one year of residence, as more time is often required for its satisfactory completion. The thesis must be in a form suitable to the committee and must be approved by the faculty of the School of Art.

A record of the thesis in approved form, consisting of photographs, color transparencies, and the like, together with research material, a written statement of goals and background of the thesis, will be kept by the School of Art and must be filed in the Art Library two weeks before the end of the quarter in which the degree is to be received.

A selection from the student's thesis may be reserved for inclusion in the annual exhibition of masters' theses of the School of Art at the Henry Art Gallery.

COURSES

307, 308, 309	Portrait Painting (3,3,3)	Brazeau, Hixson
310, 311, 312	Interior Design (5,5,5)	Footo
316, 317, 318	Design for Industry (3,3,3)	Smith
320	History of Modern Sculpture (2)	Du Pen
322, 323, 324	Sculpture (3,3,3)	Du Pen
326	History of Painting Since the Renaissance (2)	Moseley
327	History of Printmaking (2)	Alps
332, 333, 334	Advanced Sculpture (3,3,3)	Du Pen
340	Design for Printed Fabrics (3)	Penington
341J	Greek Archaeology and Art (2) Offered jointly with the Department of Classics.	Edmonson
342J	Roman Archaeology and Art (2) Offered jointly with the Department of Classics.	Edmonson
343J	Greek Sculpture (2) Offered jointly with the Department of Classics.	Edmonson
350	Introduction to Printmaking (3)	Alps
351	Printmaking—Etching (3)	Alps
352	Printmaking—Serigraph (3)	Alps

353, 354, 355	Advanced Ceramic Art (5,5,5)	Sperry
357	Metal Design (3)	Penington
358	Jewelry Design (3)	Penington
359	Enameling (3)	Penington
360, 361, 362	Life (3,3,3)	
366, 367, 368	Graphic Design (3,3,3)	Erickson
369, 370, 371	Costume Design (2,2,2)	
382	Art of India (3) (Offered alternate years; offered 1963-64.)	Rogers
383	Art of China (3) (Offered alternate years; offered 1963-64.)	Rogers
384	Art of Japan and Korea (3) (Offered alternate years; offered 1963-64.)	Rogers
386	The Art of the Ancient Near East (3) (Offered alternate years; offered 1964-65.)	Rogers
387	Islamic Art (3) (Offered alternate years; offered 1964-65.)	Rogers
388	Medieval Art (3) (Offered alternate years; offered 1964-65.)	Rogers
402J	Greek and Roman Pottery (3) Offered jointly with the Department of Classics.	Edmonson
404J	Greek and Roman Sculpture (3) Offered jointly with the Department of Classics.	Edmonson
410	Illustration (5)	Erickson
423, 424, 425	Art History and Criticism (3,3,3)	Rogers
426	Origins of Modern Art (3)	Rogers
428	Oriental Ceramic Art (2)	Rogers
436, 437, 438	Sculpture Composition (5,5,5)	Du Pen
445, 446, 447	Advanced Industrial Design (5,5,5)	Del Giudice
450, 451, 452	Advanced Printmaking (5,5,5)	Alps
457	Advanced Metal Design (3)	Penington
458	Advanced Jewelry Design (3)	Penington
459	Advanced Enameling (3)	Penington
463, 464, 465	Composition (3,3,3)	Brazeau, Hixson
466, 467, 468	Graphic Design (5,5,5)	Welman
472, 473, 474	Advanced Interior Design (5,5,5)	Foote
475, 476, 477	Advanced Painting (3,3,3) Formerly 375, 376, 377.	
479, 480, 481	Fashion Illustration (2,2,2)	
485, 486, 487	Advanced Ceramic Art (5,5,5)	Sperry
490	Art Education in the Schools (3)	
498	Individual Projects (3 or 5, maximum 15)	
500, 501, 502	Seminar in Art Education (3 or 5 each) Special problems in the teaching and supervision of art in the public schools. Prerequisite, permission.	
507, 508, 509	Advanced Portrait Painting (3,3,3)	Brazeau, Hixson
510	Advanced Illustration (3 or 5)	
522, 523, 524	Advanced Sculpture (3 or 5 each)	Du Pen
530, 531, 532	Advanced Design (3 or 5 each)	
550, 551, 552	Advanced Printmaking (3 or 5 each)	Alps
553, 554, 555	Advanced Ceramic Art (3 or 5 each)	Sperry
560, 561, 562	Advanced Life Painting (3 or 5 each)	
563, 564, 565	Composition (3 or 5 each)	
600	Research (*)	
700	Thesis (*)	

ATMOSPHERIC SCIENCES

(Formerly Meteorology and Climatology)

Chairman: PHIL E. CHURCH, 201F Atmospheric Sciences Building
Graduate Program Adviser: R. G. FLEAGLE, 201E Atmospheric Sciences Building

The Department offers programs of graduate study leading to the degrees of Master of Science and Doctor of Philosophy. These programs are open to qualified students who have earned a bachelor's degree in a physical science or mathematics. The distinction between prospective candidates for the M.S. and Ph.D. degrees is made on the basis of a qualifying examination taken after two quarters of graduate study. This examination covers fundamental aspects of atmospheric sciences and the relevant mathematics and physics.

Courses in the following subjects are normally considered as prerequisites to study toward an advanced degree, mathematics through ordinary differential equations (Mathematics 221) and advanced calculus (Mathematics 234), modern physics (Physics 320), and thermodynamics (Atmospheric Sciences 340 or Physics 371), and atmospheric analysis (Atmospheric Sciences 350).

Each student working toward an advanced degree is expected to attend Department colloquia and to attend and participate in the Graduate Student Forum which meets weekly for critical discussion of a published paper of current interest.

MASTER OF SCIENCE. The program of study and research is intended to enable the student throughout his scientific career to grow with his field, to recognize and understand new concepts, and to master new procedures as they emerge.

The minimum course requirements are 27 credits exclusive of research or thesis, of which 3 must be in applied mathematics or mathematical physics and 15 must be in atmospheric sciences courses numbered above 500.

A thesis is required. It must demonstrate the student's ability to use research methods in a limited area and to discuss critically his own and other investigators' work.

DOCTOR OF PHILOSOPHY. The degree of Doctor of Philosophy signifies understanding and knowledge normally attained only through the original solution of a problem of substantial scientific importance.

A student who passes the qualifying examination with distinction may embark on the Ph.D. program under the sponsorship of a faculty Supervisory Committee. The General Examination, taken at the end of the second year of residence, is composed of a written examination which tests mastery of general and theoretical atmospheric sciences and of relevant mathematical methods; and an oral examination which tests depth of understanding of a topic within the student's area of special interest, selected in advance.

At least half of the credits earned prior to the General Examination should be in courses numbered above 500, and at least 21 credits should be earned in approved mathematics and physics courses numbered above 400. The dissertation is an important part of the student's program; it must represent an original contribution of substantial scientific importance.

COURSES

301 Introduction to Atmospheric Science (5)

321 Physical Climatology (5)

Church

322 Regional Climatology (5)

Church

329 Microclimatology (3)

Buettner

340 Introduction to Atmospheric Physics (5)

Businger, Fleagle

350 Introduction to Atmospheric Analysis (5)

Reed

360 Meteorological Instruments and Observations (5)

Badgley

403J Introduction to Geophysics: The Atmosphere (5)

Offered jointly with the Committee on Geophysics.

- 431, 432 Atmospheric Physics (5,3)** **Businger, Fleagle**
- 441, 442 Atmospheric Motions (5,5)** **Fleagle, Reed**
- 451 Atmospheric Analysis (5)** **Reed**
- 452 Forecasting Laboratory (5)** **Reed**
Prerequisite, 451.
- 462 Sea-Air Transfer Processes (6)** **Fleagle**
(Offered at Friday Harbor Summer Quarter only.)
- 492 Readings in Meteorology or Climatology (*)**
- 493 Special Problems in Meteorology or Climatology (*)**
- 494 Meteorological Statistics (*)**
- 522 Advanced Regional Climatology (3)** **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.
- 528 Applied Meteorology and Bioclimatology (3)** **Buettner**
Interrelationship of meteorology and climatology to: human health and heat balance, aviation and space medicine, air pollution, agriculture, forestry, transportation, etc. Prerequisites, 322 and 431 or permission.
- 531 The Upper Atmosphere (3)** **Buettner**
Structure, composition, and dominant physical and photochemical processes. Sound propagation, aurora, air glow, ionosphere, and Van Allen belts. Role of the sun. Exosphere and planetary atmospheres. Prerequisites, Mathematics 221, 325, or equivalent and Physics 320, or permission.
- 532 Atmospheric Electricity (3)** **Buettner**
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)** **Buettner**
Solar spectrum. Atmospheric scattering, spectra of water vapor and other gases. Albedo of earth and atmosphere. Radiative heat balance. Prerequisites, Physics 320 and Mathematics 221.
- 541, 542 Dynamic Meteorology (3,3)** **Fleagle**
541: basic equations of dynamic meteorology, circulation and potential vorticity theorems, barotropic and baroclinic atmospheres, large and small scale approximations. Prerequisite, Mathematics 325 or Aeronautics and Astronautics 567 or equivalent. 542: particle dynamics applied to large scale motions and to stability criteria, linearized barotropic wave, numerical forecasting equations, baroclinic, diabatic and topographic effects. Prerequisites, 541 and Mathematics 221, or permission.
- 543, 544 Atmospheric Wave Theory (3,3)** **Fleagle**
543: perturbation equations in Eulerian and Lagrangian form, wave motions in incompressible and compressible fluids, wave theory of cyclones; flow over mountains. Prerequisites, 442, Aeronautics and Astronautics 567, or permission. 544: structure of baroclinic wave, baroclinic instability, general circulation, dispersion of waves, associated Legendre equation, wave motion on spheres, atmospheric tides. Prerequisite, 543.
- 546, 547, 548 Atmospheric Turbulence (3,3,3)** **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: diffusion of matter in the atmosphere; application of Fickian and statistical theories of diffusion; use of Lagrangian and Eulerian correlation functions. Prerequisite, 546. 548: 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.
- 551 Advanced Atmospheric Analysis (5, maximum 10)** **Reed**
Selected advanced nonroutine types of analysis. Exercises in objective map analysis and numerical weather prediction. Prerequisite, 442 or permission.
- 560 Theory of Meteorological Instruments (3)** **Businger, Badgley**
The physical theory of the operation of meteorological instruments. Emphasis on new and specialized research instruments and on more difficult problems involving standard instruments. Prerequisites, one year of calculus and permission.
- 570 Seminar on Cloud Physics (2)**
The physical processes in the formation and modification of clouds and the formation of precipitation in the atmosphere are examined. Prerequisite, permission.
- 572 Seminar on Polar Meteorology (3)**
Critical examination of source materials and original papers on selected topics applicable to polar meteorology. Prerequisite, permission.
- 593 Laboratory in Experimental Meteorology (3, maximum 6)** **Badgley**
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 Research (*)**
- 700 Thesis (*)**

BOTANY

**Chairman and Graduate Program Adviser: RICHARD B. WALKER,
342 Johnson Hall**

The Department of Botany offers programs leading to the degrees of Master of Science and Doctor of Philosophy. Fields for specialization are algology, anatomy and morphology, physiology, mycology, and taxonomy; and students may also choose genetics, in cooperation with the staff of the Department of Genetics. Students are encouraged to work out modern experimental approaches to problems. Facilities include a herbarium, well known for its collections of plants of the Pacific Northwest, adequate greenhouse and outplanting space, controlled-environment chambers, adequately equipped laboratories, good library facilities, a special peat-bog study area, and the Friday Harbor Marine Laboratories. Prospective candidates for degrees take an examination on the general fields of botany shortly after beginning their studies. Certain parts of this examination may be deferred for students with deficiencies in undergraduate course work. Foreign language requirements are usually met with French, German, or Russian, but Latin may be accepted in the case of students in taxonomy. Training in organic chemistry is required for all students who lack this preparation.

MASTER OF SCIENCE. Students pursue a course of study designed to enhance their general and specialized training in botany and related sciences; take an examination in their field of specialization and in the other fields of botany; and submit a thesis describing their research.

DOCTOR OF PHILOSOPHY. Students pursue a program of formal and informal study in botany and related fields leading to a broader and more intensive training than is possible in the Master of Science studies. In preparation for the oral General Examination prescribed by the Graduate School, the student is required to pass detailed departmental examinations in his field of specialty and in other pertinent fields of botany. In the dissertation study and in the writing of the dissertation, the student is expected to develop and display originality and high potential as an independent investigator.

COURSES

BIOLOGY

- | | |
|---|-----------------------|
| 401 Cytology (3) | Hsu |
| 401L Cytology Laboratory (2)
Must be accompanied by 401. | Hsu |
| 451 Genetics (3) | Roman |
| 451L Genetics Laboratory (2)
Must be accompanied by 451. | |
| 452 Cytogenetics (3) | Roman |
| 452L Cytogenetics Laboratory (2)
Must be accompanied by 452. | Hawthorne |
| 453 Topics in Genetics (2, maximum 6) | Roman, Stadler |
| 454 Evolutionary Mechanisms (3)
(Offered alternate years; offered 1962-63.) | Kruckeberg |
| 472 Principles of Ecology (3) | Edmondson |
| 472L Ecology Laboratory (2)
Must be accompanied by 472. | Edmondson |
| 473 Limnology (5) | Edmondson |
| 501 Advanced Cytology (5)
(Offered alternate years; offered 1962-63.) | Hsu |
| 508 Cellular Physiology (3)
Functional aspects of protoplasmic structures. Prerequisite, Zoology 400 or permission. | Whiteley |
| 508L Cellular Physiology Laboratory (2)
Must be accompanied by 508. Prerequisite, permission. | Whiteley |

- 509 Cellular Physiology (3)** **Whiteley**
Chemistry and physiology of the interkinetic and dividing nucleus, nucleocytoplasmic interactions, physiology of differentiated cells. (Offered alternate years; offered 1963-64.) Prerequisite, Zoology 400 or permission of instructor. (Biology 508 and 509 may be elected separately or in either sequence).
- 573 Topics in Limnology (3)** **Edmondson**
May be repeated for credit.
- BOTANY**
- 331 Ornamental Plants (3)** **Kruckeberg**
- 332 Taxonomy Field Trip (*, maximum 12)**
- 361 Forest Pathology (5)** **Stuntz**
- 371 Elementary Plant Physiology (5)** **Meeuse, Walker**
- 431, 432 Taxonomy (5,5)** **Hitchcock**
(Offered alternate years; offered 1963-64.)
- 441, 442, 443 Morphology (5,5,5)** **Blaser**
(Offered alternate years; offered 1964-65.)
- 444 Plant Anatomy (5)** **Blaser**
(Offered alternate years; offered 1963-64.)
- 445 Marine Algology (6)**
(Offered at Friday Harbor Summer Quarter only.) Prerequisites, 112 and permission.
- 446 Algology (5)**
Classification, recognition, and cultivation of marine and freshwater algae. (Offered alternate years; offered 1963-64.) Prerequisites, 112 or 20 credits in biology.
- 461 Yeasts and Molds (5)** **Stuntz**
- 462, 463 Mycology (5,5)** **Stuntz, Whisler**
- 523 Topics in Mycology (2, maximum 10)** **Stuntz, Whisler**
Selected topics in all phases of mycology. Prerequisite, permission.
- 471 Mineral Nutrition (5)** **Walker**
(Offered alternate years; offered 1962-63.)
- 472 Plant Physiology (5)** **Meeuse, Walker**
- 473 Plant Physiology (3)** **Meeuse**
(Offered alternate years; offered 1962-63.)
- 473L Plant Physiology Laboratory (2)** **Meeuse**
Must be accompanied by 473.
- 474 Plant Physiology (3)** **Walker**
(Offered alternate years; offered 1963-64.)
- 474L Plant Physiology Laboratory (2)** **Walker**
Must be accompanied by 474.
- 475 Problems in Algal Physiology (6)** **Meeuse**
(Offered at Friday Harbor Summer Quarter only.)
- 498 Special Problems in Botany (1-15)**
Prerequisite, permission.
- 520 Seminar (1)**
Prerequisite, permission.
- 521 Topics in Plant Physiology (2, maximum 10)** **Meeuse, Walker**
Modern trends and methods in plant physiology. Prerequisite, 371 or 472, or permission.
- 522 Seminar in Morphology and Taxonomy (*, maximum 5)**
Current research and trends in morphology and taxonomy of higher plants. Comparison of classical with modern approaches and concepts. Prerequisite, permission.
- 465 Marine Mycology (6)** **Whisler**
(Offered Summer Quarter only.)
- 600 Research (*)**
Original investigations of special problems in genetics, morphology, mycology, taxonomy, or plant physiology.
- 700 Thesis (*)**

CHEMISTRY

Chairman and Graduate Program Adviser: GEORGE H. CADY, 101 Bagley Hall

The Department of Chemistry offers courses leading to the degrees of Master of Science and Doctor of Philosophy. Prospective candidates for advanced degrees are expected to take the qualifying and cumulative examinations. The qualifying,

or entrance, examinations are designed to assess the student's knowledge and understanding of the material normally contained in an undergraduate program with a major in chemistry. These examinations are usually given Monday and Tuesday preceding the opening of Autumn Quarter and may be repeated during the first week of Winter Quarter and about the middle of Spring Quarter. All parts of this examination should be passed within a year. The cumulative examinations, given six times during each academic year, are General Examinations in the student's area of specialization (analytical, inorganic, organic, or physical chemistry) and are designed to stimulate independent study and thought. They attempt to evaluate the breadth of knowledge gained from courses, seminars, literature, and the student's ability to apply this knowledge to diverse problems.

MASTER OF SCIENCE. Candidates for this degree usually present German as their foreign language.

DOCTOR OF PHILOSOPHY. The cumulative examination requirement for this degree is satisfied when six examinations have been passed. The language requirement may be satisfied by passing examinations in German and in either Russian or French.

COURSES

- 335, 336, 337 Organic Chemistry (3,3,3)
 345, 346, 347 Organic Chemistry Laboratory (1,1,2)
 347 Organic and Qualitative Organic Chemistry (3)
 350, 351 Elementary Physical Chemistry (3,3)
 410 Radiochemical Techniques and Radioactivity Measurements (3)
 415 The Chemical Bond (3)
 416 Inorganic Chemistry (3)
 418 Radiochemistry (3) Fairhall
 419 Radiochemistry Laboratory (2) Fairhall
 425 Quantitative Analysis (3) Robinson
 426 Instrumental Analysis (3) Crittenden
 427 Advanced Quantitative Theory (3) Crittenden
 428 Chemical Microscopy (3) Robinson
 429 Microquantitative Analysis (3) Robinson
 445 Qualitative Organic Analysis (3)
 446 Advanced Organic Analysis and Synthesis (3)
 455, 456, 457 Physical Chemistry (4,3,3)
 458 Physical Chemistry Laboratory (4)
 511 Advanced Inorganic Chemistry (2) Cady
 Halogens; less familiar metals; chelate, clathrate, interstitial and non-stoichiometric compounds; other selected topics. Prerequisite, 416 or permission.
 512 Advanced Inorganic Chemistry (2) Ritter
 Acid-base theory; mechanism of certain reactions; compounds of nonmetals of groups 3, 4, and 5. Prerequisite, 416 or permission.
 513 Advanced Nuclear Chemistry (2) Fairhall
 Nuclear reactions, fission, complex radioactive decay, absolute counting techniques, radiochemical separations, low-level techniques, geochemistry, cosmochemistry, chemistry of the synthetic elements. Prerequisite, 418 or permission.
 526 Advanced Instrumental Analysis (3) Crittenden
 Absorption and emission spectroscopy, polarography, potentiometry, and dielectric properties as applied to problems in analytical chemistry. Prerequisite, 426 or permission.
 530, 531, 532 Advanced Organic Chemistry (3,3,3)
 Consideration of synthetic methods, structure determinations, and reaction mechanisms for acyclic, alicyclic, and aromatic compounds of synthetic and natural origin, with emphasis on modern theory and practice. Prerequisite, 337 or permission.
 543 Natural Organic Products (3) Anderson
 Structure determination, properties and synthesis of steroids and other natural organic products of current importance. Prerequisite, 532 or permission.

- 544 Theoretical Organic Chemistry (3)**
Application of the theories of chemical bonding and equilibria to the structures and reactions of organic compounds. Prerequisite, 532 or permission.
- 545 Organic Synthetic Methods (3)** **Dauben**
Consideration of carbon skeleton synthetic methods, with emphasis on Diels-Alder, organo-metallic and basecatalyzed condensation reactions. Prerequisite, 532 or permission.
- 546 Organic Radical Reactions (3)** **Dauben**
Survey of reactions in solution involving radical intermediates. Prerequisite, 532 or permission.
- 547 Organic Heterocycles (3)** **Stout**
Synthesis and reactions of organic heterocycles, with emphasis on those of natural origin. Prerequisite, 532 or permission.
- 548 Physical Organic Chemistry (3)** **Schubert**
Interpretation and application of data obtained by combined methods of organic and physical chemistry to the problems of structures of organic compounds and mechanisms of organic reactions. Prerequisite, 532 or permission.
- 550, 551, 552 Advanced Physical Chemistry (3,3,3)**
Thermodynamics, statistical mechanics, kinetic theory, chemical kinetics, quantum mechanics. Prerequisites, 457 or equivalent for 550; 550 for 551; 551 for 552.
- 560 Current Problems in Physical Chemistry (3, maximum 18)** **Rabinovitch**
For doctoral candidates in physical chemistry. A discussion of topics selected from active research fields, e.g., chemical kinetics, thermodynamics, crystallography, electron dynamics, molecular dynamics, statistical mechanics, solid state, and related topics. Prerequisite, 552 or permission.
- 581 Topics in Inorganic Chemistry (3, maximum 18)**
Open only to students accepted for doctoral work in chemistry.
- 582 Topics in Analytical Chemistry (3, maximum 18)**
Open only to students accepted for doctoral work in chemistry.
- 583 Topics in Organic Chemistry (3, maximum 18)**
Open only to students accepted for doctoral work in chemistry.
- 585 Topics in Physical Chemistry (3, maximum 18)**
Open only to students accepted for doctoral work in chemistry.
- 590 Seminar in General Chemistry (1, maximum 18)**
- 591 Seminar in Inorganic Chemistry (1, maximum 18)**
- 592 Seminar in Analytical Chemistry (1, maximum 18)**
- 593 Seminar in Organic Chemistry (1, maximum 18)**
- 595 Seminar in Physical Chemistry (1, maximum 18)**
- 600 Research (*)**
- 700 Thesis (*)**

CLASSICS

Chairman and Graduate Program Adviser: JOHN B. McDIARMID, 218 Denny Hall

The Department of Classics offers programs leading to the degrees of Master of Arts and Doctor of Philosophy. Specific departmental requirements are described briefly below. More complete information may be obtained from the Graduate Program Adviser.

MASTER OF ARTS. Requirements are: a minimum of 27 credits in courses or seminars in Greek, Latin, and related subjects approved by the Department; either an acceptable thesis or 9 additional credits in Greek or Latin 599, Graduate Reading; a reading knowledge of either French or German.

DOCTOR OF PHILOSOPHY. Requirements are: a minimum of 72 credits in courses or seminars in Greek, Latin, and related subjects approved by the Department; an acceptable dissertation; a reading knowledge of French and German. Students must pass a General Examination, both written and oral, before beginning work on the dissertation, and a Final Examination upon completion of the dissertation.

COURSES

GREEK

- 300 Greek Language, Accelerated (3)**
- 309 Advanced Grammar and Composition (1, maximum 4)**

Wyatt

N391 Sight Reading (0)

- | | |
|--|-------------------|
| 413 The Pre-Socratic Philosophers (3)
(Offered alternate years; offered 1964-65.) | McDiarmid |
| 414 Plato (3)
(Offered alternate years; offered 1964-65.) | Rosenmeyer |
| 415 Aristotle (3)
(Offered alternate years; offered 1964-65.) | McDiarmid |
| 420 Greek Epic (3)
(Offered alternate years; offered 1963-64.) | Edmonson |
| 422 Herodotus and the Persian Wars (3)
(Offered alternate years; offered 1963-64.) | Edmonson |
| 424 Thucydides and the Peloponnesian War (3)
(Offered alternate years; offered 1963-64.) | Edmonson |
| 442, 443, 444 Greek Drama (3,3,3)
(Offered alternate years; offered 1963-64.) | McDiarmid |
| 451 Lyric Poetry (3)
(Offered alternate years; offered 1964-65.) | Rosenmeyer |
| 453 Pindar: The Epinician Odes (3)
(Offered alternate years; offered 1964-65.) | McDiarmid |
| 455 Hellenistic Poetry (3)
(Offered alternate years; offered 1964-65.) | Rosenmeyer |
| 490 Supervised Study (3-6, maximum 18) | |
| 520 Seminar (3, maximum 27) | |
| 599 Graduate Reading (*, maximum 18)
Supervised reading in selected fields. | |
| 600 Research (3-5, maximum 15) | |
| 700 Thesis (*) | |
| 702 Degree Final (6)
Limited to students completing a nonthesis degree program. | |

LATIN

- | | |
|--|-----------------------|
| 300 Latin Language, Accelerated (3) | Wyatt |
| 309 Advanced Grammar and Composition (1, maximum 4) | |
| N391 Sight Reading (0) | |
| 401 Medieval Latin (3) | Pascal |
| 412 Lucretius (3)
(Offered alternate years; offered 1963-64.) | Grummel |
| 413 Cicero's Philosophical Works (3)
(Offered alternate years; offered 1963-64.) | Grummel |
| 414 Seneca (3)
(Offered alternate years; offered 1963-64.) | Grummel |
| 422 Livy (3)
(Offered alternate years; offered 1964-65.) | Edmonson |
| 423 Cicero's Orations (3)
(Offered alternate years; offered 1964-65.) | Edmonson |
| 424 Tacitus (3)
(Offered alternate years; offered 1964-65.) | Edmonson |
| 430 Latin Novel (3)
(Offered alternate years; offered 1963-64.) | Fredricksmeier |
| 442 Roman Drama (3)
(Offered alternate years; offered 1964-65.) | Pascal |
| 451 Roman Satire (3)
(Offered alternate years; offered 1963-64.) | Pascal |
| 455 Catullus (3)
(Offered alternate years; offered 1964-65.) | Grummel |
| 456 Horace (3)
(Offered alternate years; offered 1964-65.) | Fredricksmeier |
| 458 Roman Epic (3)
(Offered alternate years; offered 1963-64.) | Grummel |

- 475LJ Improvement of Teaching: Latin (5)** **Grummel, Pascal**
Offered jointly with the College of Education. (Offered Summer Quarter only.)
- 475XJ Caesar for High School Teachers (2½)** **Grummel**
Offered jointly with the College of Education. (Offered Summer Quarter only.)
- 490 Supervised Study (3-6, maximum 18)**
- 520 Seminar (3, maximum 27)**
- 599 Graduate Reading (*, maximum 18)**
Supervised reading in selected fields.
- 600 Research (3-5, maximum 15)**
- 700 Thesis (*)**
- 702 Degree Final (6)**
Limited to students completing a nonthesis degree program.

CLASSICS COURSES IN ENGLISH

- 422 Greek Historians and Philosophers in English (3)** **Rosenmeyer**
- 426 Greek and Roman Epic in English (3)** **Rosenmeyer**
- 427 Greek and Roman Drama in English (3)** **McDiarmid**
- 430 Greek and Roman Mythology (3)** **Grummel**
- 440 Greek and Roman Critics in English (3)** **Grummel**

CLASSICAL ARCHAEOLOGY

- 341J Greek Archaeology and Art (2)** **Edmonson**
Offered jointly with the School of Art.
- 342J Roman Archaeology and Art (2)** **Edmonson**
Offered jointly with the School of Art.
- 402J Greek and Roman Pottery (3)** **Edmonson**
Offered jointly with the School of Art. (Offered alternate years; offered 1964-65.)
- 404J Greek and Roman Sculpture (3)** **Edmonson**
Offered jointly with the School of Art. (Offered alternate years; offered 1964-65.)
- 406 Greek Architecture (3)** **Edmonson**
(Offered alternate years; offered 1964-65.)
- 511 Mycenaean Archaeology (3)** **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 1963-64.)
- 513 Athenian Topography (3)** **Edmonson**
Detailed consideration of the topography and monuments of ancient Athens from the beginning through the Roman period. (Offered alternate years; offered 1963-64.)
- 515 Attic Epigraphy (3)** **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 1963-64.)

CLASSICAL LINGUISTICS

- 501 Comparative Phonology of Greek and Latin (3)** **Wyatt**
The phonological developments of Greek and Latin from Indo-European to the classical periods of both languages. (Offered alternate years; offered 1963-64.)
- 503 History of the Greek Language (3)** **Wyatt**
The morphological and syntactical development of the Greek language from Homer through the New Testament; the development of prose and poetic style. (Offered alternate years; offered 1963-64.)
- 505 History of the Latin Language (3)** **Wyatt**
The morphological and syntactical development of the Latin language; the development of Latin as a literary language. (Offered alternate years; offered 1963-64.)
- 506 Italic Dialects (3)** **Wyatt**
The principal remains of the non-Latin languages and dialects of ancient Italy. (Offered alternate years; offered 1964-65.)
- 508 Greek Dialects (3)** **Wyatt**
The non-Attic dialects of ancient Greek, based on a study of inscriptions and the literary remains. (Offered alternate years; offered 1964-65.)
- 510 Mycenaean Greek (3)** **Wyatt**
A study of the Linear-B tablets found in Crete and the Greek mainland. (Offered alternate years; offered 1964-65.)

COMMUNICATIONS

**Director and Graduate Program Adviser: WILLIAM E. AMES,
129 Communications Building**

The School of Communications offers courses leading to the degree of Master of Arts in Communications. Graduate students elect up to three fields of study and research, including society and mass communications, history and communications, communications and law, propaganda, theory and research in mass communications, advertising, and radio-television.

Students who wish to utilize courses in the School of Communications as a minor in graduate study leading to the degree of Doctor of Philosophy in another department should consult the Director of the School.

COURSES

Although other courses may be substituted on approval, those for which credit customarily is given toward the degree of Master of Arts in Communications include the following from the Communications sequence: 402, 406, 411, 414, 415, 470, 480, 498, 502, 506, 511, 514, 570, 580, 598, and 600.

Students taking courses in Communications toward an advanced degree in some other division or department may earn credit in any of the following courses in the School of Communications:

ADVERTISING

440 Advertising Campaigns (3) Warner

COMMUNICATIONS

402 Freedom of the Press and Communications Law (3) Benson

406 Press and Society (3) Ames

411 Introduction to Mass Communications Research (3) Samuelson

414 History of Journalism (3) Smith

415 Comparative Communications (3) Smith

470 Theory and Criticism of Broadcasting (3) Niven

480 Propaganda (3) Edelstein

498 Problems of Communications (1-5, maximum 10)

502 Government and Mass Communications Seminar (3) Benson

506 Press and Society Seminar (3) Ames

511 Mass Communications Research Seminar (3) Samuelson

514 Journalism and History Seminar (3) Smith

570 Seminar in Theory and Criticism of Broadcasting (3) Niven

580 Seminar in Propaganda (3) Edelstein

598 Selected Readings (1-5, maximum 5)

600 Research (3-5)

700 Thesis (*)

JOURNALISM

413 Editorial Writing, Policies, and Research (3) Benson

RADIO-TELEVISION

450 Television Programming (3) Ryan

459J Television in the Schools (3) Adams

Offered jointly with the College of Education.

COMPARATIVE LITERATURE

**Chairman and Graduate Program Adviser: FRANK W. JONES,
119A Parrington Hall**

MASTER OF ARTS. Students pursuing programs of study for the degree of Master of Arts with a major in General Literature should ordinarily present a Bachelor of Arts in English, in a foreign language, or in Comparative Literature.

Course requirements are 35 credits (of which 25 must be in courses numbered 500 or above): 10 credits in Comparative Literature (including Comparative Literature 510 or 511) and 25 credits in two or more literatures or related fields. With the permission of the Graduate Program Adviser and the departments concerned, a thesis may be presented for 10 of the 35 credits.

By the time the student has fulfilled the course requirements, and before he takes the M.A. examination, he must pass the graduate reading tests in at least two of the languages included in the program: Chinese, Danish, French, German, Greek, Italian, Japanese, Korean, Latin, Norwegian, Russian, Spanish, and Swedish. The student's native language may not be one of those by which he meets this requirement.

The student must pass a written examination consisting of questions on two or more literatures and on the relations between them.

DOCTOR OF PHILOSOPHY. The degree of Doctor of Philosophy with a major in Comparative Literature is awarded through the prospective candidate's major department and his Supervisory Committee. The following departments are authorized to sponsor candidates: English, Classics, Far Eastern and Slavic Languages and Literature, Germanic Languages and Literature, and Romance Languages and Literature.

Before taking his qualifying examination, the student must complete a minimum of 70 credits in graduate course work. These must include Comparative Literature 510 and 511; 35 credits in the student's major literature (including English 505 if the major literature is English); and 25 credits in his minor field or fields. The major literature must be Chinese, English, French, German, Greek, Italian, Latin, Japanese, Russian, or Spanish. The minor field may be in any of the languages listed under the M.A. requirements.

The student must know at least two languages in the program sufficiently well for graduate study of their literatures. The languages are those listed under the M.A. requirements.

The qualifying examination is to be taken within three quarters (Summer Quarter excepted) after completing course work. It is based on the assumption that the student's reading and study have prepared him for the following: a written examination testing his knowledge of a genre as represented in the major and minor literatures; a critical essay of about five thousand words on a comparative topic; an oral examination in the major and minor fields.

The Graduate Program Adviser in the student's major department will recommend a dissertation committee to the Dean of the Graduate School. The student may request any member of the graduate faculty in his major or minor field to supervise his dissertation. The supervisor will not be a member of the dissertation committee.

A Final Examination (oral) on the dissertation, and on the field or fields with which it is concerned, must be completed at least two weeks before the end of the quarter in which the degree is to be granted.

COURSES

400 Heroic Poetry (5)

401 Modern European Drama (5)

450, 451 Romanticism and the Nineteenth Century in Europe (5,5)

- 480 The Symbolist Movement (5)
- 510 Theories and Methods of Comparative Literary History (5, maximum 10)
- 511 The Art of Translation (5, maximum 10)
- 600 Research (*)
- 700 Thesis (*)
- 702 Degree Final (6)
Limited to students completing a nonthesis degree program.

LITERATURE COURSES IN OTHER DEPARTMENTS

CLASSICS

- 426 Greek and Roman Epic in English (3)
- 427 Greek and Roman Drama in English (3)
- 440 Greek and Roman Critics in English (3)

FAR EASTERN AND SLAVIC LANGUAGES AND LITERATURE

- Japanese 420 Japanese Literary Tradition (5)
- Japanese 421 Modern Japanese Literature in English (5)
- Japanese 422 Studies in Japanese Poetry in English (5)
- Japanese 423 Studies in Japanese Drama in English (5)
- Russian 421 Contemporary Russian Literature in English (5)
- Russian 422 Russian Plays in English (5)
- Russian 426, 427 The Russian Novel in English (5,5)

GERMANIC LANGUAGES AND LITERATURE

- 464 Thomas Mann in English (3)

ROMANCE LANGUAGES AND LITERATURE

- French 417 Racine and Moliere in English (3)
- French 418 Literature of the Enlightenment in English (3)
- French 420 Twentieth-Century Fiction in English (3)
- Italian 481, 482 Dante in English (2,2)
- Romance 460 The Literature of the Renaissance in English (5)
- Spanish 420 Contemporary Spanish Essay and Drama in English (3)

SCANDINAVIAN LANGUAGES AND LITERATURE

- 480 Ibsen and His Major Plays in English (2)
- 481 Strindberg and His Major Plays in English (2)

DRAMA

Director: GREGORY A. FALLS, 113 Drama-TV Building

Graduate Program Adviser: DONAL F. HARRINGTON, 114 Drama-TV Building

The School of Drama offers courses leading to the degree of Master of Arts, with three possible areas of emphasis: directing, children's drama, or design-technical. All prospective candidates are required to take 498, 501, earn 5 credits in 470/570 or 480/580 courses, and submit a thesis or thesis production.

A specific program leading to a degree is developed for each student by a faculty committee, in consultation with him about his previous preparation and experience, and his professional objectives. It is assumed that each student has already acquired, either through course work or professional experience, the equivalent of a Bachelor of Arts degree in his emphasis area. If not, he will be expected to make up such deficiencies. Before completion of his program of study, each prospective candidate is required to pass a comprehensive examination in his field of emphasis and related drama fields.

COURSES

- | | | |
|-----------|---|-------------------------------|
| 316 | Theatrical Make-up (2)
Formerly 406. | Davis |
| 324 | Children's Theatre (3)
Formerly 434. (For nonmajors only.) | Carr |
| 325, 326 | Play Production (5,5)
325 formerly 300; 326 formerly 426. (For nonmajors only.) | Conway |
| 331 | Puppetry (3)
Formerly 307. (For nonmajors only.) | Valentinetti |
| 338 | Creative Dramatics (3) | Haaga, Siks |
| 349 | Advanced Stage Speaking (2) | Gray, Ross |
| 395J | Special Studies in the Theatre Arts of Asia (3, maximum 9)
Offered jointly with the Far Eastern and Russian Institute. | McKinnon,
Visiting Artists |
| 411 | Advanced Stage Costume Construction (2)
Formerly 408. | Crider |
| 413 | Advanced Scene Construction (3) | Lounsbury |
| 414 | Scene Design (2, maximum 4) | Conway |
| 415 | Costume Projects (2, maximum 4) | Crider |
| 416 | History of Theatrical Costume (2)
Formerly 407. | Crider |
| 418 | Scene Painting (2) | Davis |
| 419 | Advanced Stage Lighting (2) | Conway, Lounsbury |
| 431 | Fundamentals of Puppetry (2) | Valentinetti |
| 432 | Advanced Puppetry (2, maximum 4) | Valentinetti |
| 435, 435L | Children's Theatre Directing and Laboratory (2,1) | Carr |
| 438, 438L | Creative Dramatics and Laboratory (2,1) | Haaga, Siks |
| 451, 452 | Advanced Acting (3,3)
Formerly 421, 422. | Ross |
| 453 | Acting Projects (2)
A. Style
B. Mime
C. Musical
D. Individual
Formerly 423. | Ross
Galstaun
Carr |
| 455 | Historic Manners and Movement (2)
Formerly 405. | Crider |
| 461, 461L | Theory and Fundamentals of Directing and Laboratory (2,1)
Formerly 481, 481L. | Harrington |
| 462 | Musical Comedy Direction (3) | Carr |
| 463 | Intermediate Projects in Directing (2)
Formerly 482. | Harrington |
| 471 | History of World Theatre and Drama: Classic, Oriental, and Medieval (5)
Formerly 441. | Conway, Falls, Hughes |
| 472 | History of World Theatre and Drama: Through the Eighteenth Century
Formerly 442. | Conway, Falls, Hughes |
| 473 | History of World Theatre and Drama: Nineteenth Century and Modern (5)
Formerly 443. | Conway, Falls, Hughes |
| 474 | History and Aesthetics of the Motion Picture (3)
Formerly 440. | Galstaun |
| 475 | History of Far Eastern Theatre and Drama (5) | Conway |
| 476 | History of the American Drama (5) | Hughes |
| 490 | Special Studies (1-5, maximum 5)
Formerly 479. | |
| 492 | Playwriting (3, maximum 9)
Formerly 445. | Hughes |
| 497 | Theatre Organization and Management (2) | Hughes |
| 498 | Theatre Production (1/2-1, maximum 4) | |
| 501 | Nature of Graduate Study in Drama (2)
Bibliographical resources for dramatic literature; the evaluation and organization of primary and secondary sources; the sources and philosophies of historical and contemporary criticism. | Falls |

- 510 Seminar in Production (3)**
Critical discussion of the problems and interrelationship of direction, design, costume, staging, and lighting from preliminary through post-production stages of recent productions. Prerequisite, permission. Formerly 500.
- 513 Technical Direction (3)** **Lounsbury**
Practical experience for the technician. Student assumes responsibility of technical director for at least one major production. Prerequisites, 210, 413, and permission of instructor.
- 514 Advanced Scene Design (3)** **Conway**
Designing for modern and classic plays which offer special production problems. Adaptation of plays, operas, and musicals to small theatres. Analysis of play structure in relation to design requirements. Prerequisite, 4 credits in 414. Formerly 504.
- 515 Advanced Stage Costume Design (3)** **Crider**
Practical production experience in the design and construction of costumes and work with costume "stock." Required reading and research using the historic clothing museum collection as an integral part of the course. Prerequisite, 4 credits in 415. Formerly 505.
- 530 Seminar in Children's Drama (3)** **Carr, Haaga, Siks**
Reading, critical discussion, and analysis of literature and scholarly research on formal and informal drama for and with children. Prerequisites, 438, 435, and permission.
- 551-552-553 Teaching of Acting (2-2-2)** **Harrington**
Theory and practice of teaching acting at the college level. Observation and practice teaching, seminar, required reading, and analysis of theories. Prerequisites, 452 and permission of instructor.
- 561 Advanced Directing (3)** **Harrington**
Theories and problems of advanced directing with special emphasis on pre-modern plays. Prerequisites, 451, 452, 455, 463, and permission. Formerly 581.
- 562 Advanced Directing Projects (3, maximum 6)** **Harrington**
Prerequisites, 561 and permission.
- 580 Seminar in Drama (5)** **Falls**
Critical studies of plays by types or historic periods. Prerequisites, 471, 472, 473, or permission.
- 599 Advanced Studies in Theatre Arts (1-5, maximum 10)**
No more than 5 credits in any emphasis area. Prerequisite, permission.
- 600 Research (*)**
- 700 Thesis (*)**

ECONOMICS

Chairman: J. B. GILLINGHAM, 301 Guthrie Hall

Graduate Program Adviser: DEAN A. WORCESTER, 301D Guthrie Hall

The Department of Economics offers courses leading to the degrees of Master of Arts and Doctor of Philosophy. Requirements for both advanced degrees include work in the Graduate Core Program of the Department and in some of the following fields of specialization: (1) Comparative Economic Development; (2) Economic History; (3) Economic Theory; (4) Government Regulation and Industrial Organization; (5) International Trade; (6) Labor Economics; (7) Public Finance; and (8) Statistics and Econometrics.

A beginning graduate student with a four-year degree, B.A., B.S., etc., but with little training in economics should expect to take Economics 300 and 301, and other preliminary work in each field selected as is deemed necessary to begin graduate work in that field.

Students may be allowed to substitute equivalent graduate work taken at other institutions for part of the course requirements.

MASTER OF ARTS. Students must complete Economics 500, 501, 502, and 503 in the Graduate Core Program. In addition, they must take four more courses at the 400 and 500 level. Students contemplating careers in business or government are advised to include Economics 481, 482 in their program. Programs can also be arranged in which the student takes a field in a related subject.

The requirements for a minor in economics for a master's degree is 8 credits in advanced economics courses (400 and 500 level).

DOCTOR OF PHILOSOPHY. Prospective candidates must complete the Graduate Core Program and three fields, two of which must be in economics. A student may offer a minor in another department related to his field of major interest, or, with permission of his graduate advisory committee, he may offer a program of selected courses outside economics as the third field.

Doctoral students offering a minor in economics must demonstrate competence in a portion of the Graduate Core Program, which shall include Economics 500, 501, 502, and 503, and one field in economics.

The course program completed by each student must include some work at the 400 or 500 level in each of five fields. For this purpose, students who have completed the Graduate Core Program shall be considered to have had work in economic theory, statistics, and either comparative economic development or economic history.

Through the cooperation of the Far Eastern and Russian Institute, a student may offer, together with a minor in Far Eastern, a Far Eastern area study program as a substitute for one field. In such a case, the work offered will include the Graduate Core Program and one field in economics, one joint economics and Far Eastern field, and the Far Eastern minor. When this option is allowed, the student normally chooses a dissertation subject related to his Far Eastern specialty, and the dissertation is jointly supervised by the Institute and the Department.

The program of study for a full-time student will normally require approximately two years beyond the B.A. degree after official admission to the Graduate School. If the student holds an assistantship this period may be somewhat extended, depending upon whether his undergraduate preparation fits well into the fields of specialization in his graduate program. Upon completion of the program of study the student will be required to pass the General Examinations, both oral and written, covering the Core Program and his selected fields. Normally a student begins work upon a doctoral dissertation after passing the General Examinations and he should plan on spending a year on research for the dissertation. A Final Examination (oral) is taken upon completion of the dissertation.

GRADUATE CORE PROGRAM

481 Economic Statistical Analysis (5)

482 Advanced Economics Statistical Analysis (5)

500 Micro-Economic Analysis I (3)

Price and distribution theory with emphasis upon the former.

501 Micro-Economic Analysis II (3)

Price and distribution theory with emphasis upon the latter.

502 Macro-Economic Analysis I (3)

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 and 301, or permission.

503 Macro-Economic Analysis II (3)

Recent developments. (Formerly 521.) Prerequisite, 502 or permission.

504 Economic History and Economic Development (3)

Analysis of determinants of long-run development; theoretical issues in the long-run supply and efficiency of productive factors; consideration of case studies in relation to theoretical issues.

507 History of Economic Thought (3)

Study of Marxian and classical economics and the origins of contemporary economic theory. **Gordon**

FIELDS

ECONOMIC THEORY

300 Intermediate Economics (5)

301 National Income Analysis (5)

411 Introduction to the Use of Mathematics in Economic Theory (5)

- 507 History of Economic Thought (3)** **Gordon**
Study of Marxian and classical economics and the origins of contemporary economic theory.
- 510 Value and Distribution Theory (3)** **Mund**
Systematic review of theories of value, price, costs, and supply. The capital concept. Income and its functional distribution. Formerly 505.
- 511 Advanced Micro-Economic Theory: Selected Topics (3)**
Seminar in advanced micro-theory. Selected topics of special interest and significance. Prerequisites, 500 and 501.
- 512 Advanced Macro-Economic: Selected Topics (3)**
Seminar in advanced macro-theory. Selected topics of special interest and significance. Prerequisites, 502 and 503.

GOVERNMENT REGULATION AND INDUSTRIAL ORGANIZATION

- 404 Advanced Price Analysis (5)**
- 530 Public Control of Industry (3)** **Mund**
Public policy in the United States on industrial combinations, pricing, practices, and monopoly control. Recent issues in public control of business. Prerequisite, permission.
- 532 Public Utilities (3)**
Critical consideration of recent developments in the study of public utilities. Emphasis on electrical utilities and public power projects of federal and local governments.
- 533 Price Policy and Industrial Organization (3)** **Crutchfield**

LABOR ECONOMICS

- 441 Union-Management Relations (5)**
- 442 American Labor History (5)**
- 443 Labor Market Analysis (5)**
- 445 Social Security (5)**
- 541 Theory of Trade-Unionism (3)** **Gillingham**
Prerequisite, permission.
- 542 Labor Economics (3)** **Hopkins**
Prerequisite, permission.

PUBLIC FINANCE AND MONETARY POLICY

- 416J Regional Income Analysis (5)** **Tiebout**
Offered jointly with the Department of Geography.
- 421 Money, Credit, and Economy (5)**
- 451 Public Finance and Taxation II (5)**
- 516J Research Seminar: Regional Economics (3)**
Offered jointly with the Department of Geography. Prerequisites, 300 and 301.
- 550 Public Finance (3)** **Tiebout**
Fiscal policy instrumentalities and comparative effects on income and employment; limitations of fiscal policy; review of current literature. Prerequisite, permission.
- 551 Public Finance (3)** **Tiebout**
Special problems in the fields of taxation and public debt; review of current literature. Prerequisite, permission.

ECONOMIC HISTORY

- 460J Economic History of Europe (5)** **Morris**
Offered jointly with the Department of History.
- 462 Development of American Commercial Capitalism (5)** **North**
- 463 Development of American Industrial Capitalism (5)** **North**
- 504 Economic History and Economic Development (3)**
- 561 European Economic History (3)** **Morris**
Emphasis on the period since 1750. Prerequisite, permission.
- 562 American Economic History (3)** **North**
Emphasis on the theoretical issues involved in American economic development.

INTERNATIONAL TRADE

- 471 International Economics (5)**
- 472 International Economic Problems (5)** **Huber**
- 571 International Trade Theory (3)** **Huber**
Modern developments in national income theory and welfare economics with relation to international trade. Prerequisite, permission.

572 International Economic Theory (3)

Problems of foreign trade and exchange controls, and international monetary policies. Prerequisite, permission.

COMPARATIVE SYSTEMS AND DEVELOPMENT**493J Economy of Modern China (5)**

Mah

Offered jointly with the Far Eastern and Russian Institute.

495 The Economy of Soviet Russia (5)**591 Theoretical Issues in Economic Development (3)**

Exploration and analysis of theoretical issues in economic development; for advanced students. Prerequisite, 504.

595 Soviet Economics (3)

Analysis of problems of economic measurement, economic development, optimum resource allocation, national income, and planning in the Soviet Union. Prerequisite, permission.

STATISTICS AND ECONOMETRICS**481 Economic Statistical Analysis (5)****482 Advanced Economic Statistical Analysis (5)****580 Econometrics I (3)**

Oi

Study of empirical significance of economic theory and related methodological problems.

581 Econometrics II (3)

Oi

Advanced study of econometric methods and techniques.

GENERAL**600 Research (*)**

Prerequisite, permission.

700 Thesis (*)**ENGLISH**

Chairman: ROBERT B. HEILMAN, 115 Parrington Hall

The purpose of graduate work in English is the acquisition of a body of learning and the development of critical skills and standards of judgment. Though having central objectives identical to all, the graduate English program can provide a background for different professional pursuits: some students may look forward to careers as scholars and college teachers; others to positions in the secondary school system; and still others to work in the fields of professional writing, editing, and publishing. The Department of English has sought, therefore, to keep its general requirements for advanced degrees sufficiently broad and flexible to permit the following emphases in courses and dissertations: classification and analysis of literary works in their historical context; theories of criticism, and the analysis and evaluation of literary works; linguistic analysis and language processes in Old and Middle English and American English with related work in other languages; projects in imaginative writing, supported by courses in criticism and literary periods and types (for the Master of Arts only).

Programs leading to the degrees of Master of Arts and Doctor of Philosophy in comparative literature are also offered in this Department.

Each student's program will be planned in consultation with a graduate adviser in the Department and will emphasize his particular interests and abilities.

Students pursuing programs of study toward advanced degrees in English must present an undergraduate English major equivalent to that at the University of Washington, which requires 50 quarter credits.

MASTER OF ARTS. A minimum of 35 credits is required, of which 25 must be in courses numbered 500 or above. Ten credits may be in courses in other departments. A maximum of 5 quarter credits may be transferred from an accredited institution.

The student must show a reading knowledge of one foreign language by the time he has fulfilled his course requirements and before he takes the written M.A. examination.

He must pass a written examination on three fields chosen by him in consultation with the Chairman of Graduate Programs.

In the advanced creative writing program the student must complete 23 credits, not more than 15 of which must be in advanced writing courses, and present, in addition, a piece of original imaginative writing (thesis, 10 credits).

DOCTOR OF PHILOSOPHY. A student pursuing a program of study toward the Ph.D. must complete a minimum of 70 credits in course work (of which 55 must be at the 500 or 600 level) before taking his General Examinations. Fifteen credits may be in approved courses in other departments. English 505, 530, and 531 are required. The credits that may be transferred from another institution (not more than 35) must be from another recognized graduate school and are subject to review by the Graduate Studies Committee.

The student must show a reading knowledge of two foreign languages (usually Latin or French, and German—though upon approval of the Graduate Studies Committee and the Dean of the Graduate School he may offer appropriate substitutes).

A General Examination (not given during the Summer Quarter) is based on the assumption that the student's reading and study have prepared him for the following: a one-day written examination testing the student's command of the facts of literary history and the content of English and American literary works; a critical essay of about five thousand words on a major literary figure chosen by the student and approved by the Graduate Studies Committee, written during the first three weeks of the quarter in which the candidate takes his oral examination; an oral examination which will emphasize two fields of literature.

As soon as possible after he has passed his General Examination, which admits him to candidacy, the candidate must submit for the approval of the Graduate Studies Committee a statement of the subject of his dissertation. On the basis of this statement, a dissertation committee will be recommended to the Dean of the Graduate School. The student must pass a Final Examination (oral) devoted to the dissertation and to the field with which it is concerned.

MINORS IN ENGLISH. The requirement for a minor in English for a master's degree is 20 credits in undergraduate and graduate work combined, plus 10 credits in graduate courses earned in residence.

The requirement for a minor in English for the doctor's degree is 20 credits in undergraduate and graduate work combined, plus 20 credits in graduate courses. At least half the credits must be in courses numbered 500 or above and at least 10 must be earned in residence.

COURSES

- 410 *Types of Dramatic Literature: Comedy* (5)
- 411 *Types of Dramatic Literature: Tragedy* (5)
- 413, 414, 415 *Types of Contemporary Poetry* (5,5,5)
- 417, 418, 419 *The English Novel* (5,5,5)
- 424 *The Popular Ballad* (5)
- 425 *Chaucer* (5)
- 426 *Utopias and Social Ideals* (5)
- 430 *English Literature: 1900-1930* (5)
- 431 *English Literature: Since 1930* (5)
- 434 *American Literature: 1900-1930* (5)
- 435 *American Literature: Since 1930* (5)
- 437 *Modern European Literature* (5)
- 447 *History of the English Language* (5)
- 449 *English Prose Style* (5)
- 451 *Advanced Expository Writing* (5)

- 453, 454, 455 Advanced Verse Writing (5,5,5)
- 457, 458 Advanced Short Story Writing (5,5)
- 461, 462, 463 Novel Writing (5,5,5)
- 493, 494 Advanced Writing Conference (3-5, 3-5)
- 505 Graduate English Studies (5)
- 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, maximum 10 each)
- 527, 528 Studies in Medieval Literature (5,5)
- 530 The English Language (5)
- 531 Introductory Reading in Old English (5)
- 532 Advanced Reading in Old English (5)
- 533 Foundations of American English (3)
- 534 American English Dialectology (3)
- 538, 539, 540 Early Nineteenth-Century Literature (5,5,5)
- 541, 542, 543 Victorian Literature (5, maximum 10 each)
- 544, 545, 546 Eighteenth-Century Literature (5,5,5)
- 548 Twentieth-Century Literature (5)
- 586 Graduate Writing Conference (5)
- 599 Special Studies in Literature (5, maximum 15)
- 600 Research (*)
- 700 Thesis (*)
- 702 Degree Final (6)
Limited to students completing a nonthesis degree program.

FAR EASTERN AND RUSSIAN INSTITUTE

Director and Graduate Program Adviser: GEORGE E. TAYLOR,
406 Thompson Hall

The Far Eastern and Russian Institute administers programs of undergraduate and graduate studies and research on Russia, China, Japan, Inner Asia, and the Far East in general. It is closely associated with the Department of Far Eastern and Slavic Languages and Literature, through which Far Eastern and Slavic studies in the humanities are organized (see page 76).

The Institute itself does not grant degrees. It arranges the programs in Far Eastern and Russian studies for the Bachelor of Arts and Master of Arts degrees given through the Department of Far Eastern and Slavic Languages and Literature. That Department has programs of study leading to the Doctor of Philosophy degree in Far Eastern and Slavic Languages and Literature. Graduate degrees in the social sciences (with Far Eastern and Russian emphasis) are sponsored by the Institute in cooperation with the Departments of Anthropology, Economics, Geography, History, Political Science, and others. In the joint programs leading to the advanced degree in these departments, graduate students receive training in their respective disciplines which they apply to their study of the Far East or Russia. These joint programs are described in the curricular announcements of the respective departments.

The Institute sponsors research projects in the following fields: Modern China, Inner Asia (Tibet, Mongolia, Turkestan), Modern Japan, Russia, and Eastern

Europe. Each of these projects has its own research colloquium, composed of faculty from various disciplines.

A number of graduate students have the opportunity to participate in the research through special studies of their own and to profit from the advice and criticism of faculty members working on the projects. The Far Eastern and Russian Institute has a number of research fellowships which are given to especially qualified graduate students.

COURSES

- | | |
|---|---|
| 303J Monsoon Asia (5) | Earle |
| <i>Geography.</i> Offered jointly with the Department of Geography. | |
| 310 The Far East in the Modern World (5) | Maki, Michael, Taylor, Williston |
| 312J South Asia (5) | Murphey |
| <i>Geography.</i> Offered jointly with the Department of Geography. | |
| 313J East Asia (5) | Kakiuchi |
| <i>Geography.</i> Offered jointly with the Department of Geography. | |
| 314J Peoples of Central and Northern Asia (3) | Pritsak |
| (Offered alternate years jointly with the Department of Anthropology; offered 1964-65.) | |
| 316 History of Southeastern Asia (5) | Williston |
| 329 Russia and the Muslim World (5) | Spector |
| 322J Islands of the Pacific (3) | Earle |
| <i>Geography.</i> Offered jointly with the Department of Geography. | |
| 333J The Soviet Union (5) | Jackson |
| <i>Geography.</i> Offered jointly with the Department of Geography. | |
| 335J Japanese Foreign Policy in Asia (3) | Maki |
| Offered jointly with the Department of Political Science. | |
| 345J Japanese Government (5) | Maki |
| Offered jointly with the Department of Political Science. | |
| 378 Russia in Asia (3) | Pritsak |
| (Offered alternate years; offered 1963-64.) | |
| 382J Civilization of India: Indian Thought (5) | |
| Offered jointly with the Department of History. | |
| 383J Civilization of India: Impact of Islam and the West (5) | |
| Offered jointly with the Department of History. | |
| 384J Civilization of India: Literature and Arts (5) | |
| Offered jointly with the Department of History. | |
| 395J Special Studies in the Theatre Arts of Asia (3, maximum 9) | McKinnon |
| Offered jointly with the Department of Drama. | |
| 401, 402 Marxism-Leninism and the Thought of Mao Tse-tung (5,5) | Wittfogel |
| 410 Far Eastern Workshop (3) | |
| (Offered Summer Quarter only.) | |
| 421J Kievan and Muscovite Russia, 850-1700 (5) | Szeftel |
| Offered jointly with the Department of History. | |
| 422J Imperial Russia, 1700-1905 (5) | Szeftel, Treadgold |
| Offered jointly with the Department of History. | |
| 423J Twentieth-Century Russia (5) | Treadgold |
| Offered jointly with the Department of History. | |
| 424J Modern Russian Intellectual History (5) | Treadgold |
| Offered jointly with the Department of History. | |
| 426 Origins of the East European States (5) | Boba |
| 427J- Eastern Europe, 1772-1918 (5-) | Sugar |
| Offered jointly with the Department of History. | |
| 428J Eastern Europe Since 1918 (5-) | Sugar |
| Offered jointly with the Department of History. | |
| 429 The Soviet Union and the Muslim World (5) | Spector |
| 430 Survey of Mongol Culture (3) | Poppe |
| (Offered alternate years; offered 1963-64.) | |
| 433J Problems in the Geography of the Soviet Union (3 or 5) | Jackson |
| Lectures (3 credits); independent study (2 additional credits), optional with permission of instructor. Offered jointly with the Department of Geography. | |

- 434J Problems in the Geography of Southeast Asia (5)** Earle
Offered jointly with the Department of Geography.
- 435J Problems in the Geography of China (5)** Murphey
Offered jointly with the Department of Geography.
- 437J Problems in the Geography of Japan (5)** Kakiuchi
Offered jointly with the Department of Geography.
- 440 Tibetan Cultural History: Dynastic Period (3)** Wylie
- 441 Tibetan Cultural History: Hegemonic Period (3)** Wylie
- 442 Tibetan Cultural History: Theocratic Period (3)** Wylie
- 443 Chinese Social Institutions (5)** Hsiao
(Offered alternate years; offered 1963-64.)
- 448J History of Russian Culture to 1800 (5)** Szoftel
Offered jointly with the Department of History.
- 449J Russian Historiography (5)** Szoftel
Offered jointly with the Department of History.
- 450 Survey of Turkic Culture of Central Asia (3)** Pritsak
(Offered every three years; offered 1964-65.)
- 452J Early Japanese History (5)** Butow
Offered jointly with the Department of History.
- 453J Modern Japanese History (5)** Butow
Offered jointly with the Department of History.
- 456J Senior Seminar in Far Eastern Diplomatic History (5)** Butow
- 461, 462, 463 Studies in Buddhism (5,5,5)** Hurvitz
- 457J Historical Social Structure of Japan (5)**
Offered jointly with the Department of Anthropology.
- 458J Social and Cultural Changes in Contemporary Japan (5)**
Offered jointly with the Department of Anthropology.
- 465J Chinese History: Earliest Times to 221 B.C. (5)** Wilhelm
Offered alternate years jointly with the Department of History; offered 1964-65.
- 466J Chinese History: 221 B.C. to 906 A.D. (5)** Wilhelm
Offered alternate years jointly with the Department of History; offered 1964-65.
- 467J Chinese History: 906 A.D. to 1840 A.D. (5)** Wilhelm
Offered alternate years jointly with the Department of History; offered 1964-65.
- 468J Modern Chinese History (5)** Michael
Offered jointly with the Department of History.
- 482J History of India: Earliest Times to 647 A.D. (5)**
Offered jointly with the Department of History.
- 483J History of India: 647 to 1525 (5)**
Offered jointly with the Department of History.
- 484J History of India: 1525 to the Present (5)**
Offered jointly with the Department of History.
- 489 Russian and East-European Bibliography (5)** Boba
- 493J Economy of Modern China (5)** Mah
Offered jointly with the Department of Economics.
- 500 Research Seminar in Asian Arts (3-5, maximum 15)** Rogers, McKinnon, Visiting Faculty
An interdisciplinary inquiry into the history, aesthetics, and forms of Asian Arts. Prerequisite, permission.
- 504J Research Seminar: Japan (3, maximum 6)** Kakiuchi
Geography. Offered jointly with the Department of Geography.
- 505J Research Seminar: China and Northeast Asia (3, maximum 6)** Murphey
Geography. Offered jointly with the Department of Geography.
- 506J Research Seminar: Southeast Asia (3, maximum 6)** Earle
Geography. Offered jointly with the Department of Geography.
- 507J Research Seminar: Soviet Union (3, maximum 6)** Jackson
Geography. Offered jointly with the Department of Geography.
- 519J Seminar on Asia (3, maximum 6)**
The large cultural regions of the continent are studied in succession, with special reference to anthropological problems. Offered jointly alternate years with the Department of Anthropology; offered 1964-65.
- 520J Seminar on the Foreign Policy of the Soviet Union (3)** Reshetar
Offered jointly with the Department of Political Science. Prerequisite, permission.
- 521, 522, 523 Seminar on Modern Asian History (3,3,3)** Taylor
(Offered alternate years; offered 1964-65.)

- 525, 526 Seminar on Far Eastern Diplomacy (3,3)** **Williston**
- 528J History of Eastern Europe, 1772-1939 (5)** **Sugar**
A study of the East-Central European region: Poland, Czechoslovakia, Hungary, Rumania, and the Balkan countries, from their rebirth to World War II. Offered jointly with the Department of History. Prerequisite, reading knowledge of German, French, Russian, or one East-European language.
- 530, 531 Seminar on China (3,3)** **Wilhelm**
Prerequisite, permission.
- 533 Seminar: Problems of Chinese and Russian Communism (5)** **Wittfogel**
Institutional analysis of representative periods and key aspects of Chinese society.
- 534J Modern Russian History (3-6)** **Treadgold**
Offered jointly with the Department of History.
- 535J-536J-537J Seminar in Modern Russian History (3-6)-(3-6)-(3-6)** **Treadgold**
Seminar in modern Russian history. Offered jointly with the Department of History. Prerequisites, reading knowledge of Russian and permission.
- 538 Seminar on Modern China (3)** **Michael**
Studies of problems in Chinese government, politics, ideology, and social and economic issues from 1911 to the present.
- 539J Medieval Russian History (3-6)** **Szeftel**
Offered jointly with the Department of History. Prerequisite, 421J, 448J, or permission; Russian, or French and German.
- 540 Seminar on Eurasian History (3)** **Pritsak**
(Offered every three years; offered 1965-66.)
- 541J The Soviet Political System (4, maximum 8)** **Reshetar**
Critical appraisal of the principal research methods, theories, and types of literature dealing with the government and politics of the Soviet Union. Offered jointly with the Department of Political Science. Prerequisite, permission.
- 542J Personality Patterns in Japanese Culture (3)**
The nature and content of Japanese social life as it bears upon Japanese character. Offered jointly with the Department of Anthropology. Prerequisite, permission.
- 545J Seminar on Japanese Government and Diplomacy (3, maximum 6)** **Maki**
Offered jointly with the Department of Political Science.
- 546J-547J Seminar in Medieval Russian History (3-6)-(3-6)** **Szeftel**
Offered jointly with the Department of History. Prerequisites, Russian and permission.
- 548J History of Eastern Europe, 1939 to the Present (5)** **Sugar**
Offered alternate years jointly with the Department of History; offered 1964-65. Prerequisite, a reading knowledge of one major European or one East European language.
- 549J Japanese History (3-6)** **Butow**
Field course. Offered alternate years jointly with the Department of History; offered 1964-65. Prerequisite, permission.
- 550J-551J-552J Seminar in Japanese History (3-6)-(3-6)-(3-6)** **Butow**
Offered jointly with the Department of History. Prerequisite, permission.
- 557J Seminar on Japanese Society (3-6)**
Analysis of selected critical problems for the understanding of Japanese society; and an introduction to the social-historical, social-economic and social-anthropological literature. Offered jointly with the Department of Anthropology. For advanced students. Prerequisite, permission.
- 598 Inner Asia Research Colloquium (5, maximum 15)** **Chang, Hurvitz, Li, Poppe, Pritsak, Wylie**
- 599 Colloquium on Chinese History Research (5, maximum 15)** **Bauer, Henderson, Hsiao, Hsu, Lo, Mah, Meijer, Michael, Murphoy, Shih, Taylor, Wilhelm**
A research seminar dealing with various aspects of Chinese society, modern and contemporary. Prerequisite, permission.
- 600 Research (*)**
Prerequisite, permission.
- 700 Thesis (*)**

The following courses may be used for credit toward a Far Eastern major or minor:

- Anthropology 317 Ethnology of Southeast Asia (3)**
- Art 382 Art of India (3)**
- Art 383 Art of China (3)**
- Art 384 Art of Japan and Korea (3)**
- Art 428 Oriental Ceramic Art (2)**
- Drama 475 History of Far Eastern Theatre and Drama (5)**
- Economics 495 The Economy of Soviet Russia (5)**
- Economics 595 Soviet Economics (3)**

Linguistics 478 Introduction to Southeast Asian Linguistics (3)
 Linguistics 578 Seminar in Southeast Asian Linguistics (3, maximum 9)
 Philosophy 428 Chinese Philosophy (5)
 Philosophy 429 Neo-Confucianism (5)
 Political Science 344 Chinese Government (5)
 Political Science 414 Oriental Political Thought (5)
 Political Science 420 Foreign Relations of the Soviet Union (5)
 Political Science 429 International Relations in the Far East (5)
 Political Science 432 American Foreign Policy in the Far East (5)
 Political Science 441 Political Institutions of the Soviet Union (5)

FAR EASTERN AND SLAVIC LANGUAGES AND LITERATURE

Chairman: **GEORGE E. TAYLOR**, 406 Thomson Hall

Graduate Program Adviser: **K. C. HSIAO**, 238 Thomson Hall

The Department of Far Eastern and Slavic Languages and Literature offers courses leading to the degrees of Master of Arts and Doctor of Philosophy. In addition, the Department faculty cooperates in the arrangements for joint degrees (see the Far Eastern and Russian Institute, page 72).

Faculty advisers draw up student programs on the basis of individual requirements. Entering graduate students without a substantial amount of undergraduate work on Russia or the Far East are normally expected, in their first year, to take senior level courses (including Far Eastern 310) in the area of their interest. Entering graduate students planning to specialize in language and literature normally devote a major part of their first year to language work.

MASTER OF ARTS. The Department offers courses leading to the Master of Arts degree in the fields of language and literature and in regional studies.

The Master of Arts degree in the fields of language and literature is offered in any language and literature for which the Department is responsible and for which there are staff, curriculum, and library holdings necessary for research on the master's level. A prerequisite for this degree is the ability to do research in the language appropriate to the student's field of interest. In addition to course work and seminars in the appropriate language and literature, students are also expected to take work relating to the history and culture of the area and in the fields of linguistics or comparative literature. General requirements are 45 credits (including a minimum of 12 in seminar work) and a thesis.

The Master of Arts degree in the area of regional studies is offered with the support of the Far Eastern and Russian Institute and the various cooperating departments. Students taking this degree concentrate on the area of their choice (either in the Far East or Russia) and on one discipline, but also take supporting courses in other disciplines dealing with the area of concentration. Disciplines in which such course work is available are anthropology, art, economics, geography, history, linguistics, literature, music, philosophy, and political science. For regional studies, a working knowledge of the appropriate language is required. General requirements are a minimum of 45 credits (including at least 12 in seminar work) and a thesis.

In some cases, it is possible to arrange a Master of Arts degree in Far Eastern regional studies for students without a working knowledge of a Far Eastern language. Strong training in a discipline is required.

DOCTOR OF PHILOSOPHY. The Department of Far Eastern and Slavic Languages and Literature offers a program leading to the Doctor of Philosophy degree with a specialization in any of the languages or literatures for which the Department is responsible and for which there are available the staff, curriculum, and library holdings necessary for research on the doctoral level.

Students interested in working for this degree must have, as a minimum requirement for beginning their programs, the equivalent of a strong undergraduate major in any language or literature or in Far Eastern or Russian area studies.

Each student must present a program covering four fields of study. The fields may be in a single language and literature for which the Department is responsible, or in a combination of such languages and literatures, or in a combination of three fields within the Department plus a field in either linguistics or comparative literature.

The Department requires that all students have some familiarity with a second Far Eastern or Slavic language and culture as well as work in linguistics or general and comparative literature.

All students are expected to be familiar with the history, society, and culture of the country in whose language or literature they are specializing. In cases where it would be appropriate, a field may be approved in another discipline dealing with the area involved.

COURSES

CHINESE

- 300 Chinese, Non-Intensive F (5)**
- 301 Chinese Language, Intensive EF (10)**
- 302, 303, 304 Intermediate Modern Chinese (5,5,5)** Yen
- 405, 406, 407 Classical and Documentary Chinese (5,5,5)** Reifler
- 408 Chinese Reference Works and Bibliography (3)** Wilhelm
(Offered alternate years; offered 1964-65.)
- 430 Readings in Chinese Philosophical Texts (5)** Shih
- 455, 456, 457 Chinese Literature (5,5,5)** Wilhelm
(Offered alternate years; offered 1963-64.)
- 460 Advanced Modern Chinese (5, maximum 15)** Yen
- 522, 523, 524 Readings in Classical Chinese (5,5,5)** Reifler
- 525 Structure of Chinese Characters (5)** Reifler
- 526, 527, 528 Studies in Chinese Literature (5,5,5)** Shih
526: literature of the Chou and Han periods. 527: literature from Wei to T'ang times.
528: literature since the end of T'ang. (Offered alternate years; offered 1963-64.)
- 529 Chinese Phonology (3)** Li
- 530 Studies in Chinese Prose (5)** Wilhelm
(Offered alternate years; offered 1963-64.)
- 531 Studies in Chinese Poetry (5)** Shih
(Offered alternate years; offered 1964-65.)
- 532 Studies in Chinese Drama and Novel (5)** Shih
(Offered alternate years; offered 1964-65.)
- 535 Chinese Epigraphy (3, maximum 6)** Reifler
Introduction to texts in ancient character forms; selected readings of inscriptions on bronzes and oracle bones.
- 536, 537, 538 Readings in Chinese Political Thought and Institutions (5,5,5)** Hsiao
For students wishing to develop proficiency in using Chinese source material. Different texts each quarter, selected primarily on basis of students' needs. (Offered alternate years; offered 1964-65.) Prerequisite, permission.
- 550 Seminar on Chinese Literature (4, maximum 8)** Shih
(Offered alternate years; offered 1964-65.)
- 555 Seminar on Chinese Linguistics (3, maximum 9)** Li
Advanced phonology, problems of archaic Chinese, dialectology; descriptive and historical treatment of Sinitic languages. For advanced students of Chinese or of linguistics. Prerequisite, permission.
- 560 Modern Chinese Readings (5, maximum 15)** Chang
Selections from learned journals in intermingled style. (Colloquial and literary Chinese.) Prerequisite, 304.
- 600 Research (*)**
Prerequisite, permission.
- 700 Thesis (*)**

JAPANESE

- 301, 302, 303 Second-year Reading Japanese (5,5,5) Hiraga
 311, 312, 313 Accelerated Japanese Language Program (15,15,15) Matsuda, Niwa
 351, 352, 353 Japanese for China Specialists (5,5,5) Hurvitz
 (Offered alternate years; offered 1963-64.)
 401, 402, 403 Advanced Reading Japanese (5,5,5)
 405 Readings in Newspaper Materials (5) Hiraga
 451, 452, 453 Advanced Japanese for China Specialists (5,5,5) Hurvitz
 (Offered alternate years; offered 1964-65.)
 460 Readings in Modern Japanese Literature (3-5, maximum 15) McKinnon
 (Offered alternate years; offered 1964-65.)
 500 Readings in Bibliographical Materials (5) 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, 403, or equivalent, or permission.
 522, 523, 524 Readings in Documentary Japanese (5,5,5) Hiraga
 Readings in documents of the Tokugawa and Meiji periods in the literary and epistolary styles; introduction to *kambun*. Prerequisite, permission.
 550 Readings in Classical Japanese Literature (3-5, maximum 15) McKinnon
 Readings in prose, poetry, and drama, antiquity to nineteenth century. (Offered alternate years, offered 1963-64.) Prerequisite, permission.
 570 Seminar in Japanese Literature (3-5, maximum 15) McKinnon
 Close examination of selected periods, writers or genres, including problems of literary criticism in Japanese literature. (Offered alternate years; offered 1964-65.) Prerequisite, 15 credits in 460, or 550.
 600 Research (*) Hiraga, Hurvitz, McKinnon, Niwa
 Prerequisite, permission.
 700 Thesis (*)

KOREAN

- 302-303 Elementary Spoken Korean Language (5-5) Suh
 304 Intermediate Korean (5) Suh
 405 Korean Grammar (5) Suh
 406, 407 Advanced Korean Reading (5,5) Suh
 501, 502, 503 Seminar in Korean (3-5, 3-5, 3-5) Suh

MONGOLIAN

- 302 Introduction to Mongolian (5) Poppe
 (Offered alternate years; offered 1964-65.)
 303 Modern Mongolian Literary Language (5) Poppe
 (Offered alternate years; offered 1964-65.)
 304 Colloquial Mongolian (5) Poppe
 (Offered alternate years; offered 1964-65.)
 305 Classical Mongolian (5) Poppe
 (Offered alternate years; offered 1964-65.)
 521 Ancient Mongol: hPhagspa Script (3) Poppe
 Script and grammar of hPhagspa texts; reading and translation. (Offered alternate years; offered 1963-64.) Prerequisite, 304.
 522 Mongol: Ancient Texts (3) Poppe
 Grammar and reading of Mongol texts of the fourteenth to seventeenth centuries. Historical texts are emphasized. (Offered alternate years; offered 1963-64.)
 579J Comparative Altaic Linguistics (3) Poppe
 Comparative phonology and morphology of Mongol and Turkic and other related languages. Offered alternate years jointly with the Department of Linguistics; offered 1964-65. Prerequisite, permission.
 600 Research (*) Poppe
 Prerequisite, permission.

POLISH

- 401, 402 Phonetics, Grammar, and Vocabulary (5,5)
 (Offered alternate years; offered 1964-65.)
 411 Readings in Polish (5)
 (Offered alternate years; offered 1964-65.)

RUSSIAN

- 311, 312, 313 Intermediate Russian A, B, C (5,5,5) Gribanovsky

- 315 Intermediate Russian Conversation (2-3, maximum 9) Tracy
 330 Scientific Russian Readings (5, maximum 10) Gershevsky
 361, 362, 363 Russian Readings A, B, C (3,3,3) Gribanovsky
 451, 452 Advanced Russian Grammar and Composition (5,5) Abernathy
 455 History of Russian Standard Language (5) Abernathy
 464 The Russian Symbolist Movement (3)
 (Offered alternate years; offered 1964-65.)
 465 Modern Russian Poetry (Acmeism and Futurism) (3) Ivask
 (Offered alternate years; offered 1963-64.)
 468 Contemporary Russian Literary Criticism (3) Staff
 (Offered alternate years; offered 1964-65.)
 470 Russian Versification (3) Ivask
 (Offered alternate years; offered 1963-64.)
 560 Studies in Early Russian Literature (4) Ivask
 (Offered alternate years; offered 1963-64.)
 561 Gogol (3) Ivask
 Close analysis of Gogol's novels, plays, and stories in Russian. (Offered alternate years;
 offered 1963-64.)
 565 Russian Eighteenth-Century Literature (5) Ivask
 Discussion of representative works of Russian poetry, prose, fiction, and criticism in the
 formative period in history of Russian letters. (Offered alternate years; offered 1964-65.)
 Prerequisite, 320 or permission.
 566 Pushkin (4) Ivask
 Analysis of the works of Alexander Pushkin. (Offered alternate years; offered 1964-65.)
 567 Studies in Russian Prose (4) Ivask
 Close analysis of representative works of the nineteenth-century Russian prose fiction in
 original texts. (Offered alternate years; offered 1964-65.)
 568 Nineteenth-Century Russian Poetry Since Pushkin (3) Ivask
 Discussion of the masters of nineteenth-century Russian lyric poetry since Pushkin.
 (Offered alternate years; offered 1964-65.)
 570 Seminar in Russian Literature (3) Ivask
 Examination and discussion of Russian masterpieces.
 590 Seminar in Russian Literary History (4, maximum 8) Ivask
 Close examination of selected periods or figures in Russian literature. Prerequisite, 10
 graduate credits in Russian literature.
 600 Research (*)
 Prerequisite, permission.
 700 Thesis (*)

SERBO-CROATIAN

- 401-402 Phonetics, Grammar, and Vocabulary (5-5)
 (Offered alternate years; offered 1963-64.)
 411 Reading in Serbo-Croatian (5)
 (Offered alternate years; offered 1963-64.)

SLAVIC

- 450 Introduction to Slavic Philology (3) Abernathy
 552 Phonetic Structure of Slavic Languages (3) Abernathy
 A detailed analysis of the phonological evolution from the earliest period of the Common
 Slavic language. (Offered alternate years; offered 1963-64.)
 553 Morphological Features of Slavic Languages (3) Abernathy
 Development of the various grammatical forms of the Slavic languages from the Common
 Slavic period. (Offered alternate years; offered 1963-64.)
 555 Old Church Slavonic (3) Abernathy
 Rise and development of the earliest Slavic literary language and a descriptive study of
 its orthography, phonology, morphology, and syntax. (Offered alternate years; offered
 1964-65.)
 556 Readings in Old Church Slavonic (3) Abernathy
 Reading and grammatical interpretation of a selected group of texts. (Offered alternate
 years; offered 1964-65.)

THAI

- 301, 302, 303 Basic Thai (5,5,5)
 (Offered alternate years.)
 401, 402, 403 Intermediate Thai (5,5,5)
 (Offered alternate years.)

TIBETAN

- 401, 402, 403 Colloquial Tibetan (3,3,3)** Wylie
404, 405, 406 Literary Tibetan (3,3,3) Wylie
414 Readings in Modern Tibetan (3, maximum 9) Wylie
 (Offered alternate years; offered 1964-65.)
500 Advanced Literary Tibetan (3, maximum 9) Wylie
 Reading of Tibetan manuscripts and xylographs with emphasis on biographical, historical, and geographic material. (Offered alternate years; offered 1963-64.) Prerequisites, 406 and permission.
502, 503, 504 Comparative Study of Chinese, Mongolian, Tibetan, and Sanskrit Texts (5,5,5)
 Chang, Hurvitz, Li, Poppe, Wylie
534 Buddhistic Tibetan (2, maximum 6) Chang
 Reading of Tibetan translations of Buddhist literature. Knowledge of Sanskrit desirable but not required. Prerequisites, 406 and permission.
544 Ancient Tibetan Documents (2, maximum 6) Chang
 Reading of selections from ancient documents, treaties, edicts, and annals. Knowledge of Chinese desirable but not required. Prerequisites, 406 and permission.
600 Research (*) Wylie
 Prerequisite, permission.

TURKIC

- 301, 302, 303 Introduction to Modern Eurasian Turkic (3,3,3)** Pritsak
 (Offered every three years; offered 1963-64.)
311, 312, 313 Modern Turkey Turkish (3,3,3) Pritsak
 (Offered every three years; offered 1964-65.)
405, 406 Arabic for Turkologists (3,3) Pritsak
 (Offered every three years; offered 1964-65.)
407 Persian for Turkologists (3) Pritsak
 (Offered every three years; offered 1965-66.)
408, 409 Chuvash and Yakut (3,3) Pritsak
 (Offered every three years; offered 1965-66.)
504, 505 Middle Turkic (3,3) Pritsak
 Introduction to the comparative phonology, morphology, and syntax of the Middle Turkic languages; reading and translation of texts in Karakhanid (11th-13th Century), Khwarezm Turkic (13th-15th Century), Old Ottoman (13th-15th Century), Kipchak (13th-15th Century) and Chaghatai (15th-16th Century); in Arabic, Latin and Armenian scripts. (Offered every three years; offered 1965-66.) Prerequisites, 303 or 313, 406, 407.
506, 507 Old Uighur (3,3) Pritsak
 Introduction to script systems, phonology, morphology and syntax; reading and translation of texts in Uighur (Soghdian) and Manichaean scripts (8th-11th Century). (Offered every three years; offered 1965-66.) Prerequisites, 303 or 313, German and Russian.
510, 511 Ottoman Texts (3,3) Pritsak
 Readings in prose, poetry, and drama, antiquity to nineteenth century, in Arabic script; readings in official documents. (Offered every three years; offered 1963-64.) Prerequisites, 313, 406, 407.
512, 513 Old Turkic (3,3) Pritsak
 Türküt. Introduction to script system, phonology, morphology, and syntax of the oldest form of Turkic; reading and translation of seventh-eighth century texts in Runic script. (Offered every three years; offered 1964-65.) Prerequisites, 313 and permission.
521, 522 Comparative and Historical Grammar of Turkic Languages (3,3) Pritsak
 Script systems, phonology, morphology, syntax and basic lexicon. (Offered every three years; offered 1963-64.) Prerequisites, 303 or 313, 507 or 513.
523 Seminar on Turkic Literature (3) Pritsak
 Oral literature (epic, tales, songs); written literature: traditions and techniques; special consideration to the relationship with Persian and Arabic literatures on one side, and French and Russian on the other. (Offered every three years; offered 1963-64.) Prerequisite, any Turkic language, Russian or German, Arabic or Persian.

VIETNAMESE

- 301, 302, 303 Basic Vietnamese (5,5,5)** Thompson
 (Offered alternate years; offered 1964-65.)
401, 402, 403 Intermediate Vietnamese (5,5,5) Thompson
 (Offered alternate years; offered 1963-64.)

LITERATURE COURSES IN ENGLISH

- Chinese 320 Chinese Literature in English (5)** Shih
 (Offered every three years; offered 1965-66.)
Japanese 420 Japanese Literary Tradition (5) McKinnon

Japanese 421 Modern Japanese Literature in English (5)	McKinnon
Japanese 422 Studies in Japanese Poetry in English (5) (Offered alternate years; offered 1964-65.)	McKinnon
Japanese 423 Studies in Japanese Drama in English (5) (Offered alternate years; offered 1963-64.)	McKinnon
Korean 320 Korean Literature in English (5)	Suh
Mongolian 320 Mongolian Literature in English (5) (Offered alternate years; offered 1963-64.)	Poppo
Russian 320 Russian Literature in English (5)	Konick
Russian 421 Contemporary Russian Literature in English (5)	
Russian 422 Russian Plays in English (5)	Konick
Russian 426 The Russian Novel in English (5) Gogol, Goncharov, Turgenyev.	Konick
Russian 427 The Russian Novel in English (5) Dostoevski and Tolstoy.	Konick
Slavic 320 Polish Literature in English (5) (Offered alternate years; offered 1964-65.)	

GENETICS

**Chairman and Graduate Program Adviser: HERSCHEL L. ROMAN,
340 Johnson Hall**

The Department of Genetics offers a graduate program leading to the degrees of Master of Science and Doctor of Philosophy. In addition to the courses given by the Department, the program includes a selection of courses in other areas, particularly in biochemistry, microbiology, botany, zoology, and statistics. Materials for research in genetics include microorganisms, *Drosophila*, mammalian tissue culture, and man. Clinical facilities for the study of human genetics are made available by the Department's affiliation with the Division of Medical Genetics in the Department of Medicine.

COURSES

BIOLOGY

351 Human Genetics (3)	Gartler
451 Genetics (3)	Roman, Sandler
451L Genetics Laboratory (2) Must be accompanied by 451.	
452 Cytogenetics (3)	Roman, Sandler
452L Cytogenetics Laboratory (2) Must be accompanied by 452.	Hawthorne
453 Topics in Genetics (2, maximum 6)	

GENETICS

501 Introduction to Research Materials (2) The student is introduced to <i>Neurospora</i> , yeast, bacteria, viruses, and mammalian material, and to some of the techniques in which these are used for genetic research. Prerequisite, graduate standing in the Department of Genetics.	
520 Seminar (1) Prerequisite, permission.	
531 Problems in Human Genetics (2) An advanced course in human genetics emphasizing modern aspects and research methods. Prerequisites, Biology 351, 451, or permission.	Motulsky
551 Genetics of Microorganisms (3) The contributions of research with microorganisms are discussed in relation to basic genetic concepts. Prerequisite, Biology 451 or permission.	Stadler
552 Genetics of Microorganisms Laboratory (3) The student learns how to use a variety of microorganisms as research tools for problems in genetics. Prerequisite, 551 or permission.	Stadler

- 553 Biochemical Genetics (3)** **Gallant**
Recent advances in our understanding of the molecular bases of heredity. Prerequisites, 551, Biochemistry 481, or permission.
- 561 Advanced Genetics (3)** **Sandler**
A detailed discussion of chromosomal structure, mutation, chromosomal aberrations and population genetics. To alternate with Biology 452. Prerequisite, Biology 451 or equivalent.
- 600 Research (*)**
- 700 Thesis (*)**

GEOGRAPHY

**Acting Chairman and Graduate Program Adviser: JOHN C. SHERMAN,
406 Smith Hall**

Programs of study leading to the degrees of Master of Arts and Doctor of Philosophy in geography are developed by the Graduate Program Adviser and the student, taking into account the student's preparation, professional objectives, and professional interests. These programs are largely restricted to four fields selected for special emphasis: economic geography, the Far East, the Soviet Union, and cartography. The student considering the Department of Geography for professional training should be certain, or at least be able to predict, that his interests will center on one of these fields. If he enters the Department, he must be prepared to work within the framework of the specialist or be ready to equip himself to do so. This may mean, for example, additional preparatory work in geography, a working knowledge of Russian or a Far Eastern language, competence in statistical methodology, or special studies in allied social sciences.

The departmental library serves as a reference-research collection of selected recent and basic sources in geography and allied fields. It contains approximately four thousand titles, subscribes to the leading American and foreign journals, and has such standard source materials as publications of the United States Bureau of the Census. The map library, containing approximately seventy thousand sheets, follows a plan of development similar to that of the departmental library.

Courses and seminars pertinent to graduate study in the Department are offered in other departments of the College of Arts and Sciences and such professional schools as the Colleges of Business Administration and Engineering. With regard to the Far East and the Soviet Union, opportunities for studies supplementary to geography are unique. The Far Eastern and Russian Institute, primarily a research organization, offers specialized studies largely in fields of history and government and provides excellent specialized library sources. Faculty research projects and seminars include the participation of faculty and graduates in the Department of Geography. Languages taught in the Department of Far Eastern and Slavic Languages and Literature include: Chinese, Japanese, Korean, Mongolian, Polish, Tibetan, Turkic, and Russian. Interdepartmental relationships are also maintained with three additional departments that offer advanced studies in the Far East and Soviet field. These are the departments of Economics, History, and Political Science. With regard to economic geography, unusual opportunities for studies supplementary to geography are available in the departments of Economics, Political Science, Mathematics, Civil Engineering, and Urban Planning, and in the College of Business Administration.

COURSES

SYSTEMATIC GEOGRAPHY

- 325 Historical Geography of America (3)**
- 370 Conservation of Natural Resources (5)**
- 375 Political Geography (5)**
- 411J Geomorphology (5)**
Offered jointly with the Department of Geology.

**Jackson
Porter**

- 416J Regional Income Analysis (5)** Tiebout
Offered jointly with the Department of Economics.
- 440J Manufacturing (3 or 5)** Thomas
Lectures (3 credits); independent study (2 additional credits), optional with permission of instructor. Offered jointly with the Department of Economics.
- 442 Regional Specialization (3 or 5)** Morrill
Lectures (3 credits); independent study (2 additional credits), optional with permission of instructor.
- 444 Geography of Water Resources (3 or 5)** Marts
Lectures (3 credits); independent study (2 additional credits), optional with permission of instructor.
- 448 Geography of Transportation (3 or 5)** Ullman
Lectures (3 credits); independent study (2 additional credits), optional, with permission of instructor.
- 477 Urban Geography (3 or 5)** Ullman
Lectures (3 credits); independent study (2 additional credits), optional with permission of instructor.
- 510 Research Seminar: Settlement and Urban Geography (3, maximum 9)** Ullman
- 516J Research Seminar: Regional Economics (3)** Tiebout
Offered jointly with the Department of Economics. Prerequisites, Economics 300 and 301.
- 530 Research Seminar: The Economic Geographer and Lesser-Developed Areas (3, maximum 6)** Thomas
- 537 Research Seminar: Quantitative Methods in Economic Geography (3, maximum 6)** Morrill
- 538 Research Seminar: Geography of Transportation (3, maximum 6)** Ullman
- 539 Research Seminar: Utilization of Water Resources (3, maximum 6)** Marts
- 540 Research Seminar: Geography of Manufacturing (3, maximum 6)** Thomas
- 575 Research Seminar: Political Geography (3, maximum 6)** Jackson

REGIONAL GEOGRAPHY

- 301 Anglo-America (5)**
- 302 The Pacific Northwest (3)**
- 303J Monsoon Asia (5)** Earle
Offered jointly with the Far Eastern and Russian Institute.
- 304 Europe (5)**
- 305 Latin America (5)** Heath
- 306 Africa (5)**
- 307 Australia and New Zealand (5)** Earle
- 312J South Asia** Murphey
Offered jointly with the Far Eastern and Russian Institute.
- 313J East Asia (5)** Kakiuchi
Offered jointly with the Far Eastern and Russian Institute.
- 332J Islands of the Pacific (3)** Earle
Offered jointly with the Far Eastern and Russian Institute.
- 333J The Soviet Union (5)** Jackson
Offered jointly with the Far Eastern and Russian Institute.
- 402 United States (5)**
- 433J Problems in the Geography of the Soviet Union (3 or 5)** Jackson
Lectures (3 credits); independent study (2 additional credits), optional with permission of instructor. Offered jointly with the Far Eastern and Russian Institute.
- 434J Problems in the Geography of Southeast Asia (5)** Earle
Offered jointly with the Far Eastern and Russian Institute.
- 435J Problems in the Geography of China (5)** Murphey
Offered jointly with the Far Eastern and Russian Institute.
- 437J Problems in the Geography of Japan (5)** Kakiuchi
Offered jointly with the Far Eastern and Russian Institute.
- 504J Research Seminar: Japan (3, maximum 6)** Kakiuchi
Offered jointly with the Far Eastern and Russian Institute.
- 505J Research Seminar: China and Northeast Asia (3, maximum 6)** Murphey
Offered jointly with the Far Eastern and Russian Institute.

- 506J Research Seminar: Southeast Asia (3, maximum 6)** Earle
Offered jointly with the Far Eastern and Russian Institute.
- 507J Research Seminar: Soviet Union (3, maximum 6)** Jackson
Offered jointly with the Far Eastern and Russian Institute.
- 508 Research Seminar: Anglo-America (3, maximum 6)**

CARTOGRAPHY

- 360 Principles of Cartography (5)** Heath, Sherman
- 361 Experimental Cartography (5)** Heath, Sherman
- 363 Aerial Photographs as Source Materials (2)** Heath, Sherman
- 425J Graphic Techniques in the Social Sciences (5)** Schmid
Offered jointly with the Department of Sociology.
- 458 Map Intelligence (3)** Sherman
- 462 Problems in Map Compilation and Design (5)** Heath, Sherman
- 464 Problems in Map Reproduction (3)** Heath
- 520 Research Seminar: Cartography (3, maximum 6)** Heath, Sherman

INTRODUCTORY RESEARCH TECHNIQUES

- 426 Statistical Measurement and Inference (5)** Morrill
- 490 Field Research (6, maximum 12)**

INTRODUCTION TO PROFESSIONAL TRAINING

- 500 Contemporary Geographic Thought (3)**
- 501 Geographic Analysis (3)**
- 502 Professional Writing in Geography (*, maximum 6)**
- 503 Source Materials in Geographic Research (3)**

NONTHESIS AND THESIS RESEARCH

- 600 Research (*)**
- 700 Thesis (*)**

GEOLOGY

Chairman and Graduate Program Adviser: HOWARD A. COOMBS,
42 Johnson Hall

The Department of Geology offers courses leading to the degrees of Master of Science and Doctor of Philosophy. All students pursuing programs for advanced degrees in geology must have completed essentially the same academic work as outlined in the undergraduate curriculum. Examinations for both the master's and doctor's degree will include subjects from the whole field of geology. All graduate students must have an approved field course such as 401, or other field experience which is approved by the Graduate Program Adviser.

MASTER OF SCIENCE. Either a thesis or a research paper is required of all master's degree students. For the thesis program, 36 credits (approved by the Graduate Program Adviser) must be submitted. The thesis should demonstrate the student's ability to engage in original and independent research in a limited area. Prior approval of the area to be covered must be obtained by petition to the Graduate Program Adviser. Forty-five credits, with a minimum of 36 credits in work other than field geology, are required for the nonthesis program. The language requirement for this degree must be met with either French, German, or Russian.

DOCTOR OF PHILOSOPHY. Prospective candidates must present any two of the following languages, French, German, or Russian, for the language requirement. All prospective Ph.D. candidates must have either an M.S. or an M.A. degree. A dissertation is required, representing an original contribution of substantial scientific importance to the field of geology.

COURSES

- 310 **Geology for Engineers (5)** Sinclair
326 **Sedimentary Petrology (5)** Barksdale
330 **General Paleontology (5)** Mallory
340 **Structural Geology (5)** McKee
361 **Stratigraphy (5)** Wheeler
362 **Interpretation of Geologic History** Wheeler
401 **Field Course (15)**
(Offered Spring Quarter only.)
405J **Introduction to Geophysics: The Earth (5)**
Offered jointly with the Committee on Geophysics.
411J **Geomorphology (5)** Porter
Offered jointly with the Department of Geography.
412 **Geology of North America (5)** Porter
413 **Glacial and Pleistocene Geology (5)** Porter
423 **Optical Mineralogy (5)** Vance
424 **Petrography and Petrology of Igneous Rocks (5)** Vance
425 **Petrography and Petrology of Metamorphic Rocks (5)** Vance
436 **Micropaleontology (5)** Mallory
(Offered odd-numbered years only.)
443 **Advanced Structural Geology (5)** Misch
450 **Elements of Geophysics (3)** Porter, Czamansko
451 **Theory and Principles of Geophysical Methods (3)** Porter, Czamansko
472 **Elements of Geochemistry (3)** Czamansko
Formerly 572.
480 **History of Geology (3)** Barksdale
481 **Preparation of Geologic Reports and Publications (3)** Coombs
487 **Ore Deposits (5)** Sinclair
Formerly 427.
510 **Research in Geomorphology and Pleistocene Geology (*, maximum 10)** Porter
Research projects in geomorphology and Pleistocene geology.
511 **Seminar in Geomorphology (2)** Porter
Guided discussion of selected topics in geomorphology.
512 **Seminar in Pleistocene Research (2)** Porter
Guided discussion of selected topics in Pleistocene research.
520 **Advanced Studies in Mineralogy, Petrography and Petrology (*)** Misch, Sinclair, McKee
Selected readings and individual conferences on fundamental problems regarding the origin and development of minerals and rocks. Formerly 570.
521 **Metamorphic Minerals (5)** Misch
Nature and paragenesis of metamorphic minerals; physical, chemical, and geological interpretation of paragenesis. (Offered odd-numbered years only.)
522 **Regional Metamorphism and Granitization (5)** Misch
Deformation and crystallization, migmatization, and mobilization. (Offered even-numbered years only.)
523 **Advanced Mineralogy (3)** McKee
Research methods in mineralogy including universal stage techniques, specific gravity and refractive index determinations and x-ray diffraction pattern interpretation.
524 **Advanced Igneous Petrography and Petrology (3 or 5)** Vance
The origin of the igneous rocks with emphasis on the interpretation of textures. (Offered odd-numbered years only.)
526 **Advanced Petrography and Petrology of Sedimentary Rocks (3)** Barksdale
Thin section study of sedimentary rocks. (Offered even-numbered years only.)
527 **Sedimentary Minerals (3)** McKee
Study of the nature and formation of sedimentary minerals with emphasis on the physical, chemical, and geological interpretation of their formation.
530 **Advanced Studies in Paleontology (5)** Mallory
Selected work in paleontology. (Offered odd-numbered years only.)
531 **Biostratigraphy (5)** Mallory
The data and principles of stratigraphic paleontology and of chronologic biostratigraphy. (Offered even-numbered years only.)
540 **Advanced Studies in Structural Geology (*)** Misch, McKee
Selected readings and individual conferences on fundamental problems in structural geology.

- 545 Structure of Europe (5)** **Misch**
Structural evolution and tectonic forms of Europe. (Offered even-numbered years only.)
- 546 Structure of Asia and the West Pacific Rim (5)** **Misch**
Structural evolution from Central Asia to West Pacific; geotectonic principles. (Offered odd-numbered years only.)
- 547 Literature on Structural Geology (3 or 5)** **Misch**
Selected readings and seminars on Cordilleran structures.
- 550 Advanced Studies in Geophysics (*, maximum 9)** **Kaarsberg**
Individual research on specific problems in seismometry and seismic data analysis.
- 560 Advanced Studies in Stratigraphy (*)** **Mallory, Wheeler**
Selected work in biostratigraphy or physical stratigraphy.
- 563 West Coast Cenozoic Stratigraphy (5)** **Mallory**
Lithologic and faunal studies of the West Coast Cenozoic. (Offered odd-numbered years only.)
- 565 Paleozoic Stratigraphy (5)** **Wheeler**
North American Paleozoic stratigraphy as a basis for interpretation of regional and inter-regional geologic episodes. (Offered odd-numbered years only.)
- 568 Mesozoic Stratigraphy (4)** **Wheeler**
North American Mesozoic stratigraphy as a basis for interpretation of regional and inter-regional geologic episodes. (Offered even-numbered years only.)
- 570 Advanced Studies in Geochemistry (*)** **Czamanske**
Selected work in the chemistry of geologic processes and the study of the distribution and migration of elements in minerals and rocks.
- 571 Engineering Geology (3)** **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 Topics in Advanced Geochemistry (5)** **Czamanske**
Selected readings and individual research on specific problems in the chemistry of geologic processes.
- 574 Seminar in Geochemistry (2)** **Czamanske**
Selected topics of major interest in geochemistry. Students will participate actively in choice of topics and seminar meetings.
- 580 Advanced Studies in Economic Geology (*)** **Sinclair, Coombs**
Selected readings and individual conferences on the application of geology to deposits of economic significance.
- 590 Seminar (*)**
Formerly 520.
- 600 Research (*)**
- 700 Thesis (*)**
- 702 Degree Final (6)**
Limited to students completing a nonthesis degree program.

GERMANIC LANGUAGES AND LITERATURE

Chairman and Graduate Program Adviser: WILLIAM H. REY, 340 Denny Hall

The Department of Germanic Languages and Literature offers courses leading to the degrees of Master of Arts and Doctor of Philosophy. To register for any graduate course in German, students must receive permission from the Graduate Program Adviser.

MASTER OF ARTS. Prospective candidates must, in addition to fulfilling general requirements of the Graduate School, complete a program of 36 credits. If the student minors in some other department, he may take a minimum of 24 credits in Germanics. If his entire program lies within the field of Germanics, he must elect 24 credits in modern literature and 12 credits in philology and medieval literature or vice versa.

The M.A. program is designed for three quarters and consists of a compact schedule of courses repeated every year. The courses in the modern field are devoted to Lessing (531), Schiller (438), Goethe (434, 435), Romanticism (515), Nineteenth-Century Drama (416), Nineteenth-Century Prose (417), and Twentieth-Century Literature (518). They are complemented by courses in Middle High German, and Middle High German Literature in the Original (556, 557), Bibliography (501), and Linguistic Analysis of German (405). Instead of a thesis, the

student is required to write two extensive term papers which should give evidence of his scholarly abilities and of his growth during the M.A. year. These papers will be kept on file so that they can be taken into consideration for the student's final evaluation. At the end of the M.A. year, the student must pass a comprehensive written examination. This examination has to be taken by all graduate students regardless of whether or not they wish to proceed toward the doctorate. On the basis of the student's classroom performance, his term papers, and examinations, the departmental Committee on Graduate Studies will: (1) recommend to the Graduate School that the M.A. degree be granted or withheld; (2) advise the student on the desirability of a subsequent academic career.

In exceptional cases, advanced students who have taken courses of the M.A. program before their graduation may receive permission from the Graduate Program Adviser to obtain at least 9 of the 36 required credits by writing a thesis, which should give proof of their superior experience and qualifications.

A minor in Germanics for the M.A. degree must consist of a minimum of 12 credits in acceptable courses beyond an undergraduate minor in the field. In no instance, however, may a minor in Germanics for the master's degree be less than a major for the bachelor's degree at the University of Washington.

DOCTOR OF PHILOSOPHY. For a major in Germanics, the student must complete all of the stated requirements of the Graduate School, pursue his studies for at least three graduate years, pass General Examinations on the field, and submit a satisfactory dissertation which demonstrates a mastery of scholarly procedure and is an acceptable contribution to knowledge. The Ph.D. student must complete a minimum of 81 credits in course work after admission to the Graduate School (45 credits beyond the M.A.) before taking his General Examinations. If he minors in another department, he may elect a minimum of 30 credits in Germanics. If his entire program lies within the field of Germanics, he must elect 30 credits in modern literature (since 1500), and 15 credits in philology and the older literature, or vice versa. Furthermore, he is expected to earn at least 9 credits in supervised research (600). The General Examinations, which are both written and oral, will not be confined to courses taken at the University or elsewhere, but will endeavor to demonstrate the student's breadth of knowledge, which he has acquired by independent reading and study. His intensive training in areas of special interest and his abilities in critical evaluation will also be tested.

For a minor in Germanics, a minimum of 15 credits is required. In no instance, however, may a minor in Germanics for the doctor's degree be less than the course requirements stated for the master's degree.

COURSES

404 History of the German Language (5) (Offered 1963-64.)	Meyer
405 Linguistic Analysis of German (3)	Reed
410, 411, 412 Survey of Modern German Literature and Culture (3,3,3)	
413, 414, 415 Survey of Older German Literature and Culture (3,3,3)	
416 Nineteenth-Century Drama (3)	Sauerlander
417 Nineteenth-Century Prose (3)	Rey
434 Goethe I (3)	Loeb
435 Goethe II (3)	Loeb
438 Schiller (3)	Baumgaertel
497 Studies in German Literature (1-5, maximum 15)	
498 Studies in the German Language (1-5, maximum 15)	
500 Methodology (3) (Offered 1963-64.)	
501 Bibliography (3)	
502 History of German Criticism (3) (Offered 1964-65.)	Rey

503 Modern Poetry (3) (Offered 1963-64.)	Loeb
515 Romanticism (3)	Immerwahr
518 Twentieth-Century Literature (3)	Rey
520 Seminar in Medieval Literature (3) (Offered 1964-65.)	Hruby
521 Seminar in the Literature of the Reformation and Renaissance (3) (Offered 1963-64.)	
522 Seminar in Baroque (3) (Offered 1964-65.)	Rey
524 Seminar in Eighteenth-Century Literature (3) (Offered 1963-64.)	Baumgaertel
525 Seminar in Romanticism (3) (Offered 1963-64.)	Immerwahr
526 Seminar in Nineteenth-Century Drama (3) (Offered 1964-65.)	Sauerlander
527 Seminar in Nineteenth-Century Prose (3) (Offered 1963-64.)	
528 Seminar in Twentieth-Century Literature (3) (Offered 1964-65.)	
531 Lessing (3) Formerly 431.	Loeb
544 Seminar in Goethe (3) (Offered 1964-65.)	Loeb
550 Gothic (3) (Offered 1963-64.)	Meyer
552 Old High German (3) (Offered 1963-64.)	Reed
555 Old Saxon (3) (Offered 1964-65.)	Reed
556 Middle High German (3)	Meyer
557 Middle High German Literature in the Original (3)	Hruby
558 Studies in Medieval German Literature (3) (Offered 1963-64.)	Hruby
560 Modern Dialects (3) (Offered 1964-65.)	Reed
590, 591, 592 Seminar in Literary History (1-5, 1-5, 1-5)	
595, 596, 597 Seminar in Germanic Philology (1-5, 1-5, 1-5)	
600 Research (*)	
700 Thesis (*)	
702 Degree Final (6) Limited to students completing a nonthesis degree program.	

COURSES IN ENGLISH

350 Masterpieces of German Literature in English (3)	
464 Thomas Mann in English (3) (Offered 1964-65.)	Rey

HISTORY

Chairman: ROBERT E. BURKE, 308 Smith Hall

Graduate Program Advisor: JON M. BRIDGMAN, 318 Thomson Hall

The Department of History offers courses leading to the degrees of Master of Arts and Doctor of Philosophy. Before beginning graduate work, students should have completed an undergraduate history major or the equivalent. It is expected that students specializing in Far Eastern history will have had sound undergraduate preparation in history.

The requirements for both advanced degrees include work in selected fields of history. Each field is a brief period or a restricted topic which is part of a general subject in one of the major divisions of history. Subjects within the first division

are ancient history, medieval history, and Renaissance history; those within the second division are modern European history, United Kingdom, British Empire, and Commonwealth history; American history is the third division; subjects within the fourth division are the history of science, historiography, and the philosophy of history; subjects within the fifth division, Asian history, may be selected by arrangement with the Department of History and the Far Eastern and Russian Institute.

Applicants for admission to graduate degree programs in History will be required to give evidence of reasonable competence in at least one foreign language. They will be expected to take the examination in this language at the beginning of their first quarter at the University. Failure to pass such examination will result in reducing the academic program in history by at least one course to allow further language study. Applicants failing the language examination will repeat the examination in subsequent quarters, and continue with a reduced program until the language requirement is satisfied. Students who plan to become candidates for the Ph.D. degree will present themselves for examination in the second foreign language at the beginning of their first quarter in the Ph.D. program. If unsuccessful, such student's program will be correspondingly reduced to permit further study in the second language.

Students wishing to enter graduate study in history are expected to submit their applications and supporting documents prior to March 1. All applications will then be considered by the Department as well as by the Graduate School of the University and the resulting decisions will be announced by April 1. Later applications and applications for admission to other than the Autumn Quarter will be considered, but the applicants must recognize that all available space may be taken.

In addition to submitting a regular application for admission to the Graduate School, each applicant is expected to file with the Department of History certain additional documents, including three letters of recommendation and a sample of written work. Full information may be obtained from the Graduate Program Adviser, Department of History.

MASTER OF ARTS. In history there are two programs leading to the degree of Master of Arts. The professional program is planned as the first year of a scholar's career, and the assumption is that the student expects to continue working for the degree of Doctor of Philosophy. The second or general program is designed to meet the interests and purposes of secondary school teachers and other students who think of the M.A. as a terminal degree. The major emphasis is placed upon reading and lecture courses which will enrich and broaden the student's knowledge of history rather than upon technical problems of research and original scholarship.

A student in the professional program must complete 500, 501, and 502, one seminar, and graduate courses in three fields selected for special study. The subjects from which the student selects the fields should be in different divisions of history as described above. In addition, he must have a reading knowledge of one foreign language and must submit an acceptable thesis, the writing of which should involve original research and the fundamentals of historical method.

A student in the general program must complete 500, 501, and 502, four courses numbered in the 400's (two in each of two divisions of history), and one graduate course in a field selected for special study. In addition, he must have a reading knowledge of a foreign language and must submit an acceptable thesis, the emphasis of which may be on interpretation rather than on research.

A student in the professional program who studies in Far Eastern history must meet the requirements indicated above, except that he may take 500, or 501, or 502. One of the three fields is arranged in cooperation with the Far Eastern and Russian Institute.

The prerequisite for a minor in history for the master's degree is an undergraduate program in history or such preparation as the Department deems satisfactory. For this minor, 15 credits in history are required in courses numbered 400 and 500, subject to the approval of the Department.

DOCTOR OF PHILOSOPHY. Prospective candidates must complete 500, 501, 502, and at least two years of seminar work, participate in the work of the advanced seminar, and prepare at least four fields from subjects in the five divisions of history described above. (Only in a single division may students choose two fields.) In addition, they must have a reading knowledge of two foreign languages related to their major fields of study and they are expected to complete a minor in another department.

Students majoring in Far Eastern history are expected to satisfy the same requirements, except that only one year of seminar work in the Department of History is required, and they are expected to take 502 and either 500 or 501. Two fields are arranged in cooperation with the Far Eastern and Russian Institute.

Students majoring in ancient history are expected to satisfy the same requirements as other students, except that only one year of seminar work in the History Department may be required. They will take two fields of ancient history, and one of the remaining fields will be arranged in cooperation with the Classics Department. Additional work in ancient history may be prescribed in lieu of a minor. Before advanced scholarly work in ancient history can be seriously undertaken, a working knowledge of Latin and Greek is essential.

A history minor for the doctor's degree requires 500, 501, 502, and 25 credits in courses numbered 400 and 500, subject to the approval of the Department.

COURSES

ANCIENT HISTORY

401 Greece in the Age of Pericles (3)	Edmonson, Katz
402 Alexander the Great and the Hellenistic Age (5)	Edmonson, Katz
403 The Roman Republic (3)	Katz
404 The Roman Empire (3)	Katz

EUROPEAN HISTORY

Medieval Period

408 Church and State in the Middle Ages (5)	Kaminsky
410 The Byzantine Empire (5)	Katz
411 Medieval Europe, 500-1100 (5) (Not offered 1964-65.)	Kaminsky
412 Medieval Europe, 1100-1300 (5) (Not offered 1963-64.)	Kaminsky
413 Medieval Europe, 1300-1500 (5) (Not offered 1963-64.)	Kaminsky
421J Kievan and Muscovite Russia, 850-1700 (5) Offered jointly with the Far Eastern and Russian Institute.	Szeftel
426 Central Europe in the Middle Ages (5) (Not offered 1963-65.)	Kaminsky

Early Modern Period

414 Culture of the Renaissance (5)	Griffiths
415 The Reformation (5)	Griffiths
429 France, 1429-1789 (5)	Lytle

Modern Period

422J Imperial Russia, 1700-1905 (5) Offered jointly with the Far Eastern and Russian Institute.	Szeftel, Treadgold
423J Twentieth-Century Russia (5) Offered jointly with the Far Eastern and Russian Institute.	Treadgold
424J Modern Russian Intellectual History (5) Offered jointly with the Far Eastern and Russian Institute.	Treadgold
427J- Eastern Europe, 1772-1918 (5-) Offered jointly with the Far Eastern and Russian Institute.	Sugar
428J Eastern Europe Since 1918 (5-) Offered jointly with the Far Eastern and Russian Institute.	Sugar

- 430 The French Revolution and Napoleonic Era, 1789-1815 (5) Lytle
 431 Europe, 1814-70 (5) Emerson, Lytle, Sugar
 432 Europe, 1870-1914 (5) Emerson, Sugar
 433 Europe, 1914-45 (5) Emerson
 434 Europe Since 1945 (5) Willis
 436 Germany, 1648-1914 (5) Emerson
 (Offered alternate years; offered 1963-64.)
 437 Germany, 1914-45 (5) Emerson
 (Offered alternate years; offered 1962-63.)
 438- History of the Near East, 622-1789 (5-) Sugar
 (Not offered 1963-64.)
 -439 History of the Near East, 1789-1959 (-5) Sugar
 (Not offered 1963-64.)
 444 France Since 1815 (5) Willis
 448J History of Russian Culture to 1800 (5) Szeftel
 Offered jointly with the Far Eastern and Russian Institute.
 449J Russian Historiography (5) Szeftel
 Offered jointly with the Far Eastern and Russian Institute.
 460J Economic History of Europe (5) Morris
 Offered jointly with the Department of Economics.
- UNITED KINGDOM, BRITISH EMPIRE, AND COMMONWEALTH**
- 382J Civilization of India: Indian Thought (5)
 Offered jointly with the Far Eastern and Russian Institute.
 383J Civilization of India: Impact of Islam and the West (5)
 Offered jointly with the Far Eastern and Russian Institute.
 384J Civilization of India: Literature and Arts (5)
 Offered jointly with the Far Eastern and Russian Institute.
- 469 England in the Sixteenth Century (5) Levy
 470 England in the Seventeenth Century (5) Levy
 472 England in the Nineteenth Century (5) Costigan
 473 England in the Twentieth Century (5) Costigan
 474 Modern Irish History (5) Costigan
 475 History of Canada (5)
 477 History of Australia and New Zealand (5)
 478 Africa South of the Sahara (5)
 480 History of the British Empire Since 1783 (5)
 481 History of the Commonwealth of Nations (5)
 482J History of India: Earliest Times to 647 A.D. (5)
 Offered jointly with the Far Eastern and Russian Institute.
 483J History of India: 647 to 1525 (5)
 Offered jointly with the Far Eastern and Russian Institute.
 484J History of India: 1525 to the Present (5)
 Offered jointly with the Far Eastern and Russian Institute.
- AMERICAN HISTORY**
- 441 American Revolution and Confederation (5) Savelle
 (Offered every three years; offered 1965-66.)
 442 The Colonial Mind (5) Savelle
 (Not offered 1964-65.)
 443 The Intellectual History of the United States (5) Savelle
 (Offered 1964-65.)
 445-446 American Constitutional History (5-5) Bestor
 447 History of the Civil War and Reconstruction (5) Pressly
 450 Twentieth-Century America (5) Burke, Pressly
 Not open to students who have taken 343.
 458 The United States in World Affairs, 1776-1865 (5) Holt
 459 The United States in World Affairs, 1865 to the Present (5) Holt
 461 History of American Liberalism Since 1789 (5) Burke, Pressly
 463 The Westward Movement (5) Berg

- 464 History of Washington and the Pacific Northwest (5) Berg
 486 The History of Mexico, 1517 to the Present (5) Alden

HISTORY OF SCIENCE

- 420 Science and the Enlightenment (5)

ASIAN HISTORY

- 452J Early Japanese History (5) Butow
 Offered jointly with the Far Eastern and Russian Institute.
 453J Modern Japanese History (5) Butow
 Offered jointly with the Far Eastern and Russian Institute.
 456J Senior Seminar in Far Eastern Diplomatic History (5) Butow
 Offered jointly with the Far Eastern and Russian Institute.
 465J Chinese History: Earliest Times to 221 B.C. (5) Wilhelm
 Offered alternate years jointly with the Far Eastern and Russian Institute; offered 1964-65.
 466J Chinese History: 221 B.C. to 906 A.D. (5) Wilhelm
 Offered alternate years jointly with the Far Eastern and Russian Institute; offered 1964-65.
 467J Chinese History: 906 A.D. to 1840 A.D. (5) Wilhelm
 Offered alternate years jointly with the Far Eastern and Russian Institute; offered 1964-65.
 468J Modern Chinese History (5) Michael
 Offered jointly with the Far Eastern and Russian Institute.

HISTORIOGRAPHY

- 500 Historiography: Ancient and Medieval European (3)
 501 Historiography: Early Modern European (3)
 502 Historiography: Modern European and American (3)

COURSES IN FIELDS OF SPECIALIZATION

These courses are introductions to advanced study. They are designed to show how important historical conclusions have been reached, to suggest further research, and particularly to give bibliographical guidance to students in their preparation for the examinations in the fields selected.

- 511 Greek History (3-6) Edmonson
 Problems in the history of the Athenian Constitution.
 512 Roman History (3-6) Badian
 Roman History, 31 B.C.-A.D. 37.
 513 Byzantine History (3-6) Katz
 514 Medieval History (3-6) Kaminsky
 515 Renaissance and Reformation History (3-6) Griffiths
 520 History of Science (3-6)
 528J History of Eastern Europe, 1772-1939 Sugar
 Offered jointly with the Far Eastern and Russian Institute. Prerequisite, a reading knowledge of one major European or one East European language.
 532 Modern European History: Germany (3-6) Emerson
 533 Modern European History: Franco (3-6) Lytle
 534J Modern Russian History (3-6) Treadgold
 Offered jointly with the Far Eastern and Russian Institute.
 539J Medieval Russian History (3-6) Szeftel
 Offered jointly with the Far Eastern and Russian Institute. Prerequisite, 421J, 448J, or permission; Russian, or French and German.
 540 American Constitutional History (3-6) Bestor
 541 American History: Early (3-6) Saville
 542 American History: Western (3-6) Burke
 543 American History: Civil War (3-6) Pressly
 544 American History: National Period (3-6) Holt, Bestor
 545 American History: Twentieth Century (3-6) Burke
 548J History of Eastern Europe, 1939 to the Present (5) Sugar
 Offered alternate years jointly with the Far Eastern and Russian Institute; offered 1964-65. Prerequisite, a reading knowledge of one major European or one East European language.
 549J Japanese History (3-6) Butow
 Field course. Offered alternate years jointly with the Far Eastern and Russian Institute. Prerequisite, permission.
 574 English History: Tudor and Stuart (3-6) Levy
 (Offered 1964-65.)

- 575 English History (3-6)** Costigan, Levy
576 British Empire History (3-6)
580 Latin American History (3-6) Alden
 Prerequisite, permission.

SEMINARS

- 503-504 Seminar in Philosophy of History (3-6)-(3-6)** Costigan
 (Offered alternate years; offered 1963-64.)
517-518-519 Seminar in Medieval History (3-6)-(3-6)-(3-6) Kaminsky
521-522-523 Seminar in Modern European History (3-6)-(3-6)-(3-6) Emerson, Lytle
525, 526-527 Seminar in the History of Science (3-6), (3-6)-(3-6)
529-530-531 Seminar in the Renaissance and Reformation (3-6)-(3-6)-(3-6) Griffiths
535J-536J-537J Seminar in Modern Russian History (3-6)-(3-6)-(3-6) Treadgold
 Offered jointly with the Far Eastern and Russian Institute. Prerequisites, reading knowledge of Russian and permission.
546J-547J Seminar in Medieval Russian History (3-6)-(3-6) Szoftel
 Offered jointly with the Far Eastern and Russian Institute. Prerequisite, Russian and permission.
550J-551J-552J Seminar in Japanese History (3-6)-(3-6)-(3-6) Butow
 Offered jointly with the Far Eastern and Russian Institute. Prerequisite, permission.
553-554-555 Seminar in American History: Early (3-6)-(3-6)-(3-6) Savelle
563-564-565 Seminar in American History: Western (3-6)-(3-6)-(3-6) Burke
590-591-592 Seminar in American History: National Period (3-6)-(3-6)-(3-6)
 Bestor, Burke, Holt, Pressly
593-594-595 Advanced Seminar (3-6)-(3-6)-(3-6) Holt, Savelle
600 Research (*)
700 Thesis (*)

HOME ECONOMICS

Director and Graduate Program Adviser: MARY LOUISE JOHNSON,
201 Raitt Hall

The School of Home Economics offers courses leading to the degrees of Master of Arts, Master of Science, Master of Arts in Home Economics, and Master of Science in Home Economics. The master's degree programs require a minimum of 45 credits. Half of the work, including the thesis, must be in courses numbered 500 or above. The Graduate Program Adviser must approve all proposed graduate programs.

MASTER OF ARTS OR MASTER OF SCIENCE. The Master of Arts is attained by work in textiles and clothing, the Master of Science, by work in foods and nutrition. Study in either area may be combined with home economics education or family economics. A minimum of 12 credits in a field related to home economics is required.

MASTER OF ARTS IN HOME ECONOMICS OR MASTER OF SCIENCE IN HOME ECONOMICS. There is no foreign language requirement for these degrees. Students may take all their work in home economics or may take up to 15 credits in related fields, such as art, economics, education, public health, or the biological, physical, or social sciences. Students must present acceptable undergraduate preparation in home economics and basic fields.

DIETETIC INTERNSHIPS. Graduates in institution administration who wish to become hospital dietitians select a hospital training course, which is a dietetic internship, for their fifth year of study. Those who wish to become dietitians in lunchrooms, restaurants, or dormitories select an administration internship, such as the one offered by the School of Home Economics. Some of these internships carry graduate credit, and completion of all approved courses makes students eligible for membership in the American Dietetic Association.

COURSES

307	Nutrition (3 or 5)	Johnson
315	Advanced Food Selection and Preparation (5)	Nielsen
321	Applied Design (2)	Payne
322	Applied Design (2)	Payne
334	Costume Design (3)	Payne
338	Clothing for the Family (3)	Payne
354	Family Economics and Finances (5)	Hall
407	Advanced Nutrition (3)	Johnson
408	Diet Therapy (3)	Johnson
415	Experimental Foods (3)	Nielsen
425	Advanced Textiles (3)	Brockway
429	Advanced Weaving (3)	Brockway
432, 433	History of Costume and Textiles (4,4)	Payne
434	Costume Design (3)	Shigaya
435	Advanced Costume Design (5)	Payne
436	Advanced Costume Design (5)	Payne
447	Advanced Home Furnishing (3)	Hosmer
454	Advanced Family Economics and Finances (2)	Hall
457	Child Nutrition and Care (3)	Johnson
472	Institution Food Purchasing (3)	Terrell
473	Institution Management (5)	Terrell
474	Institution Management (5)	Sandstrom
475	Institution Equipment (3)	Terrell
495	Special Problems in Home Economics (*, no more than 10 credits toward any one degree)	
507	Readings in Nutrition (*) Library research. Prerequisite, 407 or equivalent.	Johnson
515	Readings in Food Selection and Preparation (*) Professional literature on recent developments. Prerequisite, 315 or equivalent, or permission.	Nielsen
525	Seminar in Textiles (3) Readings and discussion of factors affecting economic utilization and technical development of textile products. Trends in current research and methods of investigation. For graduate students in textiles and clothing. Prerequisites, 125, 425 or equivalent.	Brockway
554	Social and Economic Problems of the Consumer (3-5) Selected topics in the family economics field. Prerequisites, 454 or equivalent, or permission.	Hall
562	Home Economics Education (*) Study of achievements, trends, functions, methods, and teaching materials.	McAdams
576, 577, 578	Supervised Field Work (4,4,4) Three quarters of practice and organized classwork for graduates in institution management and dietetics. An administrative dietetics internship approved by the American Dietetic Association.	Torrell
600	Research (*) A. Costume design B. Institution administration C. Nutrition D. Textiles E. Family economics F. Foods G. Home economics education H. Family relations I. Home management K. Home furnishing	
700	Thesis (*)	

LINGUISTICS

Chairman and Graduate Program Adviser: Sol Saporta, 229C Denny Hall

The faculty in Linguistics offers a program of studies for graduate students leading to master's and doctoral degrees in linguistics. The program is administered by the faculty in the Department of Linguistics in cooperation with various other departments. Queries regarding the program in linguistics may be addressed to the Graduate Program Adviser of the Department of Linguistics.

Normal requirements for admission to the program leading to an advanced degree in linguistics include the equivalent of 45 quarter credits (30 semester credits) in undergraduate college language study. This requirement implies the attainment of proficiency in one language other than English, or, in the instance of a non-native speaker of English, a course of study and proficiency in a language other than his native speech. The Graduate School may be consulted when there is need for special determination regarding meeting the requirements for admission. To register for courses, students should consult with the Graduate Program Adviser in the Department of Linguistics.

MASTER OF ARTS. Requirements are as follows (subject to readjustment by the student's Committee):

1. A reading knowledge of German and French, to be demonstrated before the end of one year of graduate study.
2. The following courses or equivalents: 404, 405, 406, 501, 502, 503 (plus 400, 451J, 452J, 453J, 462J, 463J, if the student has not previously taken courses equivalent to these in phonetics, phonemics, morphology, and syntax).
3. Eighteen additional credits in linguistics or supporting areas.
4. Completion of a thesis acceptable to the student's Committee and successful performance in a comprehensive examination.

DOCTOR OF PHILOSOPHY. A student may plan to proceed directly for the doctoral degree without an M.A., but his Committee reserves the right to require any individual student to present himself for the M.A. before accepting him as a student in the Ph.D. program. Requirements include items one, two, and three for the M.A., plus the following (subject to readjustment by the student's Committee):

1. A structural knowledge of Latin and Greek, to be demonstrated as early as possible. This requirement may be fulfilled either by examination or by enrolling for Latin 300 and Greek 300, offered by the Classics Department.
2. Linguistics 504, 505, 506, 514, 515, 516, 530, and 599.
3. Nine additional credits in linguistics or supporting areas.
4. The General Examination, usually conducted at the conclusion of course work, in (1) descriptive linguistics, (2) historical-comparative linguistics, and (3) a specialty of the student's choice, e.g., Germanics, Romance, Slavic, Chinese, Altaic, American Indian linguistics, etc.
5. Independent research in the analysis of a language utilizing a native speaker or speakers and/or manuscripts in the language.
6. A Final Examination and a dissertation suitable for publication.

COURSES

400	Survey of Linguistic Method and Theory (3)	Saporta
404, 405, 406	Indic and Indo-European (3,3,3)	Chang
451J, 452J, 453J	Phonetics and Phonemics (3,3,3)	Thompson
	Offered jointly with the Department of Anthropology.	
454J	Methods in Comparative Linguistics (3)	Jacobsen
	Offered jointly with the Department of Anthropology.	
455J	Areal Linguistics (3, maximum 6)	Jacobsen
	Offered jointly with the Department of Anthropology.	
462J, 463J	Morphology and Syntax (3,3)	Thompson
	Offered jointly with the Department of Anthropology.	
501, 502, 503	Linguistic Analysis Laboratory (3,3,3)	Thompson
	Guided analysis of a language unfamiliar to all students of the class; construction of a grammar based on material elicited from native informant. Prerequisites, 453J, 463J, or permission.	
504	Indo-European Comparative Phonology (2)	Reed
	Sound systems of the principal families of Indo-European and the relation of these to a hypothetical parent tongue. Prerequisite, 406.	

- 505, 506 Indo-European Comparative Grammar (2,2)** **Reed**
Systematic treatment of Indo-European grammar, with extensive surveys of individual language groups. Prerequisite, 504.
- 514, 515, 516 Seminar in Comparative Linguistics (2,2,2)** **Li**
Advanced problems in comparative linguistics; special attention to work with languages having few or no written records. Prerequisite, 506 or permission.
- 530 Dialectology (3)** **Reed**
The principles of dialect deviation as related to linguistic structure and usage. Prerequisite, 452J or permission.
- 553J Analysis of Linguistic Structures (3, maximum 6)** **Jacobs, Li**
Offered jointly with the Department of Anthropology. Prerequisite, permission.
- 579J Comparative Altaic Linguistics (3)** **Poppe**
Comparative phonology and morphology of Mongol and Turkic and other related languages. Offered alternate years jointly with the Department of Far Eastern and Slavic Languages and Literature (Mongolian); offered 1963-64. Prerequisite, permission.
- 580 Problems in Linguistics (2-4, maximum 12)** **Reed**
A course for advanced students of linguistics, dealing with significant movements, techniques, skills, and theories in the field. Prerequisite, permission.
- 599 Linguistics Colloquium (1, maximum 6)**
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 Research (1-5)**
- 700 Thesis (*)**

Specialized course work is available in various cooperating departments. Each student is expected to elect an area of specialization and work out with the Chairman of his Supervisory Committee an appropriate program of courses supporting his required work. The fields of specialization regularly available at this institution are the following (cooperating departments in parentheses):

Altaic (Far Eastern and Slavic Languages and Literature)
American Indian linguistics (Anthropology)
Anthropological linguistics (Anthropology)
Chinese (Far Eastern and Slavic Languages and Literature)
Classical linguistics (Classics)
English (English, Germanic Languages and Literature)
Germanic (Germanic Languages and Literatures)
Japanese and Korean (Far Eastern and Slavic Languages and Literature)
Oral Literature (Anthropology, Comparative Literature)
Romance (Romance Languages and Literature)
Scandinavian (Germanic Languages and Literature, Scandinavian Languages and Literature)
Slavic (Far Eastern and Slavic Languages and Literature)
Southeast Asian linguistics (Far Eastern and Slavic Languages and Literature)
Speech and Phonetics (Speech)
Tibetan (Far Eastern and Slavic Languages and Literature)

For a listing of course work in these fields consult the section of this *Bulletin* pertaining to the department indicated.

In certain cases arrangements may be made for students to specialize in fields not listed above. Students interested in such a possibility should consult with the Graduate Program Adviser, stating their specific interests and objectives.

MATHEMATICS

Chairman: R. S. PIERCE, 245 Physics Hall

Graduate Program Adviser: D. G. CHAPMAN, 137 Physics Hall

The Department of Mathematics offers courses leading to the degrees of Master of Arts, Master of Arts in Teaching Mathematics, Master of Science, Master of Science in Mathematical Statistics, and Doctor of Philosophy.

The student's minimum undergraduate preparation for an advanced degree in mathematics must be equivalent to the requirements for a mathematics major for the Bachelor of Arts degree. Students presenting only the minimum amount of undergraduate mathematics cannot expect to earn a master's degree in less than two years.

Since one foreign language is required for all the above masters' degrees except the Master of Arts in Teaching Mathematics and two languages are required for the doctor's degree, candidates for admission are advised to elect languages as undergraduates. French, German, and Russian are the only languages acceptable toward these degrees.

The minor in mathematics for a master's degree requires at least 12 credits in approved courses numbered 400 or above. At least 9 of these are to be taken in residence.

The minor for the degree of Doctor of Philosophy requires a minimum of 33 approved credits in courses numbered 400 or above, including at least 6 credits in each of three of the four categories, algebra, analysis, geometry, and statistics.

MASTER OF ARTS Thesis Program: A minimum of 27 approved credits in courses numbered 400 or above, with at least 9 credits in courses numbered 500 or above, is prescribed. These courses must include at least 6 credits each in algebra, analysis, and one other field. The thesis for this degree, while demonstrating ability and aptitude, may be largely expository.

Nonthesis Program: A minimum of 36 approved credits in courses numbered 400 or above with at least 18 of these credits in courses numbered 500 or above is prescribed. The 18 credits in courses numbered 500 or above should be distributed over no more than three sequences. The total credits should include at least 6 credits each in algebra, analysis, and one other field. The final examination will be a comprehensive one.

MASTER OF ARTS IN TEACHING MATHEMATICS. The program for this degree is planned to increase the mathematical background of present or prospective high school teachers of mathematics. Thus the program is devoted primarily to courses in mathematics chosen for their relevance to the mathematics curriculum of the high school.

A minimum of 30 approved credits in courses numbered 400 or above, with at least 5 credits in courses numbered 500 or above, is prescribed. These credits must all be in mathematics except that Education 475A, Improvement of Teaching: Secondary Mathematics, may be included. The thesis for this degree should be an exposition of a mathematical subject closely related to the content of secondary school mathematics. There is no language requirement for this degree.

MASTER OF SCIENCE. A minimum of 27 approved credits in courses numbered 400 or above, with at least 18 credits in courses numbered 500 or above, is prescribed. These courses must include at least 6 credits each in algebra, analysis, and one other field. The thesis should demonstrate the student's ability to engage in independent research.

Under certain circumstances, this degree may also be awarded to a student who has passed the General Examinations for the Ph.D. degree. In such cases, no thesis is required.

MASTER OF SCIENCE IN MATHEMATICAL STATISTICS. The undergraduate preparation should consist of courses in probability and statistical inference equivalent to Mathematics 481 and 482. The student must present a minimum of 27 approved credits in mathematics courses numbered 400 or above. This work may include, on approval, some courses in mathematical statistics needed to make up deficiencies in undergraduate preparation and must include 15 credits in mathematical statistics courses numbered 500 or above. The thesis should demonstrate the student's ability to engage in independent research.

DOCTOR OF PHILOSOPHY. The Department requires basic training equivalent to courses 504, 505, 506 (Modern Algebra), 524, 525, 526 (Real Variable), 534, 535 (Complex Variable), and 561, 562 (General Topology) (only 561 for students in mathematical statistics); a graduate sequence in some other field chosen by the student and approved by the Graduate Advisory Committee; an additional sequence of courses related to the student's field of special interest. This last sequence of courses should be at the second-year graduate level.

To become a candidate for the Ph.D., a student must pass a General Examination in four fields: algebra, real variable, and two others chosen by the student and approved by his Supervisory Committee. These examinations may be written or oral, or both.

COURSES

- 301 Elementary Number Theory (3)
- 305 Introduction to Mathematical Logic (3)
- 322 Principles of Differential Equations (3)
- 324, 325 Advanced Calculus I, II (3,3)
- 374 Principles of Digital Computers and Coding (5)
- 382, 383 Statistical Inference in Applied Research (5,5)
- 391 Elementary Probability (3)
- 392 Elements of Statistics (3)
- 401 Matrices (3)
- 402, 403 Introduction to Modern Algebra (3,3)
- 404 Linear Algebra (3)
- 405 Introduction to Metamathematics (3)
- 407 Game Theory and Linear Programming (3)
- 411, 412, 413 Linear and Modern Algebra (3,3,3)
- 424, 425, 426 Fundamental Concepts of Analysis (3,3,3)
- 427, 428, 429 Topics in Applied Analysis (3,3,3)
- 441, 442, 443 Advanced Geometry (3,3,3)
- 444, 445 Foundations of Geometry (3,3)
- 464, 465, 466 Numerical Analysis I, II III (3,5,5)
- 481 Calculus of Probabilities (5)
- 482 Statistical Inference (3)
- 483 Theory of Correlation (3)
- 484 Distribution-Free Inference (3)
- 485 Analysis of Variance (3)
- 496 Honors Seminar (*, maximum 9)
- 497J Special Topics in Mathematics for Teachers (2-5, maximum 15)
Offered jointly with the College of Education.
- 498 Special Topics in Mathematics (2-5, maximum 15)
- 501, 502, 503 Mathematical Logic (3,3,3)
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. (Not offered 1963-64.) Prerequisites, 405 or equivalent for 501; 501 for 502; 502 for 503.
- 504, 505, 506 Modern Algebra (3,3,3)
Theory of groups, rings, integral domains, and fields; polynomials; vector spaces, Galois Theory, and theory of ideals. Prerequisites, 403 or equivalent for 504; 504 for 505; 505 for 506.
- 510 Seminar in Algebra (*, maximum 5)
Prerequisite, permission.
- 511, 512, 513 Special Topics in Algebra (2-3, 2-3, 2-3)
Each may be repeated twice for credit. 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.

521, 522, 523 Probability (3,3,3)

Measure theory and integration, independence, laws of large numbers, Fourier analysis of distributions, central limit problem and infinitely divisible laws, conditional expectations, martingales. Prerequisite, 426.

524, 525, 526 Real Variable (3,3,3)

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)

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 and Applications (3,3)

Spectral theorem for bounded Hermitian operators, statement for unbounded operators, application to ordinary and partial differential operators with Fourier transforms, construction of Green functions, Schrödinger equation, eigenvalue distributions, perturbation theory; contour integral representation, special functions. Prerequisites, 527 for 528; 528 for 529.

530 Seminar in Analysis (*, maximum 5)

Prerequisite, permission.

531, 432, 533 Special Topics in Analysis (2-3, 2-3, 2-3)

Each may be repeated twice for credit. 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 Linear Spaces, Potential Theory, and Numerical Analysis.

534, 535, 536 Complex Variable (3,3,3)

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.

538, 539 Nonlinear Ordinary Differential Equations (3,3)

Phase plane; analysis of critical points (nodes, saddle points, foci); theory of oscillations, limit cycles, Poincaré-Bendixon theory; topological methods, fixed point theorem. Prerequisites, 322 and 324 (or 236) for 538; 538 for 539.

544, 545, 546 Differential Geometry (3,3,3)

Differential geometry of curves and surfaces in ordinary space and in n -space. Differential forms and the Cartan calculus. Differential geometry in the large. Prerequisites, 404 and 426 for 544; 544 for 545; 545 for 546.

550 Seminar in Geometry (*, maximum 5)

Prerequisite, permission.

551, 552, 553 Special Topics in Geometry (2-3, 2-3, 2-3)

Each may be repeated twice for credit. In recent years the following subjects have been covered: Riemannian Geometry, Differentiable Manifolds, Complex Manifolds, Geometry of Convex Bodies.

561, 562, 563 General Topology (3,3,3)

Theory of sets; metric spaces; topological spaces; compactness and other covering properties; function spaces; polyhedra; dimension theory. Prerequisites, 426 for 561; 561 for 562; 562 for 563.

564, 565, 566 Algebraic Topology (3,3,3)

Classical and modern approaches to algebraic topology; 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.

569J Partial Differential Equations (3)

Classification of second order partial differential equations; solution by separation of variables and reduction to a boundary value problem; theory of characteristics and solutions by means of Green's functions. Examples from classical mechanics of continua. Prerequisite, 428 or Aeronautical Engineering 568. Offered jointly with the Department of Aeronautical Engineering.

570 Seminar in Topology (*, maximum 5)

Prerequisite, permission.

571, 572, 573 Special Topics in Topology (2-3, 2-3, 2-3)

Each may be repeated twice for credit; special topics from general and algebraic topology.

581, 582, 583 Advanced Theory of Statistical Inference (3,3,3)

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, 484 and 485, or permission for 581; 581 for 582; 582 for 583.

590 Seminar in Probability and Statistics (*, maximum 5)

Prerequisite, permission.

591, 592, 593 Special Topics in Statistics (3,3,3)

Each may be repeated twice for credit. 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).

600 Research (*)

Prerequisite, permission.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

METEOROLOGY AND CLIMATOLOGY

See ATMOSPHERIC SCIENCES, p. 55. The Department of Meteorology and Climatology was renamed Atmospheric Sciences, effective November 1, 1962.

MUSIC

Director: WILLIAM BERGSMA, 104 Music Building

**Graduate Program Adviser: DEMAR IRVINE,
108 Music Building**

The School of Music offers courses leading to the degrees of Master of Arts, Master of Arts in Music, Doctor of Philosophy, and Doctor of Musical Arts. All students working toward advanced degrees are expected to be proficient in general musicianship, including piano, and must show a satisfactory knowledge of music theory and music literature. The School of Music issues information leaflets, "Graduate Studies," as a guide to the standards expected for each of the various degrees and majors.

MASTER OF ARTS. A minimum of 36 credits is required, of which 15 credits must be in courses numbered 500 or above, and 9 credits represent the thesis. Students must have a reading knowledge of one foreign language. The emphasis in this program will be in music history and literature, or in music theory. The purpose of the thesis is to develop the student's capacity for independent investigation.

MASTER OF ARTS IN MUSIC. Majors are offered in composition, music teaching, opera production, music performance (piano, violin, voice, organ, or another approved instrument), and conducting. Students beginning the program after August, 1961, must pass a reading knowledge examination in one foreign language. The student may elect the thesis or the nonthesis option.

Thesis Option. The requirements are a minimum of 45 approved credits, of which 18 must be in courses numbered 500 or above, and 9 credits represent the thesis.

Nonthesis Option. The student must complete a minimum of 45 approved course credits, of which 24 must be in courses numbered 500 or above, and pass a comprehensive Final Examination. Before being admitted to the examination, the student must submit a qualifying essay demonstrating that he is able to discuss musical subjects with competence and insight, and in clear English.

DOCTOR OF PHILOSOPHY. This degree is offered with a major in music, and with opportunity for specialization in musicology or music theory. Students must have a reading knowledge of French and German, and of such other languages as are necessary for research in the field of the dissertation. A minimum of 80 credits is required, of which 36 credits must be in music courses numbered 500 or above, and 20 to 30 credits will normally represent supporting courses in other departments. In addition, the student must present an acceptable dissertation representing original and independent investigation.

DOCTOR OF MUSICAL ARTS. This degree is intended as a recognition of high professional attainment in some major branch of performance, or in original composition, or in the field of music teaching. The main objective of the doctoral studies for this degree should be the broadening and deepening of professional prepara-

tion for teaching at the college level. In addition to an expert knowledge of the specialty, candidates must show superior competence in the various supporting musical disciplines and some awareness of fields other than music.

Of the minimum of 80 credits of course work required, half must represent music courses numbered 500 or above, and from 15 to 25 credits should be completed in courses numbered 300 or above in departments other than music. In lieu of a single longer dissertation, students will submit three theses. One of the theses must be a research paper; the other two may be additional research papers, or musical compositions, or essays of a critical or methodological nature.

A reading knowledge of two foreign languages is required.

COURSES

301 Contemporary Idioms (3)	McKay
303 Keyboard Harmony (3)	
307, 308 Music Before 1750 (2,2)	Terry, Woodcock
314, 315, 316 Music Cultures of the World (3,3,3)	Garfias
317 Chamber Music (2)	Ferrin
321 Modal Counterpoint (3)	Babb
322 Tonal Counterpoint (3)	Verrall
330 Vocal or Instrumental Instruction (2-3, maximum 18)	
331, 332, 333 Keyboard Transposition and Improvisation (2,2,2)	Beale
334, 335, 336 Accompanying (1,1,1)	Hokanson
337, 338, 339 Repertoire (1,1,1)	
340 University Concert Band (1, maximum 6)	Welke
344 Elementary School Music (4)	Heffernan
346J Teachers' Course in Secondary School Music (3) Offered jointly with the College of Education.	Normann
347 Music in the United States (2)	Clarke
348 Twentieth-Century Music in the Americas (2)	Clarke
350 Vocal or Instrumental Instruction (2-3, maximum 18)	
352 Musical Form (3)	Woodcock
353 Orchestration (3)	McKay, Verrall
354 Band Arranging (2)	Welke
357 Church Music (3)	Woodcock
360 University Symphony Orchestra (1, maximum 6)	Chapple
367 History of Chamber Music (3)	Ferrin
377, 378, 379 Score Reading (1,1,1)	Irvine
380 Advanced Chamber Music (1, maximum 6)	
384 Instrumental Conducting (2)	Welke
385 Choral Conducting (3)	Terry
401 Contemporary Idioms (3)	McKay
407 Medieval and Renaissance Music (3)	Irvine
408 Baroque Music (3)	Terry
409 Contemporary Music (3)	McKay
414, 415 School Choral Materials (1,1)	
421 Modal Counterpoint (3)	Babb
422 Tonal Counterpoint (3)	Verrall
424, 425 School Instrumental Materials (1,1)	Cole, Normann
427 Haydn and Mozart (3)	Terry
428 Beethoven (3)	Woodcock
430 Vocal or Instrumental Instruction (2-3, maximum 18)	
434, 435, 436 Pedagogy (2,2,2)	Moore, Zetlin, Harris
437 Rococo and Preclassic Music (3)	Terry

- 440 **Wind Sinfonietta (2, maximum 6)** Welke
(Offered Summer Quarter only.)
- 447 **Schumann and Brahms (3)** Woodcock
- 449 **Late Nineteenth-Century Music (3)** Irvine
- 450 **Vocal or Instrumental Instruction (2-3, maximum 18)**
- 452 **Musical Form (3)** Woodcock
- 453 **Orchestration (3)** Beale
- 460 **Sinfonietta (1, maximum 9)** Chapple
- 464, 465 **Opera Direction and Production (4,4)** Rosinbum
- 467 **History of Keyboard Music (3)** Woodcock
- 471 **Introduction to Ethnomusicology (3)** Garfias
- 474 **The Curriculum in Music Education (2)** Normann
- 476 **The General Music Class (2)** Heffernan
- 480 **Opera Theatre (2, maximum 6)** Chapple, Rosinbum
- 481 **Harmonic Analysis (3)** Beale
- 484 **Instrumental Conducting (1)** Cole
- 485 **Choral Conducting (2)** Kechley
- 486 **Instrumental Conducting (1)** Chapple
- 487, 488 **History of Opera (3,3)** Clarke, Chapple
- 490 **Collegium Musicum (1, maximum 6)** Bostwick, Heinitz, Terry
- 491 **Composer's Laboratory (3, maximum 18)** McKay, Verrall
- 495 **Advanced Choral Conducting (3)** Kechley
- 497, 498 **History of Choral Music (3,3)** Terry
- 500 **Methods of Musical Research (3)** Irvine
Bibliography and research techniques. Designed to prepare students for their work in seminars, individual research, and the writing of theses.
- 507 **Seminar in Renaissance and Baroque Music (3, maximum 6)** Terry
Prerequisite, one or more undergraduate courses in the same field.
- 508 **Seminar in Classic and Romantic Music (3, maximum 6)** Woodcock
Prerequisite, one or more undergraduate courses in the same field.
- 509 **Seminar in Modern Music (3, maximum 6)** Verrall
Prerequisite, one or more undergraduate courses in the same field.
- 514 **Psychological Foundations of Music (3)** Normann
The nature of musical effects; growth and development of musical powers; factors influencing musical taste; applications of music to therapy and industry.
- 524 **Seminar in Music Education (3)** Heffernan
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)** Normann
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 **Music and Society (3)** Normann
Philosophical foundations in music education. Prerequisites, one year of teaching experience and permission.
- 547 **Seminar in American Music (3, maximum 6)** Clarke
History and literature of music in the United States from 1600 to the present.
- 550 **Vocal or Instrumental Instruction (3, maximum 12)**
Prerequisite, 30 credits in the same branch of performance.
- 561 **Problems in Choral and Orchestral Scoring (2-5)** Verrall
Special techniques of choral, orchestral, and dramatic composition. Original composition and research with emphasis on the evolution of ensemble types and forms.
- 566 **Opera Direction and Production (4 or 6, maximum 12)** Rosinbum
Practical experience with problems of the opera theatre.
- 568, 569 **Historiography and Criticism (3,3)** Irvine
An approach to critical scholarship through the review and evaluation of the writings of music historiographers and music critics with main emphasis on the period since 1770.
- 577, 578 **Early Notation (2,2)** Irvine
577: Gregorian notation; ars antiqua; ars nova. 578: white mensural notation; lute and organ tablatures. Prerequisite, 407 or permission.
- 579 **Seminar in Musicology (3, maximum 6)** Irvine
Selected topics in music history, literature, and theory. Prerequisite, permission.

- 584, 585, 586 Advanced Conducting (1-3, 1-3, 1-3)** **Chapple**
Analysis of scores leading to rehearsal and preparation of musical groups.
- 590 Recital (2, maximum 6)**
Public performance in one solo recital and in chamber music, cantata, concerto, opera, or oratorio.
- 591 Graduate Composition (*)** **McKay, Verrall**
- 600 Research (*)**
Prerequisite, permission.
- 700 Thesis (*)**
- 702 Degree Final (6)**
Limited to students completing a nonthesis degree program.

OCEANOGRAPHY

Chairman: RICHARD H. FLEMING, 202 Oceanography Building

Graduate Program Adviser: J. S. CREAGER, 124 Oceanography Building

Graduate programs in the Department of Oceanography lead to the degrees of Master of Science and Doctor of Philosophy. Since these programs are built upon a broad background in the basic sciences and in oceanography, a student should have an undergraduate background in oceanography or in one of the basic sciences. The best preparation for graduate study in oceanography includes differential and integral calculus, physical geology, general chemistry and quantitative analysis, general biology, one year of physics, and either French, German, Japanese, or Russian. Students with too many deficiencies to be admitted directly to the Graduate School may take basic science and oceanography courses in an Un-classified-5 status.

The student specializes in biological, chemical, geological, or physical oceanography and becomes proficient in general oceanography by taking Oceanography 360, 390, 403, 405, 410, 412, 421-422, 423, and 460. In many courses, work at sea is performed on the *M.V. Brown Bear* and other research vessels. Summer Quarter instruction is offered on the Seattle campus and at the Friday Harbor Laboratories.

COURSES

- 360 Methods and Instruments in Oceanography (3)** **Coachman**
- 390 General Oceanography (5)** **Barnes, Richards**
- 401 General Physical Oceanography (5)** **Barnes**
- 403 Biological Oceanography (5)** **Banse, English**
- 404J Introduction to Geophysics: The Ocean (5)**
Offered jointly with the Committee on Geophysics.
- 405 Geological Oceanography (5)** **Creager**
- 410 Physical Oceanography (3)** **Barnes**
- 411 Ocean Tides and Waves (3)** **Rattray**
- 412 Ocean Currents (3)** **Barnes**
- 415 Fundamentals of Underwater Acoustics (3)**
- 416 Applications of Underwater Acoustics (2)**
- 421-422 Chemical Oceanography (2-2)** **Richards**
- 423, 424 Chemical Oceanography Laboratory (2,2)** **Richards**
- 452 Sedimentary Processes (3)** **Gross**
- 453 Sedimentary Techniques (2)** **Gross**
- 460 Field Experience in Oceanography (6)** **Coachman**
(Offered Summer Quarter only.)
- 461 Applications of Oceanography (3)** **Fleming**
- 511, 512, 513 Marine Hydrodynamics I, II, III (4,4,4)** **Rattray**
Methods for solving problems in physical oceanography. Prerequisite, a major in a physical science.

- 515 Waves (2)** **Rattray**
Application of marine hydrodynamics principles to the wave motion in the oceans. Prerequisite, 513.
- 516 Ocean Circulation (2)** **Rattray**
Hydrodynamic theories concerning the origin and characteristics of the major ocean currents. Prerequisite, 513.
- 517 Oceanography of Inshore Waters (5)** **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.
- 518 Seminar in Physical Oceanography (*, maximum 9)** **Barnes, Rattray**
Lectures, discussions, and field and laboratory work on selected problems of current interest. Prerequisite, permission.
- 519 Interaction of the Sea and Atmosphere (5)**
The interchange of heat, water, and energy; study of budgets and of the mechanisms of exchange. Prerequisites, 410 and Atmospheric Sciences 462.
- 520 Seminar (*, maximum 6)**
- 521 Seminar in Chemical Oceanography (*, maximum 9)** **Richards**
Lectures and discussions on selected problems of current interest. Prerequisite, permission.
- 523 Advanced Problems in Chemical Oceanography (1-4, maximum 18)** **Richards**
Field and laboratory work on selected problems of current interest. Prerequisites, 424 and permission.
- 531 Seminar in Biological Oceanography (*, maximum 9)** **Banse, English**
Lectures, discussions, and field and laboratory work on selected problems of current interest. Prerequisite, permission.
- 532 Marine Microbiology (1-4)** **Ordal**
Ecology and biochemistry of marine bacteria. Prerequisites, Microbiology 400 and permission.
- 533 Zooplankton Ecology (6)**
Adaptations, modifications, and life histories of animals in the plankton. Evaluation of methods and techniques used in field and laboratory studies. (Offered Summer Quarter only in alternate years at Friday Harbor Laboratories; offered 1964.) Prerequisite, permission.
- 534 Phytoplankton Ecology (6)**
Contemporary problems in marine phytoplankton investigations. Evaluation of methods used in field and laboratory studies. (Offered Summer Quarter only in alternate years at Friday Harbor Laboratories; offered 1964.) Prerequisite, permission.
- 535 Advanced Plankton Ecology (3)** **Banse**
Factors controlling the distribution, abundance, and production of plankton organisms, with a consideration of recent methods of sampling and analysis. Prerequisite, permission.
- 536 Benthos Ecology (3)** **Banse**
Quantitative consideration of the population of the sea-bed. Discussion of modern methods of sampling and analysis. Factors affecting production. Prerequisite, permission.
- 551 Seminar in Geological Oceanography (*, maximum 9)** **Creager, Gross**
Lectures, discussions, and field and laboratory work on selected problems of current interest. Prerequisite, permission.
- 552 Research Techniques in Marine Geochemistry (2)** **Gross**
Analytical techniques and instruments applicable to problems of marine geochemistry. Prerequisite, 405.
- 553 Research Techniques in Marine Geology (3)** **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, 405, 453, and 552.
- 555 Marine Geochemistry (3)** **Gross**
Topics in the geochemistry of the oceans and marine sediments. Prerequisites, Chemistry 351 and permission.
- 556 Advanced Marine Geology (3)** **Creager**
Contemporary problems in marine geology; concepts supporting or at variance with the accepted hypotheses; discussion of recent advances. Prerequisites, 553 and permission.
- 600 Research (*)**
- 700 Thesis (*)**

PHILOSOPHY

**Chairman and Graduate Program Adviser: ARTHUR F. SMULLYAN,
264 Savery Hall**

The Department of Philosophy offers courses leading to the degrees of Master of Arts and Doctor of Philosophy.

MASTER OF ARTS. The Department requires students for this degree to take a written general qualifying examination, of four hours' duration, to test the student's fitness for the M.A. degree program. This examination should be taken as early as possible and no later than the first quarter of the second year of graduate study.

Only after passing the general qualifying examination may the student register for thesis credit and thus formally undertake work on his thesis for the M.A. degree.

Residence and credit requirements include a full year of residence, 9 credits per quarter plus 9 thesis credits (36 credits). In addition to the 9 thesis credits, 9 others must be in 500-level courses.

The student is required to write a thesis acceptable to his committee, and must pass a final oral examination on his thesis.

DOCTOR OF PHILOSOPHY. Normally it is expected that the prospective candidate for the Ph.D. degree has satisfied all requirements for the master's degree. Students in the Ph.D. program are required to pass the General Examinations in four parts covering the fields of logic, history of philosophy, metaphysics and epistemology, and ethics. The student is expected to have taken courses and seminars in these fields and his program must be approved by his Supervisory Committee. In addition, he must prepare an acceptable dissertation and pass the oral Final Examination on it.

COURSES

320	History of Ancient Philosophy (5)	Keyt
321	History of Medieval Philosophy (5)	Boler
322	History of Modern Philosophy (5)	Richman
325	History of Nineteenth-Century Philosophy (5) (Offered 1964-65.)	
326	History of Recent Philosophy (5)	Mish'alani
347	Philosophy in Literature (5) (Offered 1964-65.)	
370	Intermediate Logic (5)	Keyt
410	Social Philosophy (5)	Rader
424	Recent American Philosophy (3) (Not offered 1963-64.)	
428	Chinese Philosophy (5) (Offered 1963-64.)	Shih
429	Neo-Confucianism (5) (Not offered 1963-64.)	Shih
431	Philosophy of Plato (3) (Not offered 1963-64.)	Keyt
433	Philosophy of Aristotle (3)	Keyt
436	British Empiricism (3) (Not offered 1963-64.)	Molden
437	Philosophy of Hume (3) (Not offered 1963-64.)	Molden
438	Philosophy of Kant (3)	Dietrichson, Smullyan
440	Advanced Ethics (3)	Molden
445	Philosophy of Art (5)	Moulton
446	Development of Aesthetic Theory (3)	Rader
447	Philosophy of Literature (3) (Offered 1964-65.)	Storn
448	Philosophy in Nineteenth-Century Literature (5) (Not offered 1963-64.)	Rader
450	Epistemology (3)	Smullyan, Richman
453	Semantics (5) (Not offered 1963-64.)	
456	Metaphysics (5)	Dietrichson, Boler

460 Introduction to the Philosophy of Science (5) (Offered 1963-64.)	Smullyan
463 Philosophy of Mind (3) (Not offered 1963-64.)	Melden
465 Philosophy of History (5)	Rader
467 Philosophy of Religion (5)	Dietrichson
469 Existentialist Philosophy (3)	Dietrichson
470 Advanced Logic (5)	Keyt, Smullyan
480 Philosophical Studies (2, maximum 4) (Selected honors students only.)	
484 Reading in Philosophy (1-4, maximum 12)	
490 Philosophy of Leibniz (3) (Not offered 1963-64.)	Melden
491 Philosophy of Spinoza (3)	Starsky
520 Seminar in Ancient Philosophy (3, maximum 12) (Not offered 1963-64.)	Keyt
522 Seminar in Modern Philosophy (3, maximum 12)	Boler
526 Seminar in Recent Philosophy (3, maximum 12) (Not offered 1963-64.)	
540 Seminar in Ethics (3, maximum 12)	Melden
545 Seminar in Philosophy of Art (3, maximum 12)	Rader, Moulton
550 Seminar in Epistemology (3, maximum 12)	Smullyan, Richman
556 Seminar in Metaphysics (3, maximum 12)	Dietrichson
565 Seminar in Philosophy of History (3, maximum 12)	Rader
567 Seminar in Philosophy of Religion (3, maximum 12)	Dietrichson
570 Seminar in Logic (3, maximum 8)	Keyt, Smullyan
575 Seminar in the Philosophy of Mathematics (3, maximum 12) (Not offered 1963-64.)	
584 Reading in Philosophy (1-4, maximum 12) Intensive reading in philosophical literature. Prerequisite, permission of Chairman.	
587 Contemporary Analytic Philosophy (3, maximum 12)	Melden
600 Research (1-6) Prerequisite, permission.	
700 Thesis (*)	

PHYSICAL AND HEALTH EDUCATION

Chairman for Women: RUTH M. WILSON, 105 Hutchinson Hall

Graduate Program Adviser for Women: MARION R. BROER, 109 Hutchinson Hall

**Chairman and Graduate Program Adviser for Men: R. K. CUTLER,
210 Edmundson Pavilion**

The School of Physical and Health Education offers courses leading to the degrees of Master of Science and Master of Science in Physical Education. Students pursuing a program for the degree of Doctor of Philosophy in other departments may obtain a minor in physical education.

The master's degree programs aim to prepare personnel who will contribute to the further growth of their profession through development and refinement of concepts and philosophy, participation in research, leadership of colleagues, and stimulation of their future teacher-education and recreational-leadership students. These programs aim to inspire students to question objectively and to search for basic answers through scientific processes. Specifically, the objectives are to provide situations and experiences which stimulate the development of an inquiring mind, critical thinking, and increased skill in effective oral and written expression; to provide a background for clear interpretation and intelligent application of research literature; to promote increased understanding of basic concepts, current philosophies, and major issues and trends in the fields of physical education, health education, and recreation.

For the master's degree with a major in physical education, at least 22 credits, including the thesis, must be in courses numbered 500 and above. There is no foreign language requirement for the Master of Science in Physical Education. In the Department for Men, a total of 41 credits, including Physical Education 600, is required. In the Department for Women, students must meet the Graduate School's general requirements for course work. Additional requirements will be determined in conference with the Graduate Program Adviser. A minimum of 6 credits must be in Physical Education 600.

Students in other departments working for the master's degree or a doctor's degree with a minor in physical education must have completed essentially the same program of study as outlined in one of the undergraduate curricula of the Physical and Health Education Department.

For a minor in physical education for the master's degree, a student must present a minimum of 26 preparatory credits in physical education and one course in human physiology.

The requirements for a minor in physical education for the master's degree are at least 12 credits in courses numbered 500 and above; for the doctor's degree, 35 approved credits in health education, physical education, or recreation education courses.

COURSES

PROFESSIONAL AREAS

HEALTH EDUCATION

- 451 Workshop in Health Education for the Classroom Teacher (Men and Women) (2½)
(Offered Summer Quarter only.)
- 453 Methods and Materials in Health Teaching (Men and Women) (3) Gaines
- 465 The School Environmental Health Program (Men and Women) (3) Mills, Reeves
- 503 Seminar in Health Education (Men and Women) (3) Gaines
Prerequisites, 453, 465, and Physical Education 345.
- 508 Administration of the School Health Program (Men and Women) (3) Reeves
Prerequisites, 291, 465, Preventive Medicine 461 or equivalent, or permission.
- 600 Research (Men and Women) (2-5)
- 700 Thesis (Men and Women) (*)

PHYSICAL EDUCATION

- 322 Kinesiology (Men and Women) (3) Cutler
- 340 Administration of Intramural Sports (Men) (3) Stevens
- 345 Principles of Physical Education (Men and Women) (3) Torney
- 351 Theatre Dance (Men and Women) (2)
- 355 Modern Dance Workshop (Men and Women) (2, maximum 6)
- 435 Adapted Physical Education (Men) (3) Cutler
- 435 Adapted Activities (Women) (3) Kidwell
- 447 Tests and Measurements (Men and Women) (3) Cutler
- 450 The School Physical Education Program (Men and Women) (men, 3; women, 2) Peek, Wilson
- 459-460 Dance Production (Women) (2-2)
- N466 Coaching (Women) (0) Rulifson
- 478J Workshop in Elementary School Physical Education (Men and Women) (2½)
Offered jointly with the College of Education. (Offered Summer Quarter only.) Horne
- 480 Principles of Movement (Women) (3) Broer, Fox
- 493 Problems in Athletics (Men) (3) Torney
- 499 Special Studies in Physical Education (Women) (2-3, maximum 12) Broer
Prerequisite, permission.
- 501 Seminar in Physical Education (Men and Women) (3, maximum 9) Broer, Torney, Wilson
Prerequisites, 345 and 450.
- 502 Problems in Physical Education (Men and Women) (2½) Wilson
(Offered Summer Quarter only.) Prerequisites, 345 and 450, or permission.

506 The Curriculum (Men and Women) (3)	Kunde
507 Supervision in Physical Education (Men) (2½) (Offered Summer Quarter only.) Prerequisites, 345 and 450, or permission.	Peek
547 Seminar in Research Procedures (Men and Women) (3) Prerequisites, 447 and Mathematics 281, or equivalent.	Broer, Fox
580 Seminar in Human Performance (Women) (4) (Offered Summer Quarter only.) Prerequisites, Physical Education 322, 380, or permission.	Broer
600 Research (Men and Women) (2-5)	
700 Thesis (Men and Women) (*)	

RECREATION EDUCATION

344 Organization and Administration of Camp Programs (Men and Women) (3)	Kunde
354 Recreation Practicum (Men and Women) (3)	
426 Field Work in Recreation (Women) (5)	Kidwell
434 Management and Operation of Recreation (Men and Women) (5) Formerly 334.	Kunde
454 Recreation Field Work (Men) (3)	Kunde
504 Problems in Administration of Recreation (Men and Women) (3)	Kunde
524 Seminar in Community Resources and Organization for Recreation (Men and Women) (3)	Kunde
600 Research (Men and Women) (2-5)	
700 Thesis (Men and Women) (*)	

PHYSICS

Chairman: RONALD GEBALLE, 215 Physics Hall

Graduate Program Adviser: J. S. BLAIR, 333 Physics Hall

The Department of Physics offers programs leading to the degrees of Master of Science and Doctor of Philosophy. Specific departmental requirements are described briefly below. More complete information can be obtained by writing to the Graduate Program Adviser.

Undergraduate preparation is expected to include upper-division courses in electricity and magnetism, mechanics, the properties of matter, advanced calculus and mathematical physics, atomic physics, and nuclear physics. Deficiencies may cause a delay of as much as a year. A reading knowledge of German, French, or Russian is desirable.

Students working for advanced degrees in physics are expected to pass certain examinations as part of the departmental degree requirements. The first, a written preliminary examination, is designed to assess the student's knowledge and understanding of the material normally included in an undergraduate program with a major in physics. Ordinarily, a student is expected to take the preliminary examination during his first year of regular graduate study at this University. It is given once each Autumn and Spring Quarter. No student is permitted to take the preliminary examination more than twice without special departmental approval.

MASTER OF SCIENCE. A minimum of 36 approved credits must be submitted, of which 18 must be in courses numbered 500 or above. These 18 credits must include a minimum of 3 credits in Physics 600, with the sponsorship of an instructor, and a minimum of 12 credits in other physics graduate courses. No thesis is required. Students working for the degree of Master of Science must pass a Final Examination, usually oral. Students who have been approved following the preliminary examination may take the Final Examination. Reading proficiency in a foreign language must be demonstrated by examination. German, French, and Russian are suitable for this purpose.

Students in other fields desiring a minor in physics for a master's degree must submit 9 credits in courses numbered 300 or above and 9 credits in courses numbered 400 or above.

DOCTOR OF PHILOSOPHY. The Department requires preparation equivalent to the courses 505, 506, 509, 510, 511, 513, 514, 515, 517, 518, 519, 524, 525, and 528 and recommends Mathematics 527 (Elements of Real Variables for Scientists), 528, and 529 (Hilbert Space Operators and Applications). Additional courses of interest will be selected by the student and his Supervisory Committee. Reading proficiency in two foreign languages must be demonstrated by examination. German, French, and Russian are suitable for this purpose.

In addition to the preliminary examination, students pursuing a program for the degree of Doctor of Philosophy must pass, successively, a written qualifying examination, a General Examination for admission to candidacy, and a Final Examination. A student is permitted to take the qualifying examination if he has been approved for it subsequent to the preliminary examination. A student in the program leading to the Ph.D. is expected to take the qualifying examination in his second year of regular graduate study. The qualifying examination is given once each Autumn and Spring Quarter. It is designed to assess the depth of the student's knowledge of the principal branches of physics.

In the oral General Examination the student is examined on topics related to the general area of physics in which he plans to do his dissertation research. A student who has passed the qualifying examination may be permitted to take the General Examination. Ordinarily he will have been accepted by a member of the staff as a research student. A student is expected to take the General Examination as soon as possible after passing the qualifying examination, usually early in his third year of regular graduate study. Passing the General Examination constitutes admission to candidacy for the Ph.D.

Each student bears responsibility for being informed of the dates on which the examinations are offered and for planning his own program so that he can take the various examinations at appropriate times.

A prospective candidate for this degree is required to conduct an original and independent investigation in one of the fields of physics. Results of this research are submitted as a dissertation. In his Final Examination, the candidate presents these results orally to the Department and is examined in his field of research.

A minor in physics for a doctor's degree requires the equivalent of a bachelor's degree in physics and three graduate courses.

COURSES

320 Introduction to Modern Physics (3)

323 Introduction to Nuclear Physics (3)

325, 326, 327 Electricity and Magnetism (3,3,4)

371, 372, Properties of Matter (3,3)

401, 402, 403 Special Problems (*,*,*)

461, 462, 463 Introduction to Atomic and Nuclear Physics (3,3,3)

471, 472, 473 Atomic and Nuclear Physics Laboratory (3,3,3)

481, 482, 483 Introduction to Mathematical Physics (3,3,3)

Graduate courses numbered to and including 528, as well as 558, 560, 561, 566, 568, and 570, are given each year. Others are given intermittently, depending on demand; in most cases this means once every two years. Further information may be obtained from the Department of Physics or the current Time Schedules.

505, 506 Advanced Mechanics (3,3)

Dynamics of a particle; generalized coordinates and Lagrange's equations; variational principles and Hamilton's equations; kinematics and dynamics of rigid body motion; special relativity; canonical transformations and Hamilton-Jacobi theory; coupled small oscillations and normal coordinates.

509, 510, 511 Atomic, Molecular, and Nuclear Structure (2,2,2)

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 Electricity and Magnetism (4,4,4)

Properties of electric and magnetic fields in free space and material media; boundary value problems; radiation from accelerated charges and electromagnetic waves; relativistic formulation of electrodynamics.

517, 518, 519 Quantum Mechanics (4,4,3)

Physical and historical basis for quantum theory; solutions of the Schrödinger wave equation for discrete and continuous energy eigenvalues; representation of physical variables as operators and matrix formulation of quantum mechanics; spin angular momentum and identical particles; approximation methods; relativistic wave equations; and quantization of fields.

520 Seminar (1-2)

Seminars in the following subjects meet regularly: high energy physics, gaseous electronics and optical spectroscopy, magnetic resonance phenomena, nuclear, low temperature, and theoretical physics. Prerequisite, permission.

524, 525 Thermodynamics and Statistical Mechanics (3,3)

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. Prerequisite, 517 or concurrent registration in 517.

528 Current Problems of Physics (2)

Discussion of research topics which are currently being investigated within the department; detailed study of at least one research problem.

558 Elementary Particle Physics (3)

Prerequisite, 560.

560, 561 Theoretical Nuclear Physics (3,3)

Prerequisites, 510 and 518.

562 Theory of Spectra (3)

Prerequisites, 509 and 518.

564 Relativity (3)

Prerequisites, 506 and 515.

566 Topics in Advanced Quantum Mechanics (3)

Prerequisite, 518.

568 Theory of Solids (3)

Prerequisite, 518.

570 Quantum Field Theory (3)

Prerequisite, 519.

574 Atomic and Molecular Collisions (3)**576 Selected Topics in Experimental Physics (*, maximum 6)**

Prerequisite, permission.

578 Selected Topics in Theoretical Physics (*, maximum 6)

Prerequisite, permission.

600 Research (*)

Research currently is in progress in the following fields: acoustics, high energy physics, gaseous electronics and collision processes, low temperature physics, magnetic resonance phenomena, natural radioactivity, nuclear physics, optical and radiofrequency spectroscopy, solid state physics, and theoretical physics. Prerequisite, permission.

700 Thesis (*)

Prerequisite, permission.

702 Degree Final (6)

Limited to students completing a nonthesis degree program.

POLITICAL SCIENCE

Chairman: HUGH ALVIN BONE, 206 Smith Hall

Graduate Program Adviser: K. C. COLE, 208A Smith Hall

The Department of Political Science offers courses leading to the degrees of Master of Arts and Doctor of Philosophy. Students working for these degrees must have completed an undergraduate major or the equivalent in political science.

Students must acquire mastery of a field of concentration in which the doctoral thesis is prepared and of additional supporting fields. The following fields may be used for both purposes: political theory; international law and relations; comparative government; public law; public administration; American government and politics; and state and local government. Combinations of some of the above fields may be required.

Students may be permitted to substitute special regional fields for any of the above general fields under the conditions set forth below. Students are also encouraged to minor, or offer supporting courses, in other social sciences such as history, economics, sociology, psychology, or geography.

Not less than two-thirds of the minimum credits required for the degree must consist of those earned in courses numbered 500 or above.

MASTER OF ARTS. A total of 36 credits in individually approved programs is required. The student must also submit an essay of distinction and pass a comprehensive examination on the content of a major and two minor fields.

If the student is permitted to adopt Far Eastern or Russian political science as a field of concentration, he must have a reading knowledge of the appropriate foreign language, and both of his supporting fields must be in general political science.

DOCTOR OF PHILOSOPHY. A minimum of 108 credits is required, including 27 allowed for the dissertation. The student must present a field of concentration and four supporting fields. Normally one of these supporting fields should be represented by supporting courses in another discipline. In special cases, a student may be permitted either to choose all of his supporting fields from within the Department or, at the other extreme, to offer a related discipline as the equivalent of two of these fields.

If the student is permitted to adopt Far Eastern or Russian political science as a field of concentration, he may also present a related field of regional studies as one of his supporting fields. But if this option is exercised, comparative government may not be included among the supporting fields.

Students who contemplate a Ph.D. in political science after securing degrees in other departments of the University are strongly advised to consult the Chairman of the Political Science Department as soon as possible. No assurance will be given that academic courses completed before such consultation will satisfy Departmental requirements.

COURSES

POLITICAL THEORY AND PUBLIC LAW

- | | |
|---|---------------------|
| 311 Theories of Modern Government (5) | Harbold |
| 362 Introduction to Public Law (5) | Danelski |
| 411 The Western Tradition of Political Thought (5) | Harbold |
| 412 American Political Thought (5) | Harbold |
| 413 Contemporary Political Thought (5) | Harbold |
| 414 Oriental Political Thought (5)
(Offered alternate years; offered 1963-64.) | Hsiao |
| 415 Analytical Political Theory (5) | Cassinelli |
| 444 Systems of Modern Government (5) | Cassinelli |
| 460 Introduction to Constitutional Law (5) | Cole, Danelski |
| 461 The Courts and Civil Liberty (5) | Cole |
| 490 Analysis of Political Behavior (5) | Kessel |
| 511, 512, 513 Seminar in Readings in Political Science (3,3,3)
Important writings of the masters in political science; the political classics. | Cole |
| 514 Seminar in Problems of Political Theory (3)
Selected topics, historical and conceptual, national, regional, and universal. | Cassinelli, Harbold |
| 515 Scope and Methods in Political Science (3)
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. | Harbold |
| 562, 563, 564 Public Law (3,3,3)
General legal concepts applicable to the conduct of governmental activities. | Cole |
| 590 Seminar in Political Behavior (3)
Analysis of behavioral research in selected fields of political science. | Kessel |

GOVERNMENT, POLITICS, AND ADMINISTRATION

- 350 Government and Interest Groups (5) **Gottfried**
- 351 The American Democracy (5) **Gottfried, Kessel**
- 353 Theory and Practice of Government in the State of Washington (3) **Warren**
- 360 The American Constitutional System (3) **Webster**
- 370 Government and the American Economy (5) **Warren**
- 375 Problems of Municipal Government and Administration (5) **Webster**
- 376 State and Local Government and Administration (5) **Warren**
- 450 Political Parties and Elections (5) **Bone**
- 451 The Legislative Process (5) **Bone**
- 452 Political Processes and Public Opinion (5) **Kessel**
- 470 Introduction to Public Administration (5) **Kroll, Warren**
- 471 Administrative Management (5) **Kroll**
- 472 Introduction to Administrative Law (5) **Danolski**
- 473 Comparative Administrative Systems (5) **Kroll**
- 480 Metropolitan Area Government (5) **Warren**
- 528 Seminar in National Security Policy Formation (3) **Denny**
The principal elements of national security. Constitutional, historical, theoretical, and administrative analysis of United States foreign and defense policy formation and execution.
- 550, 551, 552 Seminar in Politics (3,3,3) **Bone, Kessell, 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.
- 570-571-572 The Administrative Process (3-3-3) **Kroll**
An analysis of the administrative process relying primarily upon case materials and emphasizing policy formation, organization behavior, the nature of administrative roles, and the mechanism of responsibility. Same as Public Administration 501, 502, 503.
- 573-574-575 Public Management (3-3-3) **Lyden**
Expression of public policy through program activity, program planning, programming and scheduling, budgeting, staffing, fiscal and other operating controls, evaluation of effectiveness. Same as Public Administration 521, 522, 523. Prerequisite, permission.
- 576-577-578 Administrative Problems (3-3-3) **Shipman**
Methods employed in the analysis of administrative problems, programs, organization, process, procedure, and staffing; the design of organizations and operations. Same as Public Administration 511, 512, 513. Prerequisite, permission.
- 580, 581, 582 Seminar in Metropolitan and Urban Planning Problems (3,3,3) **Webster**
The metropolitan community: nature, characteristics, functions, governmental structure, and intergovernmental relationships. 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.

INTERNATIONAL LAW, ORGANIZATION, AND RELATIONS

- 321 American Foreign Policy (5) **Gottfried, Grady**
- 322 Diplomatic Practices and Procedures (5) **Riley**
- 323 International Relations of the Western Hemisphere (5) **Mander**
- 324 Contemporary International Relations in Europe (5) **Hitchner**
- 328 The United Nations and Specialized Agencies (5) **Mander**
- 335J Japanese Foreign Policy in Asia (3) **Maki**
Offered jointly with the Far Eastern and Russian Institute.
- 420 Foreign Relations of the Soviet Union (5) **Reshetar**
- 425 International Law (5) **Rohn**
- 426 International Politics (5) **Grady**
- 427 International Government and Administration (5) **Hitchner**
- 429 International Relations in the Far East (5) **Maki**
- 430 International Relations in the Middle and Near East (5) **Grady**
- 432 American Foreign Policy in the Far East (5) **Michael, Taylor**
- 520J Seminar on the Foreign Policy of the Soviet Union (3) **Reshetar**
Offered jointly with the Far Eastern and Russian Institute. Prerequisite, permission.

- 521 Seminar in the Theory of International Relations (3)** **Mander**
The principal theories underlying interstate relations; the sovereign state as a unit in the community of states; the theory of the state and the theory of the society of nations.
- 522, 523, 524 International Government and Organization (3,3,3)** **Mander**
Constitutional organization and administrative procedures, with particular reference to the United Nations, specialized agencies, and other recent developments.
- 525 Seminar in International Law (3)** **Rohn**
Transition from classical to modern international law; research in the emerging law of outer space, nuclear weapons, organic alliances, neutralism, human rights, and other selected topics.
- 526 Seminar in International Politics (3)** **Rohn**
Perceptions by scholars and statesmen of international politics as a system; the problem of systematic change and cause-effect analysis.
- 527 Seminar in Foreign Policy (3)** **Rohn**
The foreign policies of major countries; substance and procedure; foreign and domestic determinants; selected foreign policy decisions as case studies.
- 530 Seminar in Regional Foreign Policy (3)** **Mander**
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.

FOREIGN AND COMPARATIVE GOVERNMENT

- 344 Chinese Government (5)** **Michael**
(Offered alternate years; offered 1962-63.)
- 345J Japanese Government (3)** **Maki**
Offered jointly with the Far Eastern and Russian Institute.
- 346 Governments of Western Europe (5)** **Hitchner**
- 347 Governments of Eastern Europe (3)** **Reshetar**
- 348 The European Community (5)** **Rohn**
- 441 Political Institutions of the Soviet Union (5)** **Reshetar**
- 445 Comparative Political Institutions (5)** **Hitchner**
- 541J The Soviet Political System (4, maximum 8)** **Reshetar**
Critical appraisal of the principal research methods, theories, and types of literature dealing with the government and politics of the Soviet Union. Offered jointly with the Far Eastern and Russian Institute. Prerequisite, permission.
- 542 Seminar in Commonwealth Governments (3)** **Mander**
Analysis of the governments of Canada, Australia, and New Zealand; their relations with the United Kingdom.
- 543 Seminar in British Government (3)** **Hitchner**
Advanced studies in British parliamentary government.
- 544 Problems in Comparative Government (3)** **Cassinelli**
Selected problems in the comparative analysis of political institutions, organizations, and systems.
- 545J Seminar on Japanese Government and Diplomacy (3, maximum 6)** **Maki**
Offered jointly with the Far Eastern and Russian Institute.

GENERAL

- 506 Contemporary Problems, Domestic and Foreign (3)**
- 600 Research (*)**
- 700 Thesis (*)**
- 702 Degree Final (6)**
Limited to students completing a nonthesis degree program.

PSYCHOLOGY

Chairman and Graduate Program Adviser: EUGENE GALANTER,
M40 Denny Hall

The Department of Psychology offers a graduate program leading to the degrees of Master of Science and Doctor of Philosophy. The kind of education given in this program is aimed at the development of mature scholars, teachers, and scientists who are able to advance the science of psychology. We do not offer formal "programs," such as "experimental psychology," "social psychology," and "clinical

psychology." Rather, the constraints on a student are primarily those arising from the student's own imagination and interests, the current interests and skills of the Department faculty, and the faculties of associated graduate departments.

The Department is associated in a joint doctoral program in physiological psychology with the Department of Physiology and Biophysics. Students interested in this special degree can apply directly to the coordinator of the program: Dr. Mitchell Glickstein, Department of Psychology.

Within the Department itself, the Chairman serves as the Graduate Program Adviser. He receives graduate student admission application papers and corresponds and confers with the newly admitted and continuing graduate students.

The requirements for admission to the Department of Psychology are adequate intellectual ability and the desire for a career dedicated to the science. Many applicants will have had an undergraduate major in psychology, but the undergraduate major in psychology is not a requirement for admission. We look favorably upon undergraduate records that reveal good backgrounds in the sciences including mathematics and engineering. Work in zoology, chemistry, and physics is a valuable adjunct to the prospective psychologist, as is a grounding in mathematics to the level of calculus and beyond. Applicants, of course, must have a baccalaureate degree and meet other general admission requirements of the Graduate School.

It is required that the student take the verbal and quantitative parts of the Graduate Record Examination administered by the Educational Testing Service, Princeton, New Jersey (or Los Angeles, California). Additional information on admission should be obtained directly from the Chairman, Department of Psychology.

The Graduate School also requires that all students exhibit competence in reading two modern foreign languages before admission to candidacy for the Ph.D. We expect our students to have or to develop the language skills that are needed either before they matriculate or as quickly as possible after they arrive. Some language departments make available special courses in scientific reading for graduate students in psychology. These courses will prepare the student for his language examinations.

Students who are enrolled in graduate programs in other departments and wish to take offerings in the Department of Psychology should contact either the Graduate Program Adviser or the appropriate professor to make these arrangements.

Courses below the level of 400 may not be used to fulfill the departmental requirements for an advanced degree in psychology.

COURSES

301 Statistical Methods (5)

305 Abnormal Psychology (5)

306 Developmental Psychology (5)

307 Personality (5)
Formerly 405.

316 Animal Behavior (5)

345 Social Psychology (5)

355 Cognitive Processes (5)
Formerly 470.

400 Learning (5)

421 Neural Basis of Behavior (5)

422 Physiological Psychology (5)

423 Sensory Basis of Behavior (5)

430 Measurement in Psychology (5)

441 Perception (5)

447 Psychology of Language (5)**498 Readings in Psychology (1-3, maximum 9)**
(For nonmajors only.) Formerly 462.**500-501-502 Pro-seminar in Psychology (5-5-5)**

The pro-seminar meets each consecutive quarter. The topics may change from year to year, but normally will include learning, motivation, perception, physiological psychology, developmental psychology, and personality. Required of all first-year graduate majors. Must be taken in sequence.

514-515-516 Experimental Design and Quantitative Techniques (3-3-3) Edwards, Hopkins

The first two quarters are devoted to the development of topics in statistics and the design of experiments, and the third quarter deals with the application of mathematical techniques to psychological problems. This sequence can be followed by 530-531 in the second year. Required of all first-year graduate majors. Must be taken in sequence.

520-521-522 Laboratory Methods in Psychology (4-4-4)

Actual practice in the design and conduct of laboratory experiments using both animal and human subjects. Required of all first-year graduate majors. Must be taken in sequence.

SEMINARS AND SPECIAL TOPICS

(The graduate seminars and courses offered by the Department change from quarter to quarter. A list of graduate courses and seminars that are being offered currently, along with a description of their content, can be obtained from the Department of Psychology.)

530-531 Mathematical Models in Psychology (3-3)

Mathematical models and theories in psychology, including the application of topics in modern algebra, probability theory, and stochastic processes to psychological problems. Must be taken in sequence. (Not offered 1963-64.) Prerequisite, 516.

540, 541, 542, 543 Experimental Psychology (3-6 each, maximum 15 each)

Prerequisite, second-year graduate major standing.

544, 545, 546, 547 Theoretical Psychology (3-6 each, maximum 15 each)

Prerequisite, second-year graduate major standing.

548, 549, 550, 551 Physiological Psychology (3-6 each, maximum 15 each)

Prerequisite, second-year graduate major standing.

552, 553, 554, 555 Developmental Psychology (3-6 each, maximum 15 each)

Prerequisite, second-year graduate major standing.

556, 557, 558, 559 Psychopathology and Psychodiagnostics (3-6 each, maximum 15 each)

Prerequisite, second-year graduate major standing.

560, 561, 562, 563 Psychological Measurement (3-6 each, maximum 15 each)

Prerequisite, second-year graduate major standing.

564, 565, 566, 567 Personality and Social Psychology (3-6 each, maximum 15 each)

Prerequisite, second-year graduate major standing.

568 Field Work (3-5, maximum 36)

Prerequisite, second-year graduate major standing and permission.

599 Readings in Psychology (*)

Selected topics. The name of the staff member with whom readings will be done should be indicated in registration. Prerequisite, permission.

600 Research (*)

The name of the staff member with whom, nonthesis research will be done should be indicated in registration. Prerequisite, permission.

700 Thesis (*)**ROMANCE LANGUAGES AND LITERATURE**

Chairman: HOWARD L. NOSTRAND, 217 Denny Hall

Graduate Program Adviser: WILLIAM E. WILSON, 236 Denny Hall

The Department of Romance Languages and Literature offers courses leading to the degrees of Master of Arts and Doctor of Philosophy. A knowledge of Latin and an acquaintance with masterpieces of other literature are strongly recommended. The equivalent of an undergraduate major in Romance Languages is required for admission to work for an advanced degree in the Department.

The student is responsible for knowing and meeting the general requirements of the Graduate School.

MASTER OF ARTS. This Department offers two thesis programs for the degree of Master of Arts, both designed for those who may subsequently want to become candidates for the degree of Doctor of Philosophy, and a nonthesis, terminal pro-

gram for those who intend to teach in a school or junior college. The reading knowledge examination for the M.A. degree must be taken in a language other than the student's major language.

For the first of the thesis programs the Departmental requirements are: oral and written proficiency in the major language; at least 36 quarter credits in literature and linguistics, usually divided between a major and a minor subject (Romance 401, 581, and 582 must be included, and half of the 36 credits must be in courses numbered 500 and above); a knowledge of representative literary works, such as those listed in syllabi obtainable from the Department (the M.A. and B.A. syllabi for an M.A. major, and the B.A. syllabus for an M.A. minor); a satisfactory thesis, to be submitted to the Department in completed form not less than four weeks before the date of the Final Examination.

The second of the thesis programs prepares the student to specialize in problems of foreign language learning and the 36 quarter credits of course work are designed to give competence in the following fields: oral and written proficiency in the major language; knowledge of representative literary works equivalent to an M.A. minor in either French or Spanish; familiarity with general and Romance linguistics; and a knowledge of educational principles and psychological forces affecting the development of language learning. The thesis requirement is the same as for the first program cited.

The nonthesis, terminal program for language teachers stresses linguistic proficiency and acquaintance with area and culture. Forty-five credits are required, including: French or Spanish 409; French or Spanish 541, 542, 543; Romance Linguistics 401 plus at least 2 credits from Romance Linguistics 505, 506, 507; French or Spanish 600, devoted to area studies (3-5 credits); qualifying essay (5 credits). The remainder of the 45 credits in this program will normally be taken from other courses offered by this Department, in accordance with the requirements of the Graduate School. Especially recommended are Romance 572J and 573J. The student should note the special requirements of the Graduate School for this degree, which will be found elsewhere in this *Bulletin*.

DOCTOR OF PHILOSOPHY. Doctoral programs are offered in the following fields of specialization: Romance literature; Romance linguistics; language and language learning; French language and literature; Spanish language and literature; Italian language and literature; and Portuguese language and literature.

The M.A. degree is required as a prerequisite for the Ph.D. General Examination, unless an exception is voted by the Graduate Studies Committee. General requirements for all the Ph.D. programs are: prospective candidates must be accepted by the Graduate Studies Committee of the Department; the student's adviser must present a course plan, as early as possible, to the Department's Graduate Studies Committee for approval; all students are expected to demonstrate near-native proficiency in the major Romance language; a satisfactory dissertation must be submitted to the Chairman of the Supervisory Committee in completed form not less than six weeks before the date of the Final Examination; a reading knowledge of two foreign languages other than the major is required; prior to the General Examination, any student who has not written a master's thesis will be required to write, after consultation with his adviser, a critical paper designed to develop and demonstrate his capacity for research and criticism. The program of studies in any of the above-mentioned fields will require a minimum of 90 credits, at least 50 of which must be in courses numbered 500 and above. Romance 401, 581, 582, and a course of study in the history of one Romance language are required of all candidates for the Ph.D. degree. Special requirements for the various fields of specialization are as follows:

ROMANCE LITERATURE. The student's course work will include at least 30 credits each in two Romance national literatures, as selected by the student and his adviser. Whatever the combination of these two literatures may be, every prospective candidate will be examined on a minimum of one literary figure in French,

Italian, and Spanish. The authors in Italian and Spanish will normally be Dante and Cervantes. A major figure in the French field must be approved by the adviser and the Graduate Studies Committee. Romance linguistics 505, 506, 607, (2,2,2) are required. Studies outside the Department may be included in this program.

The student will be expected to demonstrate at the General Examination a thorough knowledge of one literary genre or period in the literatures embraced by his program.

ROMANCE LINGUISTICS. Approximately half of the student's course work will be in Romance linguistics and histories of individual Romance languages. The other half will be divided equally between courses in general linguistics and in one Romance national literature as chosen by the student. In literature, the student should have knowledge of literary works such as those listed in the M.A. syllabus for that literature.

LANGUAGE AND LANGUAGE LEARNING. Students are expected to develop a minimum competence in each of the three following fields, with further specialization possible in any combination of two. A minimum of 50 credits of course work must be taken in the Department of Romance Languages and Literature.

1. Literature. Students are expected to complete the equivalent of a Ph.D. minor in either French or Spanish literature and consequently should have a knowledge of works such as those listed in the M.A. syllabus. In addition, Romance 475DJ and 475EJ are required.
2. Linguistics. Students will be expected to acquire a command of current developments in linguistics, both theoretical and applied, and to demonstrate the ability to relate these principles to the analysis and teaching of French or Spanish. In addition to Romance 505, 506, 507, and 574J, courses in general linguistics are strongly recommended.
3. Psychology of Language. Students will be expected to acquire a knowledge of the methodology of language teaching, the application of psychological principles, and the use of experimentation, tests and measurements in connection with the language learning process. The following courses are among those designed to develop this competence: Psychology 301, Statistical Methods (5), and Psychology 447, Psychology of Language (5).

FRENCH, OR SPANISH, OR ITALIAN, OR PORTUGUESE LANGUAGE AND LITERATURE. Students specializing in a single Romance literature will devote two-thirds of their course work to their field of specialization. They may devote the remainder of their work to studies, within the Department or outside, in a historical period or a literary genre, or in any humanistic field relevant to the prospective candidate's research specialization as represented by his choice of doctoral dissertation subject.

COURSES

ROMANCE LINGUISTICS AND LITERATURE, GENERAL AND COMPARATIVE

401, 402 Introduction to Romance Linguistics (3,3)

475DJ, 475EJ The Teaching of Foreign Literature (3,3)

Offered jointly with the College of Education.

505, 506, 507 Romance Linguistics (2,2,2)

Principles of comparative linguistics; a brief history of the Romance languages and detailed investigation of their linguistic evolution.

521, 522, 523 Phonemic Analysis and Description (2,2,2)

Phonology as functional phonetics; brief history of the phoneme idea; comparison of the variant phonemic systems in the Romance languages and other linguistic structures; functional and structural analysis of linguistic expression.

531 Problems in Romance Linguistics (2-5, maximum 10)

572J, 573J Romance Language Teachers' Seminar (2½,2½)

Simpson

The teaching of foreign languages; conducted as a workshop. Opportunity for directed practice teaching of elementary and secondary school children. Offered jointly with the College of Education. (Offered Summer Quarter only.)

- 574J The Application of Linguistics to the Teaching of Romance Languages (2)** **Saporta**
Current methods and techniques of foreign language instruction, based on the findings of scientific linguistics. Offered jointly with the College of Education.
- 581, 582, 583 Methodology and Bibliography of Research (2,2,2)** **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)**
Individual and collective research in the evolution of concepts common to Romance literature. Open to graduates of this and other departments.
- 590 Research in Comparative Romance Literature (2-5, maximum 20)**
- 599 Research in Romance Linguistics (2-5, maximum 15)**
- 700 Thesis (*)**
- 702 Degree Final (6)**
Limited to students completing a nonthesis degree program.

CATALAN

- 535 Catalan Language and Literature (5)** **Simpson**
Survey of political and literary history of Catalonia. Reading and reports on modern Catalan literary works. (Offered when demand is sufficient.)

FRENCH

- 304 Survey of French Literature: 1100-1680 (5)**
- 305 Survey of French Literature: 1680-1800 (5)**
- 306 Survey of French Literature: 1800-1960 (5)**
- 390 Supervised Study (2-5, maximum 20)**
- 400 The Structure of Modern French (3)**
- 404 Old French (3)**
- 409 Advanced Phonetics (3)**
- 421 Fiction: 1660-1800 (3)**
- 424 Fiction: 1800-1850 (3)**
- 425 Fiction: 1850-1900 (3)**
- 426 Fiction: 1900-1950 (3)**
- 430 Advanced Conversational French (1-3, maximum 6)**
- 431 Poetry: Baroque (3)**
- 432 Poetry: Romantic (3)**
- 433 Parnassian and Symbolist Poetry (3)**
- 434 Twentieth-Century Poetry (3)**
- 436 Poetry: Renaissance (3)**
- 454 Nonfiction of the Classic Period (3)**
- 455 Eighteenth-Century Nonfiction (3)**
- 456 Nineteenth-Century Nonfiction (3)**
- 457 Twentieth-Century Nonfiction (3)**
- 461 Seventeenth-Century Drama (3)**
- 462 Eighteenth-Century Drama (3)**
- 463 Nineteenth-Century Drama (3)**
- 464 Twentieth-Century Drama (3)**
- 513 Old French Literature (3)** **Friedman**
Literary backgrounds; reading and discussion of selected texts.
- 514 Middle French Literature (3)** **Friedman**
Literary backgrounds; readings and discussion of selected texts.
- 520 Renaissance Prose: Rabelais (3)**
Seminar on Rabelais: study of his sources, style, and narrative art.
- 521 Studies in Fiction: 1660-1800 (3)** **Hanzeli**
Detailed investigation of the French novel and *conte philosophique* during the period 1680 to 1800. Diderot and his contemporaries, Marivaux, Prévost, Rousseau, Laclos, and Voltaire.

- 524 Studies in Fiction: 1800-1850 (3)**
Detailed investigation of the development of the French novel in the first half of the nineteenth century. Hugo, Balzac, Sand, and others.
- 525 Studies in Fiction: 1850-1900 (3)** **Simpson**
Detailed investigation of the French novel in the second half of the nineteenth century, Flaubert, Zola, Bourget, and others.
- 526 Studies in Fiction: 1900-1950 (3)** **C. Wilson**
Detailed investigation of the French novel in the twentieth century. The works of Proust, Gide, Aymé, Camus, Sartre, and their contemporaries.
- 530 Studies in Renaissance Poetry (3)** **Creore**
- 531 Renaissance Poetry: Ronsard (3)** **Creore**
Historical and critical study of the works of Ronsard.
- 532 Studies in Nineteenth-Century Poetry (3)**
Research in the poetry of the Romantic period. Critical examination of the poetic works of Hugo, Lamartine, and Vigny.
- 533 Studies in Parnassian and Symbolist Poetry (3)** **Nostrand**
Research in the poetry of the Parnassians and Symbolists. Critical examination of the poetry of Leconte de Lisle, Hérédia, Prudhomme, and Baudelaire.
- 534 Studies in Twentieth-Century Poetry (3)**
Research in French poetry of the twentieth century. Critical examination of the poetry of René Char, Valéry, Artaud, Aragon, and others.
- 541, 542, 543 History of the French Language (2,2,2)**
A survey of the phonological, morphological, and syntactical development of the French language from its origins to the present. (Offered alternate years; offered 1963-64.)
- 544 History of the French Language (5)**
A survey of the phonological, morphological, and syntactical developments of the French language from its origins to the present. (Offered Summer Quarter only.)
- 552 Renaissance Prose: Montaigne (3)**
Seminar on the *Essais* of Montaigne. Study of Montaigne's style, ideas, and sources.
- 554 Studies in Seventeenth-Century Nonfiction (3)**
Intensive investigation of critics and essayists of the seventeenth century. Detailed study of La Rochefoucauld, Descartes, Pascal, La Bruyère, and Mme de Sévigné.
- 555 Studies in Eighteenth-Century Nonfiction (3)** **Hanzeli**
Intensive investigation of critics and essayists of the eighteenth century, such as Voltaire, Montesquieu, Rousseau, and Diderot.
- 556 Studies in Nineteenth-Century Nonfiction (3)** **David**
Intensive investigation of critics and essayists of the nineteenth century, such as Madame de Staël, Chateaubriand, Sainte-Beuve, Tocqueville, Comte, Rinan, and Taine.
- 557 Studies in Twentieth-Century Nonfiction (3)** **David**
Intensive investigation of such contemporary critics as Péguy, Maurras, Chartier, Guittion, Thibaudet, Maurier, and Valéry.
- 558 Moral Themes in Twentieth-Century Nonfiction (3)** **David**
Formerly 504.
- 561 Studies in Seventeenth-Century Drama (3)**
Research in the drama of Racine, Corneille, or Molière.
- 562 Studies in Eighteenth-Century Drama (3)** **Hanzeli**
Research in the drama of the eighteenth century as exemplified in the works of Marivaux, Crébillon, Voltaire, La Chaussée, and Diderot.
- 563 Studies in Nineteenth-Century Drama (3)** **Creore**
Research in the drama of the nineteenth century as exemplified in the works of Hugo, Musset, Scribe, Augier, and Dumas fils.
- 564 Studies in Twentieth-Century Drama (3)**
Research in the drama of the twentieth century as exemplified in the works of Brieux, Curel, Lenormand, Anouilh, Montherland, Sartre, Cocteau, Giraudoux, Beckett, and Ionesco.
- 575, 576, 577 Literary Criticism (3,3,3)**
Major philosophies of criticism and their exponents. Influences which affected standards, purposes, and methodologies. 575: nineteenth century; 576: 1900-1935; 577: 1935 to present.
- 580 Explication de Texte (3, maximum 6)** **David**
Close study of short pieces of French prose and poetry. The method consists of a literary analysis of the text from different viewpoints: biographical, historical, etc. Lectures, discussion, and student *explications*.
- 590 Special Seminar and Conference (2-5, maximum 20)**
Group seminars and conferences will be scheduled under this number to meet special needs. For individual conferences under this number, permission of the Chairman of the Department is required.
- 600 Research (2-5, maximum 20)**
- 700 Thesis (*)**

702 Degree Final (6)

Limited to students completing a nonthesis degree program.

ITALIAN**390 Supervised Study (2-5, maximum 20)****421, 422, 423 Survey of Italian Literature (3,3,3)****512, 513, Dante (3,3)****Budel**

Dante and the *Dolce stil nuovo*: *La vita nuova*, *Le rime*. The Dante of the *Divina commedia*. Dante's literary aesthetics: *De vulgari eloquentia*, *Il convivio*.

514 Dante (3)**Budel**

Reading and discussion of the *Divina Commedia*.

531 Literary Problems (2-5, maximum 20)**Budel**

Field (see A-F, below) must be specified in registering. For individual conferences under this number (but not for group projects) permission of the Chairman of the Department is required.

A. Middle ages and fourteenth century

E. Nineteenth century

B. Renaissance

F. Twentieth century

C. Baroque

G. Spanish-Colonial Literature

D. Eighteenth century

H. Latin America

541, 542, 543 History of the Italian Language (2,2,2)

A survey of the phonological, morphological, and syntactical development of the Italian language from its origins to the present.

551, 552, 553 Seminar in Humanist and Renaissance Prose and Poetry (3,3,3)**Budel**

551: Humanism and Early Renaissance: Pulci, Boccaccio, Poliziano, Lorenzo il Magnifico, Boiardo, Sannazaro, Marsilio Ficino, Pico della Mirandola.

552: High Renaissance: Castiglione, Ariosto, Machiavelli, Folengo, Bembo, Trissino.

553: Late Renaissance: Michelangelo, Tasso, Bandello, Pietro Aretino. Renaissance literary theory from Coluccio Salutati to Scaligero.

561, 562, 563 Italian Literature of the Nineteenth and Twentieth Centuries (3,3,3)**Budel****600 Research (2-5, maximum 20)****700 Thesis (*)****702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

PORTUGUESE**390 Supervised Study (2-5, maximum 20)****PROVENÇAL****534 Old Provençal (3)****Simpson**

(Offered when demand is sufficient.)

SPANISH**304 Survey of Spanish Literature: 1140-1498 (5)****305 Survey of Spanish Literature: 1498-1681 (5)****306 Survey of Spanish Literature: 1681 to the Present (5)****390 Supervised Study (2-5, maximum 20)****400 The Structure of Modern Spanish (3)****409 Phonetics, Pronunciation, Intonation (3)****410 Hispanic Poetry: Late Middle Ages to the Sixteenth Century (2)****411 Hispanic Poetry: Seventeenth to the Nineteenth Century (2)****412 Hispanic Poetry: The Twentieth Century (2)****418 Cervantes and Modern Fiction (3)****430 Advanced Conversational Spanish (1-3, maximum 6)**

(Offered Summer Quarter only.)

441, 442, 443 Drama (3,3,3)**451, 452, 453 Spanish Literature Since 1700 (3,3,3)****461, 462, 463 Spanish Literature of the Golden Era (3,3,3)****471, 472, 473 Individual Authors (3, maximum 9 each)****481, 482, 483 Spanish-American Literature (3,3,3)****485 Romanticism, Realism, and Naturalism in Spanish America (3)****486 The Modernista Movement in Spanish-American Literature (3)**

- 487 The Contemporary Spanish-American Novel (3)**
- 500 Seminar in Spanish Linguistics (3)** **Saporta**
Problems in the phonological and grammatical analysis of modern Spanish.
- 511 The Poema de Mio Cid (3)** **Sousa**
- 512 Epic Poetry (3)** **Sousa**
The epic material in old Spanish literature and its later treatment in poetry and drama.
Special investigations and reports.
- 513 The Spanish Ballad (3)**
The origin and evolution of the Spanish ballad.
- 515 The Contemporary Spanish-American Short Story (3)** **Vargas-Baron**
Leading short story writers in Spanish America.
- 521, 522 The Renaissance in Spain (3,3)**
(Offered alternate years; offered 1963-64.)
- 531 Literary Problems (2-5, maximum 20)**
Field (see A-H, below) must be specified in registering. For individual conferences under this number (but not for group projects) permission of the Chairman of the Department is required. Maximum credit to be 5 in any one subdivision.
- | | |
|-----------------------|--------------------------------|
| A. Middle Ages | E. Nineteenth Century |
| B. Renaissance | F. Twentieth Century |
| C. Golden Age | G. Spanish-Colonial Literature |
| D. Eighteenth Century | H. Latin America |
- 541, 542, 543 History of the Spanish Language (2,2,2)**
A survey of the phonological, morphological, and syntactical development of the Spanish language from its origins to the present.
- 544 History of the Spanish Language (5)**
A survey of the phonological, morphological, and syntactical developments of the Spanish language from its origins to the present. (Offered Summer Quarter only).
- 553 The Generation of '98 (3)**
A study of the significance of the works of Unamuno, Machado, Baroja, Azorin and other writers in the light of the theory of generations.
- 561 Latin American Literature from 1910 to the Present (3)** **Vargas-Baron, Sommers**
Study of a generation of novelists, poets, dramatists, and essayists that marks a new stage in the development of Latin American letters.
- 562 Spanish Literature from 1940 to the Present (3)** **Vargas-Baron, Sommers**
- 571 The Modern Essay (3)** **Vargas-Baron**
Leading essayists of Spain and Spanish America.
- 572 Modern Poetry (3)** **Vargas-Baron**
Romanticism and later movements in Spanish and Spanish-American poetry.
- 575 Hispanic Literary Criticism (3)**
A study of the doctrinal foundations of the critique of such great critics as Menéndez Pelayo, Dámaso Alonso, Alfonso Reyes, Pedro Henriquez Ureña, etc.
- 600 Research (2-5, maximum 20)**
- 700 Thesis (*)**
- 702 Degree Final (6)**
Limited to students completing a nonthesis degree program.

COURSES IN ENGLISH TRANSLATION

Recommended as appropriate minor or supporting studies for students majoring in other departments. Courses in English translation are not applicable toward undergraduate or graduate majors in the Department of Romance Languages and Literature.

FRENCH

- 416 Rabelais and Montaigne in English (3)**
- 417 Racine and Moliere in English (3)**
- 418 Literature of the Enlightenment in English (3)** **Hanzoli**
Voltaire, Rousseau, Diderot
- 419 Nineteenth-Century Novel in English (3)**
- 420 Twentieth-Century Fiction in English (3)**

ITALIAN

- 318 Italian Literature in English (5)** **Budel**
- 384 Renaissance Literature of Italy in English (2)** **Budel**
- 481, 482 Dante in English (2,2)** **Budel**

ROMANCE LITERATURE

460 The Literature of the Renaissance in English (5)

SPANISH

315 Latin-American Authors in English (5)

Vargas-Baron

345 Spanish Literature of the Renaissance in English (3)

420 Contemporary Spanish Essay and Drama in English (3)

SCANDINAVIAN LANGUAGES AND LITERATURE

Chairman and Graduate Program Adviser: **SVERRE ARESTAD**, 215 Denny Hall

The Department of Scandinavian Languages and Literature offers courses leading to the degree of Master of Arts. To meet the language requirement for this degree, French or German is recommended. Twenty of the total credits earned must be in courses numbered 500 and above.

COURSES**DANISH**

490 Supervised Reading (*, maximum 5)

Arestad

NORWEGIAN

450 History of Norwegian Literature (3)

Arestad

490 Supervised Reading (*, maximum 5)

Arestad

SCANDINAVIAN LITERATURE

500, 501, 502 Old Icelandic (2,2,2)

506 Ibsen's Early Plays (3)

Arestad

507 Ibsen's Later Plays (3)

Arestad

508 Nineteenth-Century Danish-Norwegian Novel (3)

Arestad

509 Twentieth-Century Danish-Norwegian Novel (3)

Arestad

510, 511, 512 Strindberg (3,3,3)

Johnson

515 Modern Danish and Norwegian Poetry (3)

Arestad

516 Modern Danish and Norwegian Drama (3)

Arestad

517 Modern Swedish Poetry (3)

Johnson

518 The Swedish Novel (3)

Johnson

519 Recent Swedish Drama (3)
Formerly 409.

700 Thesis (*)

SWEDISH

450 History of Swedish Literature (3)

Johnson

455 History of the Swedish Language (3)

Johnson

490 Supervised Reading (*, maximum 12)

Johnson

COURSES IN ENGLISH

480 Ibsen and His Major Plays in English (2)

Arestad

481 Strindberg and His Major Plays in English (2)

Johnson

SOCIOLOGY

Chairman: **ROBERT E. L. FARIS**, 202 Guthrie Hall

Graduate Program Adviser: **E. A. T. BARTH**, 204B Guthrie Hall

The Department of Sociology offers courses leading to the degrees of Master of Arts and Doctor of Philosophy.

All graduate students must complete undergraduate requirements for a major in sociology. Students whose undergraduate work in sociology seems inadequate may be required to pass a qualifying examination before being admitted to graduate courses.

Requirements for both advanced degrees include work in some of these fields of specialization: sociological theory; research methods and social statistics; ecology and demography; social interaction; social institutions; social organization; and social disorganization.

MASTER OF ARTS. Students must complete an approved program in advanced sociology courses and a minor in a related field or a program of related courses. At least 9 of the sociology credits must be in courses numbered 500 and above. A reading knowledge of a foreign language is required. Students must take a Final Examination in two fields of sociology and a separate examination in the minor given by the department in which the minor courses are taken. The master's thesis must be submitted seven weeks before the degree is to be granted.

DOCTOR OF PHILOSOPHY. Students in the doctoral program must complete a program of courses approved by the Graduate Program Adviser for the Department. Half of the credits, including the dissertation, must be in courses numbered 500 and above. The residence requirement is three years, two of them at the University of Washington. One of the two years must be spent in continuous full-time residence.

A reading knowledge of two foreign languages is required.

A completed dissertation must be submitted seven weeks before the degree is conferred.

A written General Examination will cover four fields of specialization, one of which must be research methods and social statistics. A minor sequence or a program of related courses in addition to the fields, is also required.

An oral Final Examination is given on the completion of all requirements, including the dissertation.

COURSES

310 General Sociology (5)	Larson
331 Population Problems (5)	Watson
352 The Family (5)	Barth
362 Race Relations (5)	Barth, Noel
365 Urban Community (5)	Cohen
371 Criminology (5)	Schrag
389 Reading in Selected Fields (2-5, maximum 15)	
410 History of Sociological Thought (5)	Catton
411, 412, 413 Systematic Sociology (3,3,3)	Dodd
414 Sociological Theory (5)	Schrag
415 Theory of Social Organization (5)	Wager
420 Methods of Sociological Research (5)	Faris
421 Methodology: Case Studies and Interviewing (3)	Larson
423 Advanced Social Statistics (5)	Costner
425J Graphic Techniques in the Social Sciences (5) Offered jointly with the Department of Geography.	Schmid
426 Methodology: Quantitative Techniques in Sociology (3)	Costner
427 Statistical Classification and Measurement (3)	Costner
428-429 Sampling and Experimentation (3-3)	Costner
430 Human Ecology (5)	Cohen, Schmid
440 Primary Interaction and Personal Behavior (5)	Faris
442 Public Opinion (3)	Larson
443 Mass Communication (5)	Larson

- 445 Social Movements (3) Miyamoto
- 447 Social Control (5) Wheeler
- 448 Sociometric Analysis and Group Structure (5) Schrag
- 450 Contemporary American Institutions (5) Wager
- 451 Social Change and Trends (5) Catton
- 453 Social Factors of Marriage (3) Leik
- 455 Housing in the American Community (3) Cohen
- 458 Institutional Forms and Processes (5) Faris
- 459 Comparative Social Systems: Latin America (3) Hayner
- 460 Social Differentiation (5) Barth
- 463 American Negro Community (3) Barth
- 466 Industrial Sociology (5) Wager
- 467 Industry and the Community (3) Wager
- 468 Sociology of Occupations and Professions (5) Wager
- 472 Juvenile Delinquency (5) Hayner, Chambliss, Costner
- 473 Corrections (5) Hayner, Schrag
- 474 Probation and Parole (3) Hayner
- 475 Problems in the Administration of Correctional Programs (3) Schrag
- N510, N511, N512 Departmental Seminar (0,0,0)
Monthly meetings with reports on independent research by graduate students and staff members.
- 521, 522, 523 Seminar in Methods of Sociological Research (3,3,3) Wheeler
Prerequisites, 223, 414, and 420, or equivalents.
- 528 Seminar in Selected Statistical Problems in Social Research (3) Costner
Prerequisite, 426.
- 530 Advanced Human Ecology (3) Schmid
Prerequisites, 230 or 430, and 15 credits in social science.
- 531 Demography (3) Schmid
Research problems in population and vital statistics. Prerequisites, 331, and 15 credits in social science or permission.
- 540, 541 Seminar in Social Interaction (3,3) Miyamoto
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 or equivalent.
- 542 Seminar on Small Group Research (3) Leik
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. Formerly 541. Prerequisite, permission.
- 543 Communications Seminar (3) Larson
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.
- 550, 551, 552 Marriage and the Family (3,3,3) Leik
Analysis of marriage and family patterns and problems, with initial emphasis on research findings and methods. Individual research on selected projects. Prerequisite, 352 or equivalent.
- 566, 567 Industrial Sociology Seminar (3,3) Wager
Research training in industrial sociology. Readings and field projects. Prerequisite, 466 or equivalent.
- 571 Correctional Communities (3) Hayner
Prerequisites, 371 and 473, or equivalent.
- 572 Analysis of Criminal Careers (3) Hayner
Personal and social factors in criminal maturation and reformation. Prerequisites, 371 and 473, or equivalent.
- 573 Crime Prevention (3) Hayner
Prerequisites, 371 and 472, or equivalent.
- 574 Seminar in Methods of Criminological Research (3) Schrag
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. Prerequisite, permission.
- 599 Reading in Selected Fields (2-5, maximum 15)
Open only to qualified graduate students by permission.

600 Research (2-5)

Original field projects carefully planned and adequately reported. Certain projects can be carried on in connection with the Public Opinion Laboratory or the Office of Population Research. Open only to qualified graduate students by permission.

700 Thesis (*)

SPEECH

Acting Chairman: OLIVER W. NELSON, 209 Parrington Hall

**Graduate Program Adviser, General Speech: HORACE RAHSKOPF,
209 Parrington Hall**

**Graduate Program Adviser, Speech and Hearing Therapy:
JAMES A. CARRELL, 1320 N.E. Campus Parkway**

The Department of Speech offers courses leading to the degrees of Master of Arts and Doctor of Philosophy.

Students who undertake advanced study of speech usually have college teaching or clinical work in speech and hearing therapy as their goals, although they may be planning to enter other professions in which a high degree of competence in and understanding of oral communication are essential. As a rule, students working for graduate degrees will be expected to present an undergraduate background of not less than 35 quarter credits of approved courses in speech, although in certain individual cases where preparation is strong in areas closely related to speech, part or all of this requirement may be waived. In general, however, it is expected that a student's undergraduate preparation will constitute a broad orientation in the speech field. When this is not the case, the Department may require certain speech courses outside the area of specialization, either as additional undergraduate training or as part of the graduate program. In all cases, the undergraduate preparation will be reviewed by the Graduate Program Adviser and be subject to approval by the Graduate Studies Committee of the Department. Details regarding these and other requirements are presented in a special brochure provided by the Department.

MASTER OF ARTS. Students for this degree must complete 36 credits of approved course work of which 12 credits should be in a minor or supporting courses from closely related areas. Thesis research may be in any subdivision of the field.

DOCTOR OF PHILOSOPHY. Two major areas of concentration are available: public address and rhetoric, including argumentation and discussion; and speech correction and hearing, including experimental phonetics.

COURSES

VOICE AND PHONETICS

- | | |
|--|----------------|
| 310 Voice Science (5) | Tiffany |
| 411 Anatomy of the Vocal Organs and Ear (5) | Palmer |
| 415 Advanced Voice and Phonetics (5) | Tiffany |
| 510 Experimental Phonetics (3) | Tiffany |
| Application of experimental methods to research in voice and phonetics; critical review of research literature. (Offered alternate years; offered 1964-65.) Prerequisite, 415 or permission. | |

RHETORIC AND PUBLIC ADDRESS

- | | |
|--|--------------------|
| 320 Public Speaking (5) | Franzke |
| 420 Advanced Public Speaking (5) | Baskerville |
| 421 Persuasion (3) | Pence |
| 425, 426 American Public Address (5,5) | Baskerville |
| (Offered alternate years; 425 offered 1964-65; 426 offered 1963-64.) | |
| 428 British Public Address (5) | Strother |
| (Offered alternate years; offered 1963-64.) | |

- 521 Studies in Greek and Roman Rhetoric (5)** **Rahskopf**
Critical analysis of writings on rhetoric by Plato, Aristotle, Cicero, Quintilian, and others.
- 522 Studies in Medieval and Renaissance Rhetoric (5)** **LaRusso**
A critical analysis of selected persons, works, and topics related to the development of rhetorical theory during the Middle Ages and the Renaissance. (Offered alternate years; offered 1963-64.) Prerequisite, 521.
- 523 Studies in Modern Rhetoric (5)** **Pence**
Critical analysis of writings on rhetoric by Cox, Wilson, Bacon, Campbell, Blair, Whately, and others. (Offered alternate years; offered 1964-65.) Not open to students who received credit for 522 prior to Spring, 1957.
- 524 Studies in Contemporary Rhetoric (3)** **Nilson**
Critical analysis of recent developments in and contributions to rhetorical thought. (Offered alternate years; offered 1963-64.) Prerequisite, graduate standing or permission.
- 525 Rhetorical Criticism (3)** **Baskerville**
The history and method of rhetorical criticism. Application of critical standards to notable British and American speeches. Prerequisite, 425, 426, or 428.
- 530 Experimental Problems in Public Address (3-5)** **Pence**
Analysis of theoretical considerations in audience and listening behavior; application of measurement techniques. (Offered alternate years; offered 1963-64.) Prerequisite, permission.

ARGUMENT AND DISCUSSION

- 332 Principles of Group Discussion (5)** **Crowell, Nilson**
- 335 Methods of Debate (3)** **Strother**
Prerequisite, 220 or 230, or permission.
- 432 Problems of Discussion Leadership (3)** **Crowell**
- 436 Methods of Public Discussion (5)** **Franzke**

ORAL INTERPRETATION OF LITERATURE

- 340 Oral Interpretation of Prose (3)** **Grimes**
- 345 Choral Speaking (3)** **Grimes**
(Offered alternate years; offered 1964-65.)
- 440 Oral Interpretation of Poetry (3)** **Grimes**
- 540 Studies in Oral Interpretation (3)** **Grimes**
Critical analysis of writings by Sheridan, Walker, Rush, Delsarte, Bell, Curry, Emerson, and others. (Offered alternate years; offered 1963-64.) Prerequisite, 440.

TEACHING OF SPEECH

- 359 Speech in the Classroom (3)** **Nelson**
- 457 Debate and Discussion Problems in High School and College (2½)**
(Offered Summer Quarter only.)
- 550 Studies in Speech Education (3)** **Nelson**
Philosophical, curricular, and methodological problems of speech instruction. (Offered alternate years; offered 1964-65.)

RADIO-TV SPEECH

- 361 Advanced Radio-TV Speech (3)** **Bird**

SPEECH CORRECTION

- 370, 371 Speech Correction (3 or 5,5)** **Carroll**
Formerly 470, 471.
- 373 Diagnostic Methods in Speech Correction (5)** **Wingate**
Formerly 473.
- 374 Clinical Practice in Speech Correction (1-5, maximum 15)** **Palmer**
Formerly 474.
- 475 Stuttering (2)** **Wingate**
- 476 Language Development of the Child (3)** **Wingate**
(Offered alternate years; offered 1964-65.)
- 478 Interview Techniques for Speech and Hearing Rehabilitation (3)** **Wingate**
(Offered alternate years; offered 1963-64.)
- 479J Physical Medicine and Rehabilitation Information for Speech Pathology (3)** **Morse**
Offered jointly with the Department of Physical Medicine and Rehabilitation.
- 570, 571, 572, 573 Organic Disorders of Speech (3,3,3,3)** **Carroll**
Etiology, diagnosis, and therapy. 570: morphogenic disorders, especially cleft palate and dental malocclusions. Not open to students who took 574 prior to Autumn, 1956. (Offered

alternate years; offered 1964-65.) 571: dysarthria, especially cerebral palsy. (Offered alternate years; offered 1963-64.) 572: aphasia. (Offered alternate years; offered 1964-65.) 573: pathologic disorders of voice. (Offered alternate years; offered 1963-64.) Prerequisite for each course, 371 or permission.

- 574 Advanced Clinical Practice in Speech Correction (1-5, maximum 10)** Palmer
Prerequisite, 374.
- 575 Stuttering Therapy (3)** Wingate
(Offered alternate years; offered 1964-65.) Prerequisite, 475 or permission.
- 578 Psychogenic Factors in Speech and Hearing Disorders (2)** Wingate
Psychogenic factors as etiological agents in speech and hearing disorders. (Offered alternate years; offered 1963-64.) Prerequisite, Psychology 305 or permission.

HEARING

- 480 Introduction to Audiology (3 or 5)** Hanley
- 481, 482 Principles and Methods of Aural Rehabilitation (5,5)** Palmer
- 484 Clinical Practice in Aural Rehabilitation (1-5, maximum 15)** Hanley
- 485 Medical Background for Audiology (2)**
(Offered alternate years; offered 1964-65.)
- 487 Audiometry (3)** Hanley
- 488 Hearing Aid Evaluation and Selection (2)** Hanley
(Offered alternate years; offered 1964-65.)
- 580 Advanced Audiology (5)** Hanley
Methods, techniques, and instruments used in the measurement of auditory function. Review of research literature. (Offered alternate years; offered 1964-65.) Prerequisite, 480 or permission.
- 584 Advanced Clinical Practice in Aural Rehabilitation (1-5, maximum 10)** Hanley
Prerequisite, 484.
- 587 Advanced Audiometry (2)** Hanley
Special diagnostic and predictive tests of auditory function; clinical practice. (Offered alternate years; offered 1963-64.) Prerequisite, 487.
- 588 Advanced Audiometry (2)** Hanley
Course in clinical diagnostic procedures involved in threshold finding, pre-surgical and surgical audiometry and electroencephalographic audiometry. (Offered alternate years; offered 1964-65.) Prerequisite, 487.
- 589 Advanced Audiometry (2)** Hanley
Clinical procedures utilized in the measurement of auditory recruitment and aural overload. Special attention will be placed on the Rainville masking technique. (Offered alternate years; offered 1963-64.) Prerequisite, 487.

GENERAL

- 400 Backgrounds in Speech (3)** Rahskopf
- N500 Department Seminar (0)**
Reports of research by graduate students and staff members.
- 501 Introduction to Graduate Study in Speech (3)** Crowell
- 600 Research (*)**
- 700 Thesis (*)**

SEMINARS

- 590 Seminar in Theory of Speech (2, maximum 6)** Rahskopf
(Offered 1964-65.) Prerequisite, 400 or permission.
- 591 Seminar in Voice and Phonetics (2, maximum 6)** Tiffany
(Offered 1963-64.) Prerequisite, permission.
- 592 Seminar in Rhetoric and Public Address (2, maximum 6)**
(Offered 1963-64.) Prerequisite, permission.
- 593 Seminar in Argument and Discussion (2, maximum 6)**
(Offered 1963-64.) Prerequisite, permission.
- 594 Seminar in Oral Interpretation (2, maximum 6)** Grimes
(Offered 1964-65.) Prerequisite, permission.
- 595 Seminar in the Teaching of Speech (2, maximum 6)** Nelson
(Offered 1963-64.) Prerequisite, permission.
- 597 Seminar in Speech Correction (2, maximum 6)**
(Offered 1964-65.) Prerequisite, permission.
- 598 Seminar in Hearing (2, maximum 6)**
(Offered 1964-65.) Prerequisite, permission.

ZOOLOGY

**Chairman and Graduate Program Adviser: AUBREY GORBMAN,
225 Johnson Hall**

The Department of Zoology offers courses of study leading to the degrees of Master of Science and Doctor of Philosophy. Students seeking an advanced degree must be accepted for research supervision by a member of the staff. A choice of supervisor need not be made immediately, but will not ordinarily be delayed into the second year of graduate work. A program of course work for each student will be developed under the direction of his supervisor and a faculty committee. Students are encouraged to complete the written General Examination in five basic fields: comparative anatomy, embryology, general physiology, genetics, and invertebrate zoology during the first two years of residence.

COURSES

BIOLOGY

- | | |
|--|------------|
| 401 Cytology (3) | Hsu |
| 401L Cytology Laboratory (2) | Hsu |
| 451 Genetics (3) | Roman |
| 451L Genetics Laboratory (2) | Roman |
| 452 Cytogenetics (3) | Roman |
| 452L Cytogenetics Laboratory (2) | Roman |
| 453 Topics in Genetics (2, maximum 6) | Roman |
| 454 Evolutionary Mechanisms (3) | Kruckeberg |
| 472 Principles of Ecology (3) | Edmondson |
| 472L Ecology Laboratory (2) | Edmondson |
| 473 Limnology (5) | Edmondson |
| 501 Advanced Cytology (5) | Hsu |
| Detailed study of structure and function of the cell. | |
| 508 Cellular Physiology (3) | Whiteley |
| Cell membrane and permeability, cytoplasmic physiology, intracellular energetics and biosynthesis, physiology of cell division, cell movement. (Offered alternate years; offered 1964-65.) Prerequisite, 400 or permission of instructor. | |
| 508L Cellular Physiology Laboratory (2) | Whiteley |
| Prerequisites, concurrent registration in 508 or 509, and permission of instructor. | |
| 509 Cellular Physiology (3) | Whiteley |
| Chemistry and physiology of the interkinetic and dividing nucleus, nucleocytoplasmic interactions, physiology of differentiated cells. (Offered alternate years; offered 1963-64.) (508 and 509 may be elected separately or in either sequence.) Prerequisite, 400 or permission of instructor. | |
| 573 Topics in Limnology (3) | Edmondson |
| Readings in the literature of limnology, with detailed discussion of modern problems. May be repeated for credit. Prerequisite, permission of instructor. | |

ZOOLOGY

- | | |
|---|------------|
| 330 Natural History of Marine Invertebrates (5) | |
| 362 Natural History of Vertebrates (5) | Snyder |
| (Offered alternate years; offered 1964-65.) | |
| 381 Microtechnique (4) | Hsu |
| 400 General Physiology (5) | Florey |
| 402 History of Zoology (3) | Hatch |
| 403 Comparative Vertebrate Histology (5) | |
| 409 Ethology (3) | Orians |
| 409L Ethology Laboratory (2) | Orians |
| 423 Protozoology (5) | Osterud |
| 432 Marine Invertebrate Zoology (8) | |
| (Offered at Friday Harbor Summer Quarter only.) | |
| 433, 434 Invertebrate Zoology (5,5) | Illg, Kohn |

- 435 Parasitology (5)** Osterud
- 444 Entomology (5)** Hatch
- 453-454 Comparative Anatomy of Chordates (5-5)** Snyder
- 456 Vertebrate Embryology (5)** Haggis
- 457 Experimental Morphogenesis (3)** Fernald
- 457L Experimental Morphogenesis Laboratory (2)** Fernald
- 458 Vertebrate Physiology (6)** Martin
- 462 Vertebrate Systematics and Life Histories (5)** Orians, Snyder
(Offered alternate years; offered 1963-64.)
- 464 Natural History of Birds (Ornithology) (5)** Richardson
(Alternates with 465)
- 465 Natural History of Mammals (5)**
(Alternates with 464)
- 498 Special Problems in Zoology (1-5, maximum 15)**
- 503 Developmental Cytology (3)** Cloney
Discussion of fine structure of selected adult cells and tissues; analysis of changes in structure of vertebrate and invertebrate embryonic and larval tissues during development and differentiation. Prerequisite, permission of instructor.
- 506 Topics in Experimental Embryology (2, maximum 6)**
Seminars and discussions of aspects of growth of special current interest.
- 516 Chemical Embryology (3)** Whiteley
Cytochemistry of oöplasmic segregation, specificity in growth and development, cellular interactions in development, control mechanisms in development. (Offered alternate years; offered 1964-65.) Prerequisite, permission of instructor.
- 516L Chemical Embryology Laboratory (2)** Whiteley
Must be accompanied by 516.
- 517 Chemical Embryology (3)** Whiteley
Sex determination, gametogenesis, sperm metabolism, physiology of fertilization, mechanics of cleavage, energetics of development. (Offered alternate years; offered 1963-64.) Prerequisite, permission of instructor.
- 517L Chemical Embryology Laboratory (2)** Whiteley
Must be accompanied by 517.
- 520, 521, 522 Seminar (1,1,1)**
- 533 Advanced Invertebrate Zoology (6)**
The rich and varied invertebrate fauna of the San Juan Archipelago is studied, emphasizing systematics and ecology, with opportunity for developing individual research problems. (Offered at Friday Harbor Summer Quarter only.) Prerequisite, 10 credits in invertebrate zoology or equivalent.
- 534 Topics in Advanced Invertebrate Zoology (3, maximum 15)**
Advanced considerations in morphology, ecology, phylogeny of invertebrates; emphasizing current developments. Prerequisites, 434 or equivalent, and permission of instructor.
- 536 Advanced Invertebrate Embryology (6)**
Morphological and experimental studies of development of selected types of marine invertebrates. (Offered at Friday Harbor Summer Quarter only.) Prerequisites, 433, 434, and 456.
- 537 Comparative Invertebrate Physiology (3)** Florey
Selected chapters of comparative physiology of nerve, muscle, circulation, respiration, renal function, and hormone action. Prerequisites, 400 and 434.
- 537L Comparative Invertebrate Physiology Laboratory (2)** Florey
Exercises in kymographic, oscilloscopic and other recording of mechanical, electrical, and metabolic phenomena of invertebrate organ function. Must be accompanied by 537. Prerequisite, permission of instructor.
- 538 Advanced Invertebrate Physiology (6)**
Comparative physiology of muscle and nervous systems, selected topics in the physiology of osmoregulation, respiration, circulation, chromatophore regulation, metabolism, and nutrition. (Offered at Friday Harbor Summer Quarter only.) Prerequisite, chemistry through organic, physics, and 10 credits in invertebrate zoology or equivalent.
- 554 Advanced Vertebrate Morphology (3)** Snyder
Current problems and trends in vertebrate anatomy emphasizing functional relationships. Prerequisites, -454, 456, and permission of instructor.
- 558 Comparative Vertebrate Physiology (6)** Martin
Advanced studies with particular reference to cold-blooded vertebrates and to birds. Prerequisite, 458 or equivalent.
- 572 Topics in Ecology (2 or 3)**
Graduate seminar on modern problems in ecology. Prerequisites, Biology 472 or equivalent, and permission of instructor.

- 574 Ecology of Marine Communities (3)** **Paine**
Density and distribution of marine populations treated quantitatively and from the standpoint of community energetics. Community organization with emphasis on trophic interactions and stability. Prerequisites, Biology 472 or equivalent, and permission of instructor.
- 578 Advanced Ecology (5)** **Orians**
Analysis of ecosystems, fundamental properties of populations, problems of environmental utilizations, population regulation, community sampling. Prerequisite, Biology 472 or permission of instructor.
- 581 Systematic Zoology (5)** **Illg**
History, principles and procedures of zoological taxonomy; review of biological bases of phylogeny; history and principles of zoological nomenclature. Prerequisite, permission of instructor.
- 583 Advanced Techniques in Microscopy (5)** **Cloney**
Theory and use of light and electron microscopes; modern techniques of specimen preparation for morphological studies; photomicrography. Each student required to investigate a special problem. Prerequisite, permission of instructor.
- 598 Seminar in General and Comparative Physiology (2)** **Flørey**
Study and discussion of classical and current literature in the field of general and comparative physiology. Prerequisites, 400, 433, 434, and permission of instructor.
- 600 Research (*)**
- 700 Thesis (*)**

COLLEGE OF BUSINESS ADMINISTRATION

Dean: **AUSTIN GRIMSHAW**, 115 Mackenzie Hall

Graduate Program Advisor: **KERMIT O. HANSON**, 104 Mackenzie Hall

The College of Business Administration offers courses leading to the degrees of Master of Business Administration, Master of Arts, and Doctor of Business Administration. Graduate training is given in these areas of concentration:

Accounting
Business and Its Environment
Business Statistics:
 Quantitative Analysis
Finance
International Business
Marketing

Personnel and Industrial Relations
Policy and Administration
Production
Real Estate
Risk and Insurance
Transportation

The above areas shall not be held to exclude others which may be appropriate in special instances. There is no foreign language requirement for the M.B.A. and D.B.A. degrees.

Students seeking advanced degrees in business administration must first file an application for admission to the Graduate School. The Admissions Office evaluates the application and then forwards it to the College of Business Administration for approval.

Applicants also should submit their scores on the Admission Test for Graduate Study in Business. Inquiries concerning this test should be addressed to the Educational Testing Service, 20 Nassau Street, Princeton, New Jersey, or 4640 Hollywood Boulevard, Los Angeles 27, California.

MASTER'S DEGREES

Graduate standing is granted applicants who are graduates of accredited colleges and universities, with a cumulative grade-point average of 3.00 (B) or higher. Students who do not meet this requirement may be admitted (1) if they have a grade-point average of 3.25 or higher during their senior year; (2) if they rank in the upper third of their collegiate graduating class; or (3) if they have achieved a high score on the Admission Test for Graduate Study in Business.

Up to 9 graduate credits taken while a student in the graduate school of another accredited institution may be applied toward a master's degree. All work for a

master's degree (including transfer credits) must be completed within six years.

Two options are offered in the master's degree programs—the Master of Business Administration (M.B.A.) and the Master of Arts (M.A.) in the business field.

MASTER OF BUSINESS ADMINISTRATION. The M.B.A. program is designed for students who are preparing for professional careers in business management. The broad objective is to help the student develop the analytical tools and understanding of business administration which would be of continuing value throughout his career.

The program has been designed for students who hold bachelor's degrees in business administration and also for students who hold bachelor's degrees in arts and sciences, engineering, and other areas of study. Students with adequate preparation in business administration and economics subjects may expect to complete the program in a minimum of four quarters (one calendar year). A period of two academic years (six quarters) is required for students who have had no undergraduate courses in business administration; this period may be reduced for students with some undergraduate work in business.

The program consists of Core I courses for students who do not have a bachelor's degree in business, Core II courses for all students, a concentration area of study, and a substantial number of elective credits. These requirements are set forth in more detail below:

Core I		Credits
Acctg. 500	Managerial Accounting	5
B. and I. E. 500	Business Economics and Forecasting	5
Bus. Stat. 500	Business Statistics	3
Fin. 500	Business Finance	5
Hum. Rel. 500	Human Relations—Organizational Behavior	3
Mktg. 500	Marketing Fundamentals	2
Mktg. 501	Marketing Management	3
Prod. 500	Production Management	3
Total Core I Credits.....		29

Core II		
Acctg. 592	Seminar in Administrative Controls.....	3
B. and I. E. 510	Business and Public Policy.....	3
Bus. Stat. 510	Quantitative Methods	3
Pol. and Ad. 550	Organization and Management	3
Pol. and Ad. 593	Policy Determination and Administration	3
Gen. Bus. 571-572	Research in Business.....	6

Area of Concentration

Selected from any of the areas of graduate study listed in the introductory paragraph; if the area selected is represented in Core II, credits earned therein are included in the total credits for the area.....6-12

Electives

Limited to a maximum of 6 credits in any area.....18-12
Total Advanced Credits45*

Total Credits for Two-Year Program (A minimum of 36 credits must be earned in courses numbered above 501.)74*

* Only 45 credits are required for students for whom Core I requirements have been waived. Waiver for specific course requirements in Core I also may be granted to students who have completed equivalent courses. Credits earned in Core I courses may not be applied toward satisfaction of the minimum 45 credit requirement.

In addition to these course requirements, students will be required to pass a written examination during their final quarter of residence. The first part of the examination will be on Cores I and II and the second part will be on the area of concentration.

Those entering students who have not previously satisfied Core I requirements should plan to commence their programs during Autumn Quarter.

MASTER OF ARTS. The M.A. program is designed for students who desire greater specialization than is possible under the M.B.A. program. Students electing the M.A. program usually have an objective other than preparation for a career as a professional manager; some are interested in becoming technical business specialists, some are interested in research careers, and others are interested in teaching careers in a limited subject area.

Students who lack undergraduate preparation in business administration normally will be required to complete the Core I courses in the M.B.A. program. All students in the M.A. program must complete a minimum of 36 credits, including thesis credits, beyond Core I courses. A minimum of 15 credits, exclusive of the 9 credits for thesis, must be earned in the major field. A minor may be taken in the College of Business Administration or elsewhere; a minimum of 9 credits is required in the minor field. If the minor is elected outside the College, requirements of the department offering the minor must be met.

A minimum of 18 credits exclusive of thesis must be earned in courses numbered above 501. Remaining course credits may be in approved upper-division courses for graduate credit.

The student also is required to have a reading knowledge of an acceptable foreign language, as determined by examination.

MINOR IN BUSINESS ADMINISTRATION. Students working for a master's degree in other colleges who elect a minor in the College of Business Administration must have as a background 15 credits in acceptable courses in business administration. The student must earn a minimum of 15 credits in approved upper-division and graduate courses in one field of business administration.

DOCTOR OF BUSINESS ADMINISTRATION

A requirement for consideration for the D.B.A. program is a grade-point average of at least 3.25 during the preceding year of graduate study. Applications for admission to the D.B.A. program must be accompanied by three letters of recommendation, at least two of which must come from former instructors.

Requirements of Study. The D.B.A. program is designed to further advanced study in business administration for persons preparing for careers in teaching, business, and government; since the inception of the program, the majority of D.B.A. graduates have entered university teaching careers. Students who complete this program are expected to possess the professional administrative competency which is the objective of the M.B.A. program, and they are required to demonstrate academic competence in four areas of study, at least three of which must be in the College of Business Administration. Hence, the objective of the D.B.A. program is to provide breadth of training in the integrative processes involved in administrative planning and control, concurrently with subject area specialization which will enable a graduate to participate actively in advancing the frontiers of knowledge both in teaching and research in his primary areas. Students must select business and its environment, or economics, as one of their four areas of study. In addition, the candidate must show evidence of competency in business research and a knowledge of economics pertinent to his areas.

The residence requirement for the doctor's degree is three years, two of which must be at the University. Since one of the two years must be spent in continuous full-time residence (three out of four consecutive quarters), the residence requirement for the doctor's degree cannot be met solely with summer study. All work

for the D.B.A. degree must be completed within ten years. (This includes applicable work which may be transferred from other institutions.) There is no foreign language requirement for the D.B.A. degree.

Admission to Candidacy. At the end of the student's two years of graduate study as approved by his Supervisory Committee, the chairman of the committee may present to the Dean of the Graduate School for approval a warrant permitting the student to take the General Examinations for admission to candidacy. The General Examinations consist of written and oral parts in all of the student's areas. Written examinations are scheduled by the Graduate Study Committee; students may sit for all written examinations in a single quarter, or they may sit for individual area examinations as scheduled during three consecutive academic quarters. The oral examination is taken after all written examinations have been passed.

No student is regarded by the Graduate School as a candidate for the doctor's degree until after the warrant certifying the successful completion of the General Examinations has been filed with the Graduate School Office by the chairman of his Supervisory Committee. After his admission to candidacy, the student ordinarily devotes his time to the completion of his research work to be embodied in the dissertation and to preparation for his Final Examination.

Dissertation and Final Examination. The candidate's dissertation must represent original and independent investigation. It should reflect not only his mastery of research techniques but also his ability to select an important problem for investigation and to deal with it competently. Instructions for the preparation of the dissertation in acceptable form may be obtained at the Graduate School Office.

The Final Examination is oral and will normally be taken not less than two quarters after the General Examination. It is primarily on the dissertation and its field, and will not be given until after the dissertation has been accepted.

COURSES

ACCOUNTING

311 Cost Accounting (3)

321 Equity Accounting (3)

331 Income Determination Accounting (5)

344 Introduction to Electronic Data Processing (3)

411 Auditing Standards and Principles (3)

421 Federal Income Tax (5)

440 Accounting Systems (3)

444J Applications of Digital Computers (3)
Offered jointly with Business Statistics.

450 Special Tax Problems (3)

460 Advanced Cost Accounting (3)

470 Case Studies in Auditing (5)

475 Administrative Controls (3)

480 Fund Accounting (3)

485 Consolidated Financial Statements (3)

486 Fiduciary Accounting (2)

490 Advanced Problems (3)

495 Advanced Accounting Theory (3)

500 Managerial Accounting (5)

Covers concepts and procedures for presentation of data for managerial and financial decisions. Income determination, cost analysis, cash flow, and analytical reports. Interpretation, use, limitations of accounting reports. Prerequisite, permission.

520 Seminar in Financial Accounting (3)

A critical examination of accounting theories, concepts, and standards pertaining to current assets and liabilities and relevant income determination problems. Prerequisites, 321, 331 and permission.

521 Seminar in Financial Accounting (3)

A critical examination of accounting theories, concepts, and standards pertaining to noncurrent balance sheet items and relevant income determination problems. Prerequisites, 321, 331, and permission.

522 Seminar in Cost Accounting (3)

Critical examination of theories of managerial accounting. Differentiation of objectives of managerial and financial accounting, joint costs, absorption costing, direct costing, standard costing, distribution costing, techniques of analysis of cost data, including differential cost analysis. Prerequisites, 460 and permission.

592 Seminar in Administrative Controls (3)

The use of accounting and statistics by management in the exercise of its planning and controlling functions; e.g., forecasting, budgets, standard costs, analysis of cost variations. Controllership as a function in the business enterprise. Prerequisites, 230 and permission.

604 Research (*, maximum 10)

Prerequisite, permission.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

BUSINESS AND ITS ENVIRONMENT**500 Business Economics and Forecasting (5)**

Factors underlying the determination of cost and prices for the industry and the firm; forecasting at the level of the industry and the firm. Prerequisite, permission.

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.

552 Legal Aspects of Business Regulation (3)

Examination, from the administrative point of view, of advanced legal problems bearing directly upon top management's decisions concerning basic operating policy. Prerequisite, permission.

562 Responsibilities of Business Leadership (3)

Social responsibilities of business in relation to changing social forces. Relationships between business and consumers, government, labor, and agriculture. Problems of business ethics. Prerequisite, permission.

590 Business History (3)

Evolution of business institutions with special emphasis upon changing administrative policy, business organization, and methods in the American environment from the colonial period to the present. Prerequisite, permission.

593 Seminar in Business Fluctuations (3)

Business problems arising from fluctuations in prices and demand; analysis of static causes and effects of business policy on fluctuations; methods of adjustment by the firm; appraisal of corrective measures internal and external to business. Prerequisite, permission.

594 Seminar in Business Forecasting (3)

Problems of business forecasting and their setting; study and appraisal of forecasting methods in current use by corporations, advisory services and governmental agencies; review of actual cases and experience; techniques of preparing forecasts for the individual firm. Prerequisite, permission.

597 Behavioral Science of Business (3)

Analysis of the business system in the light of the concepts and methods of the behavioral disciplines. Prerequisite, permission.

598 Analysis of Business Behavior (3)

Current broad problems of business concerns in the American economy. The topics, one of which is usually discussed each quarter, emphasize practical price determination, cost analysis, firm behavior, motivation, or other similar subjects. Prerequisite, permission.

604 Research (*, maximum 10)

Prerequisite, permission.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

BUSINESS COMMUNICATIONS**410 Advanced Written Business Communications (5)****BUSINESS LAW****403 Commercial Law (5)****420 Law in Accounting Practice (3)**

BUSINESS STATISTICS: QUANTITATIVE ANALYSIS**330 Time Series Analysis and Index Number Theory (3)****340 Survey Research Methods for Business (3)****350 Quantitative Analysis for Business (5)****401 Advanced Business Statistics (4)****444J Application of Digital Computers (3)**

Offered jointly with Accounting.

450 Analytical Techniques in Business I (3)**451 Analytical Techniques in Business II (3)****460 Multivariate Analysis for Business (3)****500 Business Statistics (3)**

A treatment of statistical measures useful in the decision-making process. Includes analysis of distributions, probability and inference, correlation and regression, risk and uncertainty in estimation, and decision rules. Prerequisite, permission.

510 Quantitative Methods (3)

A survey of techniques in analytical and descriptive statistics and operations research useful in guiding business decisions. Prerequisite, permission.

520 Seminar in Business Statistics (3, maximum 6)

Reading, discussion, and limited practice in the application of selected statistical techniques. Areas: statistical decision processes; nonparametric statistics; advanced application of statistical techniques in administrative control; advanced multivariate analysis; theories and techniques of time series analysis and index number construction. Prerequisite, permission.

550 Seminar in Operations Research Techniques (3, maximum 6)

An intensive study of operations research tools useful in business analysis such as linear and other programming techniques, queuing theory, and simulation. Prerequisite, permission.

604 Research (*, maximum 10)

Prerequisite, permission.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

FINANCE**327 International Finance (3)****360 Investments (3)****361 Investment Markets and Portfolios****420 Money Markets (3)****423 Commercial Banking (3)****428 Credit Administration (3)****450 Problems in Corporation Finance (4)****453 Capital Allocation (3)****461 Investment Analysis (3)**

Formerly 436.

500 Financial Institutions and Financial Management (5)

A course in which money, banking, and aggregate economic activity are developed as the financial environment within which the theory and management of business finance are covered. Prerequisite, permission.

520 Seminar in Banking Problems (3)

Selected problems of contemporary and permanent significance in banking and related financial institutions. Prerequisite, permission.

521 Seminar in Money Markets (3)

Supply and demand for funds in short-term and long-term money markets; analysis of the influence of the money supply, bank reserves, legal restrictions, institutional portfolio policies, and changing needs and instruments of corporation finance. An objective of this seminar is to develop ability to analyze and appraise current money market developments. Prerequisite, permission.

552 Seminar in Corporation Finance (3)

Emphasizes selected contemporary problems and methods, internal and external, in solving corporate financial problems and indicating financial trends. Extensive reading and discussion is required in designated areas. Prerequisite, permission.

560 Seminar in Investments (3)

Discussion and analysis of concept, process, and problems of investment in securities. Theory of investment media valuation, portfolio valuation, and portfolio construction and administration for individuals and institutions. Prerequisite, 360 or permission.

604 Research (*, maximum 10)

Prerequisite, permission.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

GENERAL BUSINESS**439 Analysis of Business Conditions (4)****441 Managerial Economics (3)****444 Business and Society (4)****570 Seminar in Business Research (3)**

Business research methods and techniques. Emphasis is placed on what business research is; how it is done (stressing the scientific method as a research procedure) and who does it. Sources of relevant information are covered. Students will carry out the formulation of a research project—defining the problem, pinpointing sources of information, selecting a method of approach. Prerequisite, permission.

571-572 Research in Business (3-3)

Independent study of the field of 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 in seminar discussion. Open only to Master of Business Administration nonthesis students.

604 Research (*, maximum 10)

Prerequisite, permission.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

HUMAN RELATIONS IN BUSINESS AND INDUSTRY**460 Human Relations in Business and Industry (4)**

Not open to BA graduate students.

500 Human Relations—Organizational Behavior (3)

Analytically examines basic clinical processes related to diagnosing organizational behavior and taking action, and aspects as individual and group behavior, basic human relation skills and behavioral processes, and the effects of organizational systems and processes on human organizations. Prerequisite, permission.

INTERNATIONAL BUSINESS**320 International Business Environment (5)****370 Foreign Area Analysis (5)****420 Foreign Trade Practices (5)****470 Problems in Foreign Operations Management (5)****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 enterprise and world trade is emphasized. Prerequisite, permission.

604 Research (*, maximum 10)

Prerequisite, permission.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

MARKETING**371 Wholesaling (5)****381 Retailing (5)****391 Advertising (5)****400 Marketing and Physical Distribution Management (Domestic and Foreign) (3)****401 Sales Management (5)****421 Marketing Research (5)****491 Marketing Problems (5)**

500 Marketing Fundamentals (2)

Analysis of domestic and foreign markets and institutions, physical distribution, and the role of marketing in the economy. Prerequisite, permission.

501 Marketing Management (3)

Considerations necessary for sound marketing management decisions in the pricing, demand creation, physical distribution, channel selection, and product development activities of the firm. Prerequisites, 301 or 500, and permission.

520 Marketing Trends and Developments (3)

The current evolution of marketing is subjected to critical evaluation. Significant marketing trends and developments are reviewed analytically. Prerequisites, 400 or 501, and permission.

521 The Role of Marketing in The Economy (3)

Problems in increasing marketing efficiency in the firm and in the economy including pricing, consumer demand, market costs and efficiency, marketing and monopoly, and marketing and government. Prerequisites, 400 or 501, and permission.

522 Advanced Marketing Concepts (3)

The interdisciplinary exchange of ideas related to marketing is studied. New marketing theories and evolving concepts of marketing management are examined and critically appraised. Prerequisites, 520 or 521, and permission.

604 Research (*, maximum 10)

Prerequisite, permission.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

PERSONNEL AND INDUSTRIAL RELATIONS**345 Personnel Methods and Theory I (3)****346 Personnel Methods and Theory II (3)****450 Industrial Relations Administration (5)****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 programs, collective bargaining, and contribution of personnel department to the organization. Prerequisite, permission.

521 Current Problems in Personnel and Industrial Relations (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.

604 Research (*, maximum 10)

Prerequisite, permission.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

POLICY AND ADMINISTRATION**440 Organization Theory (3)****441 Advanced Organization Theory (3)****463 Administrative Behavior (4)****470 Business Policy (4)****471 Problems of the Independent Businessman (3)****480 Business Simulation (5)****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. Formerly 586. Prerequisite, permission.

565 Seminar in Comparative Administrative Theory (3)

An evaluation of the various approaches to the study of administration. A theoretical and historical point of view is taken. Each approach to the study of administration is analyzed independently, and also related to a general theory of administration. Prerequisite, permission.

575 Human Aspects of Administration (3)

Examines the processes of administration in organizations with a primary focus on organizational behavior. Develops the basic contributions of social science and other sources in the formulation of administrative-organizational behavior concepts and conceptual schemes. Critically evaluates the status of administrative theory in relation to administrative practice. Prerequisite, permission.

576 Human Aspects of Administration (3)

Develops in depth some of the most basic contributions to administrative theory and practice made by past and current research, thought, and experience. Typically examines several major research studies relating to administration and organizational behavior, drawing on studies from psychology, sociology, social, and cultural anthropology, business administration, government, and other sources. Prerequisite, permission.

580 Planning and Decision Theory (3)

Development of a theory of planning including foundation for theory, process of planning, role of participants in planning, the auxiliary functions, and integration into a general theory. Prerequisite, permission.

593, 594 Policy Determination and Administration (3,3)

Development of an appreciation for and skill in dealing with policy problems faced by the chief administrative officers of business firms. Analysis of problems which relate to determination of objectives; development of policies to achieve the objectives; organization of executive personnel to implement the policies; coordination of the organization; appraisal and adjustments to changes in the environment. The course is intended to give a clearer insight not only into how business decisions are reached, but into the motivation of businessmen 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, M.B.A. candidacy and permission for 593; 593 for 594.

604 Research (*, maximum 10)

Prerequisite, permission.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

PRODUCTION**341 Systems Design in Production (3)****342 Analysis of Production Operations (3)****343 Production and Inventory Control (3)****455 Analytical Techniques in Production Management (3)****460 Manufacturing Administration (5)****500 Production Management (3)**

A study of the production function in business and industry with emphasis on the administration of the production activities of a manufacturing enterprise. Basic concepts, philosophy, and techniques of analysis are covered together with their application and integration in solving production problems. Prerequisites, graduate standing with senior-year grade-point average of 3.00 and permission.

520 Seminar in Production (3)

Research, readings, and reports on current problems using a topical approach with emphasis on such areas as productivity, product research and development, reliability, plant location, equipment policies, and automation. Prerequisite, permission.

521 Seminar in Manufacturing (3)

Policy formulation and administration of manufacturing enterprises by analysis of case studies of selected industries emphasizing integration of the functions of production management with the major goals of the organization. Prerequisite, permission.

604 Research (*, maximum 10)

Prerequisite, permission.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

REAL ESTATE**410 Real Estate Valuation and Administration (5)****520 Seminar in Real Estate and Urban Land Economics (3)**

Analysis and evaluation of land allocation systems, institutional aspects of the real estate industry, and problems arising from competition of spatial units within urban markets. Prerequisite, permission.

521 Seminar in Real Estate Administration (3)

The administrative approach to management problems in the real estate industry; analysis of the business functions of production, finance, and distribution of real estate services. Prerequisite, permission.

604 Research (*, maximum 10)

Prerequisite, permission.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

RISK AND INSURANCE**320 Insurance Theory (3)****330 Risk Analysis (5)****432 Advanced Risk Problems I (3)****438 Advanced Risk Problems II (3)****480 Risk Management (3)****520 Seminar (3)**

Considers theoretical aspects of the insurance business rather than operational or sales factors. Economic, actuarial, legal, environmental bases for insurance. Reinsurance. Prerequisite, permission.

604 Research (*, maximum 10)

Prerequisite, permission.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

TRANSPORTATION**372 Physical Distribution Management (3)****440 Transportation Pricing (3)****471 Public Policy in Transportation (3)****481 Cases in Transportation Carrier Management (3)****491 Cases in Physical Distribution Management (3)****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. Prerequisite, permission.

604 Research (*, maximum 10)

Prerequisite, permission.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

SCHOOL OF DENTISTRY**Dean: MAURICE J. HICKEY, C301 Health Sciences****Graduate Program Adviser: SAUL SCHLUGER, B324 Health Sciences**

The School of Dentistry offers, through the Graduate School, course work leading to a Master of Science in Dentistry degree with a major in endodontics, oral pathology, oral surgery, orthodontics, pedodontics, periodontics, and restorative dentistry (fixed partial dentures, operative dentistry, prosthodontics).

An applicant is eligible for admission to the Graduate School for work leading to a Master of Science in Dentistry degree provided he is a graduate of a School of Dentistry approved by the Council on Dental Education of the American Dental Association, or of a university dental school, located outside of the North American continent, whose curriculum and admission requirements are similar to those of the School of Dentistry, University of Washington. The student must also meet the admission requirements of the Graduate School of the University of Washington.

After a student has been declared eligible for admission to the Graduate School, his acceptance as a student must be approved by the Graduate Admissions Committee of the School of Dentistry. This approval will be based upon the availability of places in the various classes. A maximum of ten students can be accommodated each year in orthodontics, two in pedodontics, and varying numbers, not to exceed two, in each of the three phases of restorative dentistry, depending upon the availability of teaching and research staff members. There are

five opening for majors in periodontics, two in endodontics, one in oral pathology, and one in oral surgery, commencing every Autumn Quarter.

A minimum of six consecutive quarters (18 months) of residence is required for the Master of Science in Dentistry degree with a major in orthodontics or pedodontics; eight quarters (24 months) in periodontics, endodontics, or oral pathology; three quarters (nine months) in restorative dentistry; three quarters (nine months) of residence for oral surgery, plus two-year hospital residency, combined academic and hospital work. Under the program for restorative dentistry, the student determines his major (operative dentistry, fixed partial dentures, or prosthodontics) by the electives he selects. No foreign language is required.

ORAL PATHOLOGY. Required courses are: 520, 521; Pathology 441-442-443.

ORAL SURGERY. Required courses are: 500, 501, 502, 530, 531, 532, 540, 541, 542, 550; Oral Diagnosis and Treatment Planning 500; Oral Pathology 531; Conjoint (Med.) 426-427, 446-447, Pathology 441-442-443; Psychiatry 400.

ORTHODONTICS. Required courses are: 500, 501, 502, 503, 504, 546, 547, 548, 549, 550; Dentistry 416, 417, 510, 511, 512, 513, 514, 515, 518, 588, 589; Pediatrics 505; Psychiatry 450.

PEDODONTICS. Required courses are: Dentistry 416, 417, 510, 511, 512, 513, 515; Orthodontics 500; Pediatrics 505; Pedodontics 500, 501, 502, 503, 504, 546, 547, 548, 549, 550; Psychiatry 450.

PERIODONTICS. Required courses are: 546, 547, 548, 549, 550, 551, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 591, 592, 593; Anatomy 405-406; Biochemistry 401, 402; Oral Pathology 520; Psychiatry 400, 430, Dentistry 563.

ENDODONTICS. Required courses are: 546, 547, 548, 549, 550, 551, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 591, 592, 593; Anatomy 405-406; Biochemistry 401, 402; Psychiatry 400; Microbiology 441-442, 510.

RESTORATIVE DENTISTRY. Required courses are: Dentistry 416, 417, 510, 511, 518, 580, 581, 588, 589, 590; and electives to make a total of 45 credits. In this program, the student selects electives to specialize in either operative dentistry, fixed partial dentures, or prosthodontics.

The approved list of electives for all programs includes such subjects as anatomy, anthropology, biometrics, child development, education, microbiology, nutrition, physiology, psychiatry, psychology, public health, speech, and maxillofacial prosthesis courses.

The programs are planned to prepare students to think independently, to evaluate their own services and the literature used, and to develop their clinical operative skills to a level to permit the successful practice of their chosen specialty. Emphasis is placed on the basic principles of diagnosis and treatment, which comprise the clinician's most valuable armamentarium. The seminar method of teaching is generally used. The purpose of the programs is not only to train students in the art of their respective specialties, but also to encourage basic science research in specialties on a graduate level in possible preparation for academic careers or for research. Research may be undertaken in the major department or in cooperation with other departments. The opportunity for collaborative research is excellent because of the close proximity of the other colleges and departments in the University.

The graduate programs of the School of Dentistry operate on the quarter system. There are three 11-week quarters in the academic school year. In order for the graduate dental programs to be continuous, the Summer Quarter has also been made an 11-week quarter.

Applications are received and processed throughout the school year. All applications for admission as well as all necessary credentials, must be submitted on or before December 1 for consideration for entrance in the following Autumn Quarter.

COURSES

DENTISTRY

- 416 Scientific Methodology in Dental Research (3)** **Kraus**
- 417 Scientific Methodology in Dental Research (3)** **Kraus**
- 510 Applied Osteology and Myology of the Head and Neck (2)** **Moore**
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)** **Erickson, Moore**
Basic principles, history, and techniques of roentgenographic cephalometry. (Department of Orthodontics)
- 512, 513 Growth and Development (2,2)** **Moore**
Review of the various methods of studying human growth, with special emphasis 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)** **Kraus**
Genes and the nature of genic action. Significance of mitosis and meiosis. Hereditary syndromes involving cranial structures. Introduction to population genetics. Genetics of the blood groups and their medico-legal implications. Hereditary aspects of the human dentition.
- 515 Evolution of the Human Cranio-facial Complex (2)** **Kraus**
Darwinism and the genetic basis for biological evolution. Principles of evolution. Palaeontological evidence of human evolution. Evolution of the cranio-facial complex. Evolution of the dentition. Malocclusion from the genetic and phylogenetic perspectives. Variability in the cranio-facial complex and its interpretation in terms of evolution.
- 518 Scientific Methodology in Dental Research (2)** **Kraus**
Critical review of dental literature. Application of principles learned in 416 and 417 to selected monographs and papers in dentistry and related fields of the basic sciences.
- 535 Oral Microbiology (3)** **Zeldow**
An advanced lecture-laboratory survey of the oral flora and diseases related to their activity.
- 563 Minor Tooth Movement (2)** **Moore**
A lecture-clinic course dealing with minor tooth movement necessary to successful periodontal therapy. Prerequisite, permission.
- 580 Gnathodynamics (2)** **Young**
A seminar devoted to a comprehensive review of the temporomandibular joint and its associated structures. Thorough review of the anatomy and growth processes of the head and oral mechanism, with special emphasis upon the functional aspect of the human denture. Study of the instruments designed to imitate jaw movement and their effectiveness, together with the pathologies of the temporomandibular joint. (Departments of Orthodontics and Prosthodontics)
- 581 Restorative Treatment Planning (4)** **Morrison**
Coordinated application of knowledge gained from both graduate and undergraduate courses to the diagnosis and treatment of the more complicated cases. (Department of Operative Dentistry)
- 582 Cast Metal Restorations (4)** **Morrison**
Metallography of cast metals; physical properties of waxes and investments. Control of shrinkage. Interrelationships of physical properties of metals and physiology of oral tissues; thermal conductivity and pulpal response; galvanism; tissue tolerance in respect to various metals. Direct and indirect technics. Principles of cavity preparation that apply specifically to cast restorations. (Department of Fixed Partial Dentures)
- 588, 589, 590 Seminar in Occlusion (2,2,2)** **Morrison**
A continuous seminar in the dynamics and physiology of occlusion and related phenomena.

ENDODONTICS

- 546, 547, 548 Clinical Endodontics (3,4,4)** **Ingle**
The clinical diagnosis and treatment of the pulpless tooth.
- 549, 550, 551 Clinical Endodontics (3,4,4)** **Ingle**
The clinical diagnosis and treatment of the pulpless tooth. Prerequisites, 546, 547, 548.
- 576, 577, 578 Endodontic Seminar (2,2,2)** **Ingle**
A continuous weekly seminar devoted to review of endodontic and related literature and to discussion of teaching methods and philosophy of teaching and treatment.
- 579, 580, 581 Endodontic Seminar (2,2,2)** **Ingle**
A continuous weekly seminar devoted to review of endodontic and related literature and to discussion of teaching methods and philosophy of teaching and treatment. Prerequisites, 576, 577, 578.
- 582, 583, 584 Treatment Planning Seminar (2,2,2)** **Ingle**
A weekly seminar to discuss controversial treatment problems and difficult diagnostic cases.
- 585, 586, 587 Treatment Planning Seminar (2,2,2)** **Ingle**
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)** **Ingle**
A closely supervised experience in teaching clinical endodontics to the undergraduate dental student. Prerequisites, 546, 547, 548, 576, 577, 578.
- 600 Research (*)** **Ingle**
An investigative program in one of the basic sciences under the direction of the departmental faculty. Prerequisite, permission.
- 700 Thesis (*)** **Ingle**
An investigative program carried out under the direction of a member of the Department staff by the candidate for the degree of Master of Science in Dentistry. The problem may be in one of the basic sciences or may have clinical application.

FIXED PARTIAL DENTURES

- 400, 401 Advanced Fixed Partial Dentures (1,1)** **Morrison**
- 446 Advanced Clinical Crowns and Fixed Partial Dentures (8)** **Morrison**
- 561 Abutments and Distribution of Masticatory Stresses (4)** **Morrison**
Tissue responses of bone and periodontal membrane to increased masticatory loads; physical principles involved in replacements in different locations in the mouth; considerations involved in length of span; retention form and resistance form; study of broken-stress design and fixed removable attachments; esthetic consideration of abutment preparation.
- 562 Advanced Dental Ceramics (3)** **Morrison**
Baked porcelain as a substitute for lost tooth structure. Physical properties of the material; pyrochemical reactions in firing. Indications and contraindications in restorative dentistry. Color in dental ceramics; esthetics, a major consideration; use of stains. Veneer crowns and inlays—variant preparations of the teeth. Methods of impression taking, die formation, and construction of matrices. Manipulation of the various porcelains; the factors involved. Variations in techniques of fabrication of restoration. Clinical considerations in respect to insertion and maintenance.
- 700 Thesis (*)**
An investigative program carried out under the direction of a member of the Department staff by the candidate for the degree of Master of Science in Dentistry. The problem may be in one of the basic sciences or may have a clinical application.

OPERATIVE DENTISTRY

- 400, 401, 402 Advanced Operative Dentistry (1,1,1)** **Stibbs**
- 446 Advanced Clinical Operative Dentistry (7)** **Stibbs**
- 561 Plastics as Restorative Materials (4)** **Stibbs**
Metallography of silver-tin amalgams; physical properties of zinc oxyphosphate cements, siliceous cements, and acrylic resins. Postoperative history of teeth restored with plastic materials; relative service life of materials. Basic and variant designs of cavity preparation, considering morphology of tooth, masticatory stress, physical properties of material, and location and size of restoration. Variant techniques of manipulation of plastics; analysis of failures in plastics.
- 562 Gold Foil Restorations (4)** **Stibbs**
Tissue reactions to operative procedures; response of dental pulp to thermal change; age changes in dentinal wall and histology of dental pulp. Indications and contraindications for gold foil in restorative procedures. Physical properties of dentin, cohesive and noncohesive pure gold foil, and platinum-centered foil. Rationale of manipulation of these materials. Modifications of basic cavity preparation for foil: Black, Ferrier, Woodbury, True, etc. Procedures for condensation and finishing.
- 700 Thesis (*)**
An investigative program carried out under the direction of a member of the Department staff by the candidate for the degree of Master of Science in Dentistry. The problem may be in one of the basic sciences or may have a clinical application.

ORAL DIAGNOSIS AND TREATMENT PLANNING

- 400, 401, 402 Advanced Oral Diagnosis and Treatment Planning (1,1,1)** **Jacobson**
- 446 Advanced Clinical Oral Diagnosis and Treatment Planning (1)**
- 500 Extraoral Radiology (1)** **Jacobson**
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.

ORAL PATHOLOGY

- 520 Seminar in Oral Pathology (1-3, maximum 9)** **Sreebny**
Conferences, seminars and round table discussions of advanced topics and recent literature in oral pathology. Prerequisite, permission.
- 531 Oral Pathology (5)** **Sreebny**
The purposes of this course are to train the student so that he may intelligently interpret manifestations of pathology as they occur in the oral cavity and to stimulate an intellectual curiosity regarding the basic pathological mechanisms responsible for these changes.

- 600 Research (*)**
Prerequisite, permission.

- 700 Thesis (*)**

ORAL SURGERY

- 500, 501, 502 Oral Surgery Seminar (2,2,2)** Gehrig, Swenson
A continuous weekly seminar devoted to oral surgery theory and literature and practical case reviews.
- 530, 531, 532 Clinical Pathology Conference (1,1,1)** Gehrig, Swenson
A clinical pathology conference of patients presented by graduate students.
- 540, 541, 542 Advanced Oral Surgery Clinic (3,3,3)** Gehrig, Swenson
The clinical diagnosis and treatment of oral surgical conditions.
- 550 Anatomical Approaches to Head and Neck Surgery (2)** Gehrig, Swenson
A study and laboratory dissection of the anatomical structures as they are found in major oral surgery procedures. Prerequisite, permission.
- 600 Research (*)** Gehrig, Swenson
An investigative program in one of the basic or clinical sciences under the direction of the departmental faculty. Prerequisite, permission.
- 700 Thesis (*)** Gehrig, Swenson

ORTHODONTICS

- 500, 501, 502, 503, 504 Orthodontics Seminar (2,4,4,2,2)** Moore
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 Clinical Orthodontics (4,5,5,5,5,6)** Moore
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 Research (*)**
Prerequisite, permission.
- 700 Thesis (*)**
An investigative program carried out under the direction of a member of the Department staff by the candidate for the degree of Master of Science in Dentistry. The problem may be in one of the basic sciences or may have a clinical application.

PEDODONTICS

- 500, 501, 502, 503, 504 Pedodontics Seminar (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 (*,*,*,*,*)** Law
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.
- 600 Research (*)**
Prerequisite, permission.
- 700 Thesis**
An investigative program carried out under the direction of a member of the Department staff by the candidate for the degree of Master of Science in Dentistry. The problem may be in one of the basic sciences or may have a clinical application.

PERIODONTICS

- 546, 547, 548 Clinical Periodontics (3,4,4)** Schluger
The clinical diagnosis and treatment of periodontal disease.
- 549, 550, 551 Clinical Periodontics (3,4,4)** Schluger
The clinical diagnosis and treatment of periodontal disease. Prerequisites, 546, 547, 548.
- 576, 577, 578 Periodontics Seminar (2,2,2)** Stern
A continuous weekly seminar devoted to review of periodontic and related literature and to discussion of teaching methods and philosophy of teaching and treatment.
- 579, 580, 581 Periodontics Seminar (2,2,2)** Schluger
A continuation of the weekly seminars devoted to review of periodontic and related literature and to discussion of teaching methods and philosophy of teaching and treatment. Prerequisites, 576, 577, 578.
- 582, 583, 584 Treatment Planning Seminar (2,2,2)** Schluger
A weekly seminar to discuss controversial treatment problems and difficult diagnostic cases.

- 585, 586, 587 Treatment Planning Seminar (2,2,2)** Schluger
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)** Ogilvie
A closely supervised experience in teaching clinical periodontics to the undergraduate dental student. Prerequisites, 546, 547, 548, 576, 577, 578.
- 600 Research (*)**
An investigative program in one of the basic sciences under the direction of the departmental faculty. Prerequisite, permission.
- 700 Thesis (*)**
An investigative program carried out under the direction of a member of the Department staff by the candidate for the degree of Master of Science in Dentistry. The problem may be in one of the basic sciences or may have clinical application.

PROSTHODONTICS

- 560 Complete Dentures (4)** Bolender
A comprehensive lecture-clinical course devoted to the diagnosis and treatment of the completely edentulous patient. Emphasis is placed on control and management of patients who present difficulties in treatment.
- 561 Immediate Dentures (4)** Bolender
A lecture-clinical course concentrating on those factors which are peculiar to the fabrication of immediate dentures. This course will provide an opportunity for the application of the principles covered in course 560. Prerequisite, 560.
- 562 Removable Partial Dentures (4)** Bolender
A lecture-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. Prerequisite, 560.
- 563 Obturators and Speech Appliances (2)** Beder
Theories, principles, technical and clinical experience in the fabrication of prostheses for the patient presenting congenital or acquired defects of the palate and contiguous tissue. Active participation in affiliated hospital programs will be provided whenever available.
- 564 Definitive and Adjunctive Maxillofacial Appliances (2)** Beder
Theories, principles, technical experience in the fabrication of somatoprostheses, appliances for the osteotomized, osteotomized, or traumatized mandible, vehicle and protective devices in irradiation therapy, stents, cranial and other alloplastic prostheses, splints, and other special prostheses. Active participation in affiliated hospital programs will be provided whenever available.
- 700 Thesis (*)**
An investigative program carried out under the direction of a member of the Department staff by the candidate for the degree of Master of Science in Dentistry. The problem may be in one of the basic sciences or may have a clinical application.

COLLEGE OF EDUCATION

Dean and Graduate Program Adviser: GORDON CANFIELD LEE, 230 Miller Hall

EDUCATIONAL OBJECTIVES OF THE GRADUATE PROGRAMS IN EDUCATION. The advanced degree programs in Education are designed to further the knowledge of students in specialized subject-matter areas and to offer advanced professional training appropriate to the goal of the individual. Qualifications for acceptance include a solid undergraduate training and successful teaching experience. In addition to opportunities for specialized training, students are required to have training in the conduct and application of research procedures and the development of communication skills.

The College of Education offers courses leading to the degrees of Master of Arts, Master of Education, Doctor of Education, and Doctor of Philosophy.

All prospective candidates for advanced degrees are required to have at least 20 credits in background courses in education. One year of successful teaching or administrative experience is required for admission to candidacy for master's degrees; two years of continuously successful teaching or administrative experience are required for admission to the doctoral program.

Graduate School requirements for all advanced degrees are described on pages 38-46 of this *Bulletin*. The course requirements as set by the College of Education for each of the degrees are:

MASTER OF ARTS. 24 credits in education, including 591 and 10 credits in each of two fields in education; and 12 credits of approved course work in a department other than education. The fields in education from which work may be taken for the M.A. degree are: higher education, curriculum, educational administration and supervision, educational methods, educational psychology, educational sociology, elementary education, guidance and counseling, history and philosophy of education, and remedial and special education. Students must pass written final examinations, and present an acceptable thesis on an approved topic.

Students in the master's degree program who are taking a minor in education must present a minimum of 12 approved credits in education courses.

MASTER OF EDUCATION. 27 credits in education, including 591 and a minimum of 5 credits in each of four fields in education; and 15 credits in two departments other than education, including 5 credits in courses numbered above 500. The fields in education from which work may be taken for the M.Ed. degree are: audio-visual education, business education, higher education, curriculum, educational administration, educational methods, educational psychology, educational sociology, educational supervision, elementary education, guidance and counseling, history and philosophy of education, industrial education, remedial and special education, secondary education, and tests and measurements. Students must pass written final examinations over the selected four fields in education and present an acceptable thesis on an approved topic.

DOCTOR OF EDUCATION. 60 credits in education, including 490 or 491, 587 and 588 or 589, 591, a minimum of 12 credits in one field in education, a minimum of 9 credits in each of three other fields in education, and electives to make up the total; and 45 credits in departments other than education, including 9 to 15 credits each in arts and letters, science and mathematics, foreign language, and social sciences. The fields in education from which prospective Ed.D. candidates may select courses are: higher education, curriculum, educational administration and supervision, educational methods, educational psychology, educational sociology, elementary education, guidance and counseling, history and philosophy of education, and remedial and special education. Normally, it is expected that students who plan to enter upon doctoral work will have maintained a grade-point average of 3.50 or better in their work for the master's degree.

DOCTOR OF PHILOSOPHY. 70 credits in education, including 490, 587 and 588 or 589, 591, and approximately 15 credits in each of three fields in education; and either 35 credits in one department other than education, or 20 credits in each of two departments other than education. The fields in education from which prospective Ph.D. candidates may select courses are: higher education, curriculum, educational administration and supervision, educational methods, educational psychology, elementary education, guidance and counseling, history and philosophy of education, and remedial and special education. Normally, it is expected that students who plan to enter upon doctoral work will have maintained a grade-point average of 3.50 or better in their work for the master's degree.

Doctoral students who are taking a minor in education must present a minimum of 35 approved credits in education courses.

COURSES

For a listing of courses offered any given quarter, together with the time and place of meeting, consult the Time Schedule which is available for reference in the College of Education, Office of the Graduate Program Adviser, 230 Miller Hall. Since the amount of credit for courses offered during Summer Quarter varies slightly in some cases from that given during the regular quarters, it is advisable to refer to the Summer Quarter Bulletin for the specific number of credits for a particular course.

- 401 Advanced Educational Psychology (3)
- 402 Child Study and Development (3)
- 404 Education of Exceptional Children (3)

Fea
McDonald
Hayden

- 405 Problems of Adolescence (3) Salyer
- 407 Teaching the Gifted Child (3) Freehill, Hayden
- 407W Workshop in Teaching the Gifted Child (3) Hayden
- 408 Mental Hygiene for Teachers and Administrators (3) Salyer
- 409AJ Training of the Mentally Retarded (5) Bijou, Hayden
Offered jointly with the Department of Psychology. (Offered Summer Quarter only.)
- 409BJ Psychology of the Mentally Retarded (5) Bijou, Hayden
Offered jointly with the Department of Psychology. (Offered Summer Quarter only.)
- 409CJ Training the Emotionally Disturbed (5) Hayden, Strother
Offered jointly with the Department of Psychology. (Offered Summer Quarter only.)
- 409DJ Psychology of the Emotionally Disturbed (5) Hayden, Strother
Offered jointly with the Department of Psychology. (Offered Summer Quarter only.)
- 409FJ The Teaching of Speech to the Deaf (6)
- 409GJ The Teaching of Language to the Deaf (6)
- 409H Elementary School Methods for the Deaf (6)
- 409I History, Education, and Guidance of the Deaf (3)
- 409WJ Advanced Workshop in the Education of the Retarded (10)
Offered jointly with the Department of Psychology. (Offered Summer Quarter only.)
- 410 Educational Sociology (3) Jessup
- 412 Foundations of Freedom and Education (3) Morris
(Offered Summer Quarter only.)
- 415 Principles of Safety Education (3) Corbally
- 415D Principles of Safety Education: Driver Education (5) Corbally
- 417 Adult Education (3) Chamberlain
- 417W Workshop for Administrators of Adult Education (3) Chamberlain
- 420 Theory and Technique of Kindergarten and Primary Teaching (3) MacDonald
- 421 Remedial Education (3) Fea
- 422 Remedial Education Clinic (3) Fea
- 425 Remedial Reading (3) Fea
- 430 Public School Administration (3) Strayer
- 430P Workshop for Public School Business Officials (2)
(Offered Summer Quarter only.) Strayer
- 430W Workshop in School Administration (1)
(Offered Summer Quarter only.) Strayer
- 431 School Finance (3) Strayer
- 433 Elementary School Organization and Administration (3) Jessup
- 434 High School Organization and Administration (3) Strayer
- 435 Administration and Supervision of Junior High Schools (3) Strayer
- 437 School Supervision (3) Bolton, Jessup
- 438 The Law and Education (2½)
(Offered Summer Quarter only.) Amandes
- 439 Pupil Personnel and Progress Reporting (3) Vopni
- 445V Principles and Objectives of Vocational Educational (3) Bailly
- 447 Principles of Guidance (3) Salyer
- 448E Guidance in the Elementary School (3) Salyer
- 448S Guidance in the Secondary School (3) Salyer
- 455 Auditory and Visual Aids in Teaching (3) Hayden
- 456 Auditory and Visual Aids in Teaching (3) Hayden
- 457 Audio-Visual Aids Management (3) Hayden
- 459J Television in the Schools (3)
Offered jointly with the School of Communications.
- 460J Field Training in Health Education (5)
Offered jointly with the Department of Preventive Medicine.
- 461 Elementary School Curriculum (3) Jarolimok, Jessup
- 463J Television Production Workshop for Teachers (2½) Ryan
Offered jointly with the School of Communications. (Offered Summer Quarter only.)

465 The American Secondary School (3)	Lee
466 Workshop in Curriculum Improvement (1-15, maximum 15)	Draper
467 Principles and Techniques of Curriculum Improvement (3)	Draper
470 Historical Backgrounds of Educational Methods (3)	
471D Observation and Student Teaching of Deaf Children (2-6, maximum 6)	Hayden
471E Advanced Directed Teaching, Elementary (4-16)	Boroughs
471X Advanced Directed Teaching, Junior High School (4-16)	Boroughs
471S Advanced Directed Teaching, Secondary (4-16)	Boroughs
471NJ Advanced Directed Teaching: School Nursing (4) Offered jointly with the School of Nursing.	Boroughs
474 Workshop in Instructional Improvement (2, maximum 6)	
474GJ Seminar in Language Teaching (3) Offered jointly with the Department of Germanic Languages and Literature.	Rabura
475 Improvement of Teaching (3)	Hayden
475A Improvement of Teaching: Secondary Mathematics (5)	Kingston
475B Improvement of Teaching: Arithmetic (3)	Vopni
475DJ, 475EJ The Teaching of Foreign Literature (3,3) Offered jointly with the Department of Romance Languages and Literature.	Keller
475GJ Geography in the Social Studies Curriculum (5) Offered jointly with the Department of Geography.	
475H Improvement of Teaching: Language Arts (3)	Fea
475I Improvement of Teaching: Industrial Education (3)	Baily
475J Advanced Teachers' Course in Journalism (3) Offered jointly with the School of Communications.	Benson
475K Improvement of Teaching: Elementary School Music (3)	Heffernan
475LJ Improvement of Teaching: Latin (5) Offered jointly with the Department of Classics. (Offered Summer Quarter only.)	Gummel
475M Improvement of Teaching: Social Studies (3)	Jarolimek
475P Improvement of Teaching: Junior High School Mathematics (5) (Offered Summer Quarter only.)	
475S Improvement of Teaching: Elementary School Science (3)	Vopni
475T Improvement of Teaching: Secondary School Science (3)	Vopni
475XJ Caesar for High School Teachers (2½) Offered jointly with the Department of Classics. (Offered Summer Quarter only.)	Gummel
476D Materials and Methods of Teaching Typewriting (2½) (Offered Summer Quarter only.)	Briggs
476E Materials and Methods of Teaching Office and Clerical Practice (2½) (Offered Summer Quarter only.) Prerequisite, permission.	Briggs
476I Problems of Distributive Education (3)	Baily
476K Coordination of Distributive Education and Diversified Occupational Programs (2-3, maximum 3) (Offered Summer Quarter only.)	Baily
476L Materials and Methods of Teaching Gregg Shorthand and Transcription (2½) (Offered Summer Quarter only.)	Briggs
476M Principles and Problems of Business Education (2½) (Offered Summer Quarter only.)	Briggs
476N Materials and Methods of Teaching Bookkeeping and General Business Subjects (2½) (Offered Summer Quarter only.)	Briggs
477 The Teaching of Reading (3)	Fea
478J Workshop in Elementary School Physical Education (2½) Offered jointly with the Department of Women's Physical and Health Education. (Offered Summer Quarter only.)	
480 History of Education (5)	Tostberg
481 Workshop in Industrial Education (3-10, maximum 10)	Baily
482 Advanced Tools and Materials (3)	Baily
483 Organizational and Administration of Industrial Education (3)	Baily
484 Comparative Education (3)	Jessup

- 485 **Advanced General Shop for Industrial Education Teachers (3)** Baily
- 486 **Trends in Industrial Education (3)** Baily
- 487 **Industrial Analysis for Industrial Education Teachers (3)** Baily
- 488 **Philosophy of Education (3)** Tostberg
- 489 **Current Problems in Industrial Education (3)** Baily
- 490 **Educational Statistics (5)** Dvorak
- 491 **Advanced Educational Measurements (3)** Dvorak
- 492 **History of European Education Through the Reformation (3)** Messerli
- 493 **History of European Education Since the Reformation (3)** Tostberg
- 494 **History of American Education to 1865 (3)** Messerli
- 495 **History of American Education Since 1865 (3)** Tostberg
- 497J **Special Topics in Mathematics for Teachers (2-5, maximum 15)**
Offered jointly with the Department of Mathematics.
- 501 **Seminar in Educational Psychology (3)** Fea, Freehill
The psychology of children's thinking. Course will emphasize study of research results in concept development and critical thinking, with application to classroom learning situations. Prerequisite, 209 or equivalent, or permission.
- 502 **Seminar in Educational Psychology (3)** Fea
The psychology of children's thinking. Each student will work intensively in one of the following: an area of cognition, a level of child development, a school subject. Prerequisite, 501 or equivalent.
- 506 **Internship in Special Education (2-10, maximum 10)** Hayden
Supervised experiences in special education for advanced students. Prerequisite, permission.
- 510 **Seminar in Educational Sociology (3)** Jessup
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. Prerequisite, permission.
- 522 **Seminar in Diagnostic and Remedial Work in Education (3)** Fea
Study of the recent research in diagnosis of and remediation for learning difficulties in the academic school subjects. Prerequisite, permission.
- 525 **Seminar in Elementary Education (3)** Foster, Jarolimek
An exploration into the philosophy, history, curriculum, and method of the elementary school, with emphasis upon individual research. Prerequisite, doctoral candidacy or special permission.
- 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 relation of costs to efficiency; preparation of the budget, salary schedules, sources of school revenue, problems of state and local school support, and state and local control of school funds; financing capital outlay, research, and public relations. Prerequisites, 430, 431, and doctoral candidacy or special permission.
- 533 **Seminar in Administration: School Buildings (3)** Strayer
School building surveys; sharing responsibility for the educational plant; types of school buildings and building materials; appraisal of existing school plants; heating and ventilating; acoustics; special areas; audio-visual illumination and color; preparation of floor plans on the basis of educational plans; building maintenance and school insurance; modernizing existing buildings; financing the school plant program. Prerequisites, 430 and doctoral candidacy or special permission.
- 536 **Internship in Educational Administration (1-0, maximum 10)** Strayer
Recommended for all doctoral candidates preparing for administrative positions except those having sufficient experience as administrators. 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 superintendent of schools or school principal in the selected school district. Prerequisites, 430 and doctoral candidacy or special permission.
- 538 **Public Relations for Public Schools (3)** Strayer
Relationship between the public schools and the public, with emphasis on the two-way flow of ideas between school and community; the school board, administrators, advisory groups, and the public relations program; school personnel and the public; pupils, parents, and community attitudes; proven techniques and media; special versus continuous public relations programs; special problems such as school finance, school extracurricular activities, and building programs. Prerequisites, 430 and doctoral candidacy or special permission.
- 540 **Individual Testing (5)** Freehill
A study of intelligence testing with supervised experience. The emphasis is on the Stanford Binet and the Weschler Intelligence Scale for Children. Prerequisites, 390, elementary statistics, and permission.
- 541 **Student Appraisal (3)** Dvorak
Emphasis on the utilization of objective measures for purposes of guidance. Prerequisite, 447 or permission.

- 542 Information Services (3)**
Emphasis on educational and vocational guidance. Prerequisite, 447 or permission.
- 543 Counseling (3)** **Freehill**
Emphasis on the theory and practice of pupil counseling. Prerequisite, 447 or permission.
- 544 Organization and Administration of Guidance Programs (3)**
Basic considerations in planning, organizing, and operating school guidance programs; analysis of issues and problems encountered in formulating policy and evaluating services. Prerequisite, 447 or permission.
- 545 Interviewing (3)** **Freehill**
A study of interviewing and supervised practice of interviewing, primarily with children and parents. Prerequisite, 540.
- 546 Internship in Guidance (2-10, maximum 10)** **Freehill**
Supervised practice in guidance activities for advanced students. Prerequisite, 447 or permission.
- 547 Seminar in Guidance (3)**
Individual problems in the areas of organization, supervision, and administration of guidance in the elementary and secondary schools. Required of most graduate students using guidance as a field for advanced degrees. Prerequisite, 447 or permission.
- 548 Personality Theory (5)** **Freehill**
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 in psychology and educational psychology.
- 550 Development and Organization of Higher Education (3)** **Giles, Madsen**
Higher education from the standpoint of the new instructor; history of administrative organization. Prerequisite, doctoral candidacy or special permission.
- 551 College Problems (3)** **Giles**
Current problems in the philosophy and organization of higher education, with special emphasis upon the curriculum and student personnel services. Prerequisite, doctoral candidacy or special permission.
- 552 Improvement of College Teaching (3)** **Hayden**
An analysis of the type of teaching applicable to the college level, with special reference to lectures, assignments, use of textbooks, student reports, quiz techniques, panel discussions, the use of visual aids, syllabi, and bibliographies. Prerequisite, doctoral candidacy or special permission.
- 553 Seminar in the Administration of Junior Colleges (3)** **Giles**
For students preparing for administrative positions in junior colleges. Principles and practices in organization and administration of junior colleges. Prerequisite, 555 or equivalent.
- 555 The Junior College (3)** **Giles**
A study of the history, development, role, objective, and organization of the junior college and of problems and issues confronting the two-year college. Prerequisite, permission.
- 556 Internship in Higher Education (3-10)** **Giles, Madsen**
Field study and experience in college teaching and administration, planned by the College of Education in cooperation with selected colleges. Prerequisites, doctoral candidacy and special permission.
- 558 History of American Higher Education (3)** **Madsen**
An examination of the historical development of the American higher educational enterprise. Prerequisite, permission.
- 559 Seminar in Higher Education (3)** **Giles, Madsen**
Intensive study of selected problems and proposals for research in higher education. Prerequisites, 550, doctoral candidacy, and permission of instructor.
- 560 Seminar in Curriculum: Cooperative Research in Curriculum (3)** **Draper**
Research studies in the field of curriculum development will be designed for experimentation in the public schools. An analytical study will be made of the place of action research in the curriculum field. Prerequisites, 476 and doctoral candidacy, or special permission.
- 561 Seminar in Curriculum: Studies in Fusion, Correlation, and Child-Centered Programs (3)** **Draper**
Research in fusion, correlation, and child-centered programs in the large block of time. Prerequisites, 467 and doctoral candidacy, or special permission.
- 562 Internship in Curriculum Direction (3, maximum 9)** **Draper**
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 Assistant Superintendent in Charge of Curriculum in the selected school district. Prerequisites, 467, doctoral candidacy, and special permission.
- 568 Seminar in Secondary Education (3)** **Draper**
Research studies in the areas of extraclass activities, curriculum improvement, guidance and counseling, foreign education systems, and the professionalization of secondary school teachers. Prerequisite, 467 or special permission.

- 570 Problems in Modern Methods (3)** **Foster**
Designed to develop an understanding of selected aspects of the history of educational methods. The course involves the exploration of various classical sources of educational theories which have provided the basis for development of educational method.
- 571 Problems in Modern Methods (3)** **Foster**
The course provides for the study of contemporary educational methods. The theory and application of these methods are explored with regard to trends, research data, and problems of implementation.
- 572J, 573J Romance Language Teachers Seminar (3,3)**
Class activities will include use of the Language Laboratory, examination and evaluation of new methods, materials and textbooks, and acquaintance with recent professional literature. Questions presented by the registrants will be considered, and each member of the seminar will work on some project of his own choice. The class time scheduled permits observation in the Young People's Classes offered by the Division of Continuing Education for those preparing to teach French or Spanish in the elementary or secondary schools, and workshop activities for others. Residence in the appropriate Living-Language Group is recommended. Students with schedule conflicts should consult the instructor. Offered jointly with the Department of Romance Languages and Literature Summer Quarter only. Prerequisite, graduate standing or permission.
- 574J The Application of Linguistics to the Teaching of Romance Languages (2)** **Saporta**
Current methods and techniques of foreign language instruction, based on the findings of scientific linguistics. Offered jointly with the Department of Linguistics. Prerequisite, permission.
- 575 Seminar in Language Arts (3)** **Foa**
Study of recent research in listening, oral language, reading, and written language, emphasizing psychological and interrelated aspects. (Offered Summer Quarter only.) Prerequisite, teaching experience or permission.
- 586 Seminar in Educational Classics (3)** **Lee**
Analysis in depth and in the context of the relevant history of several major works in educational thought from Plato to Dewey. Registration open only to advanced doctoral candidates with several years' teaching experience. Permission of instructor required.
- 587 Seminar in Philosophy of Education (3)** **Messerli, Tostberg**
Designed to provide a basic understanding of selected philosophic systems and their relationship to education. Prerequisite, permission.
- 588 Seminar in Philosophy of Education (3)** **Messerli, Tostberg**
A detailed examination of education goals undertaken through a study of axiology. Prerequisites, 587 and permission.
- 589 Seminar in Philosophy of Education (3)** **Messerli, Tostberg**
A philosophical analysis of the professional fields of education. Prerequisites, 588 and permission.
- 591 Methods of Educational Research (3)** **Hayden, Bolton**
A study of devices and methods used in conducting research. Designed to assist students in planning, organizing, and writing theses. Required of candidates for advanced degrees.
- 600 Research (*)**
Prerequisites, 591 and permission of instructor and Graduate Program Adviser in Education. Instructor and field must be designated in registration.
- | | |
|----------------------------|-------------------------------------|
| Audio-visual education | Guidance and counseling |
| Curriculum | Higher education |
| Educational administration | History and philosophy of education |
| Educational methods | Industrial education |
| Educational psychology | Remedial and special education |
| Educational sociology | Secondary education |
| Educational supervision | Tests and measurements |
| Elementary education | |
- 700 Thesis (*)**
Advanced degree candidates in education must register for "thesis."

COLLEGE OF ENGINEERING

Dean: **HAROLD E. WESSMAN, 206 Guggenheim Hall**

In the College of Engineering, graduate study leading to a Master of Science degree with departmental designation is available in the Departments of Aeronautics and Astronautics, Chemical, Civil, Electrical, and Mechanical Engineering, and in the School of Mineral Engineering through the Divisions of Ceramic, Metallurgical, and Mining Engineering.

The degree of Master of Science in Engineering (without departmental designation) is offered to qualified advanced students whose undergraduate majors have been in departments different from those in which they have worked toward

master's degrees and to students who are doing graduate work in several engineering departments with the approval of advisers in their major departments.

The degrees of Master of Aeronautics and Astronautics and Master of Electrical Engineering are offered to students who satisfactorily complete an approved two-year program of graduate work in aeronautics or electrical engineering.

Graduate study leading to the Doctor of Philosophy degree is available in aeronautics and astronautics, ceramic, chemical, civil, electrical, mechanical, and nuclear engineering, in metallurgy, and through the interdisciplinary program of engineering mechanics.

Admission to graduate study in engineering requires the approval of both the Graduate School and the engineering department in which the major work will be done.

ENGINEERING MECHANICS

An interdepartmental graduate program in engineering mechanics leading to the degrees of Master of Science in Engineering and Doctor of Philosophy is offered by the College of Engineering. The student will normally enroll in the Department of Aeronautics and Astronautics, Civil, or Mechanical Engineering.

Students entering this program should have completed an undergraduate degree in a field such as aeronautical, civil, or mechanical engineering, physics, engineering physics, mathematics, or an equivalent. The course program is planned through consultation with an adviser to fit the student's interests and background, but it will ordinarily consist of continuing study in mathematics and the engineering sciences (solid mechanics, fluid mechanics, thermodynamics, dynamics).

AERONAUTICS AND ASTRONAUTICS

**Chairman and Graduate Program Adviser: R. JOHN H. BOLLARD,
207 Guggenheim Hall**

The Department of Aeronautics and Astronautics offers courses leading to the advanced degrees of Master of Science in Aeronautics and Astronautics, Master of Science in Engineering (see page 150), Master of Aeronautics and Astronautics, and Doctor of Philosophy. Students who intend to work toward advanced degrees must meet the requirements of the Graduate School.

MASTER OF SCIENCE IN AERONAUTICS AND ASTRONAUTICS. A total of 39 credits is required: either the nonthesis option consisting of 39 credits of course work or the thesis option consisting of 30 credits of course work and 9 thesis credits. The student must follow an approved program of study including continuing study of applied mathematics and the engineering sciences (solid mechanics, gas dynamics, thermo- and electrodynamics of continua, dynamics) as well as electives related to the fields of aeronautics and astronautics. No foreign language is required.

MASTER OF AERONAUTICS AND ASTRONAUTICS. A total of 60 credits of course work and a more extensive thesis, equivalent to 18 credits of course work, are required for this more advanced degree. Other requirements are similar to those for the Master of Science degree.

DOCTOR OF PHILOSOPHY. Students working for this degree must complete an approved program of studies and a research program which makes a definite contribution to knowledge.

Before the student is allowed to take the General Examination for admission to candidacy, he must take comprehensive written and oral examinations to test his understanding and comprehension of the broad field of Aeronautics and Astronautics. After admission to candidacy and while carrying out the investigation for his dissertation, it is ordinarily required that the student be in full-time residence for at least one academic year of three consecutive quarters.

COURSES

- 300, 301, 302 Aerodynamics (3,3,3)** **Ganzer**
- 350 Aircraft Structural Laboratory (3)** **O'Brien**
- 360 Aircraft Engines (3)** **Eastman**
- N390-N391-392 Seminar (0-0-1)** **Eastman**
- 404 Introduction to Theoretical Aerodynamics (3)** **Ganzer**
- 405 Elements of Gas Dynamics (3)** **Street**
- 406 Aerodynamics of Viscous Flow (3)** **Street**
- 410, 411, 412 Aircraft Design (3,3,3)** **Ganzer**
- 422 Aerodynamics Laboratory (3)**
- 425 Flight Test Laboratory (3)** **Joppa**
- 430 Aerodynamic Performance, Stability, and Control (3)** **Ganzer**
- 441 Advanced Structural Design (3)** **Martin**
- 450 Astronautics (3)** **Street**
- 461 Jet Propulsion (3)** **Ganzer**
- 462 Propellers and Moving Wing Systems (3)** **Eastman**
- 470 Analytical Problems in Aeronautics (3)**
- 480 Elementary Design (3)** **Bollard**
- 481 Elementary Aeroelasticity (3)** **O'Brien**
- 501 Physical Gas Dynamics (3)** **Street**
Thermodynamics of real gases; reacting gas mixtures; derivation of thermodynamic properties from classical statistical mechanics of gases; equilibrium and non-equilibrium properties of air; reaction rates; introduction to kinetic theory as a non-equilibrium model. Formerly 508.
- 504 Aerodynamics of Non-Viscous Fluids I (3)** **Ahlstrom**
Equations of motion of an ideal, compressible fluid; incompressible potential flow; airfoil theory using conformal mapping; theory of the finite wing in incompressible flow; extension to high subsonic flow. Prerequisite, 404.
- 505 Aerodynamics of Non-Viscous Fluids II (3)** **Ahlstrom**
Transonic flow in the physical and hodograph planes; shock wave theory; expansion flow; exact solution for supersonic flow around a cone; small perturbation theory applied to bodies of revolution and two-dimensional wings in supersonic flow; conical flows and the delta wing. Prerequisite, 504.
- 506 Aerodynamics of Non-Viscous Fluids III (3)** **Ahlstrom**
Hypersonic flow theory; shock waves in hypersonic flow; Newtonian flow and small disturbance theory; hypersonic flow past blunt nosed bodies. Prerequisite, 505.
- 507 Aerodynamics of Viscous Fluids I (3)** **Street**
Equations of motion of a viscous compressible fluid; exact solutions; the laminar boundary layer equations; solutions for the flat plate and wedge in incompressible flow; Karman's momentum integral; laminar and turbulent boundary layer over wings and bodies. Prerequisite, 501.
- 508 Aerodynamics of Viscous Fluids II (3)** **Street**
The laminar compressible boundary layer equations; similarity solutions based upon the reduction of the compressible flow problem to incompressible form; momentum and energy integrals; heat transfer by high speed forced convection; extension to hypersonic flow with shock wave-boundary layer interaction. Prerequisite, 507.
- 509 Aerodynamics of Viscous Fluids III (3)** **Street**
Equations of motion of a dissociating or reacting gas; reduction of equations to boundary layer form; solutions of the boundary layer equations for laminar and turbulent flow. Prerequisite, 508.
- 510 Wave Propagation in Fluids and Solids (3)** **Fyfe**
Time dependent fluid flow problems; wave and shock propagation in gases and solids; the interaction of different wave forms and boundaries. Prerequisite, 569J.
- 511 Unsteady Aerodynamics (3)** **O'Brien**
Oscillating airfoils at subsonic and supersonic speeds; consideration of wings and bodies in unsteady flow. Prerequisites, 404, 405.
- 512 Magneto-Fluid Dynamics (3)** **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 propagation in a plasma. Prerequisite, 575.
- 514 Rarefied Gas Dynamics (3)** **Street**
Kinetic theory of gases; Boltzmann equation and the Maxwell transport equation; equations of continuum and slip flow, free-molecule and near free-molecule flows; applications to ultra-high altitude flight. Prerequisite, 501.

- 516 Stability and Control I (3)** **Ganzer**
General equations of motion of a flying vehicle; Eulerian axes and angles; non-dimensional linearized equations for dynamic stability; longitudinal and lateral dynamic characteristics of typical aircraft.
- 517 Stability and Control II (3)** **Ganzer**
Application of the Laplace transform to dynamic systems; feedback systems and their characteristics; response of flying vehicles to application of controls; automatic stability and control. Prerequisite, 516.
- 519 Special Topics in Stability and Control (3, maximum 6)** **Joppa**
N520-N521-522 Seminar (0-0-1)
- 523 Seminar in Aerodynamics (1-2, maximum 12)** **Street**
Study of recent advances in aerodynamics with students and staff reporting on recent publications. Topics vary from year to year. Open only to students having the M.S. degree or its equivalent.
- 530 Theory of Elastic Structures (3)** **Martin**
Stresses, strains, displacements; Hooke's Law; basic equations of elasticity; virtual work and energy theorems; application of theory to selected problems; approximate methods.
- 531 Analysis of Shells (3)** **O'Brien**
Kinematical, equilibrium, and inertial relationships for arbitrary shells; considerations of orthotropy, finite deflections and thermal stresses; applications to advanced aerospace structures. Prerequisite, 567.
- 532 Mechanics of Solids (3)** **Dill**
Phenomenological constitutive equations of solids. The mechanisms of fracture and fatigue. The process of melting and ablation. The impact of high velocity particles.
- 533 Theory of Plasticity (3)** **Martin**
Physical behavior of elastic-plastic and plastic structures; development of stress-strain relations and conditions for yielding; discussion of extremum principles; application of theory to representative problems. Prerequisite, 532.
- 540 Structural Problems (3)** **Martin**
Theory for analysis of complex structures; displacement and force methods; use of high speed calculating equipment; heated structures; nonlinear problems.
- 545, 546 Bioastronautics I, II (3,3)** **Bollard**
Systematic study in the way principles of engineering science apply to specific bio-systems and to acquaint the student with the principles of structure and function of the human organism in the alien space environment. 545 prerequisite to 546.
- 550 Space Dynamics (3)** **Fyfe**
Survey of the elementary principles. Variational principles and Lagrange's equations. Rigid body motion. Variable mass systems.
- 551 Aerospace Systems (3)** **Bollard**
The study of aerospace system analysis employing transform methods; the effect of sub-system behavior such as the flexibility of flight vehicle structure, aerodynamic forces, etc. Prerequisite, 550.
- 553 Vibrations of Aerospace Systems (3)** **O'Brien**
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. Prerequisite, 550.
- 555 Special Topics in Aerospace Systems (3, maximum 6)** **Bollard**
- 556 Aeroelasticity (3)** **O'Brien**
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. Prerequisite, 481.
- 557 Nonlinear Problems in Aerospace Systems (3)** **Fyfe**
Optimal control for non-linear control systems; existence of optimal control laws, Pontryagin's maximum principle, dynamic programming, approximation techniques for computing optimal control laws. Prerequisite, Mathematics 324, 325.
- 565 Approximate Analysis I (3)**
Approximate solution of differential equations (by infinite series and finite differences) and integral equations. Variational methods of Ritz and Galerkin. Prerequisite, 568 or Mathematics 428 and 429.
- 566 Approximate Analysis II (3)**
Conformal transformations of regions and their application to the solution of boundary value problems for harmonic and biharmonic functions. Prerequisite, 567, 568 or Mathematics 427, 428, 429.
- 567, 568 Analysis in Engineering (3,3)**
Mathematical methods for solving problems arising in engineering. 567: vector analysis, matrices, tensors, complex variables; 568: calculus of variations, Sturm-Liouville problems, series solutions and special functions for ordinary differential equations, orthogonal functions.

569J Partial Differential Equations (3)

Classification of second order partial differential equations; solution by separation of variables and reduction to a boundary value problem; theory of characteristics and solutions by means of Green's functions. Examples from classical mechanics of continua. Offered jointly with the Department of Mathematics. Prerequisite, 568 or Mathematics 428.

571 Flight Mechanics I (3)**Miele**

Equations of motion for rocket vehicles and for vehicles powered by air-breathing propulsion systems; scalar equations for flight over a flat earth and a spherical earth; quasi-steady flight of subsonic and supersonic aircraft; non-steady flight of supersonic aircraft, hypervelocity gliders, skip vehicles, and ballistic missiles. Prerequisite, 550.

572 Flight Mechanics II (3)**Miele**

Lagrange multipliers; Green's theorem method; variational methods; applications to the flight paths of aircraft, missiles, satellites and space ships; optimum shapes of wings, fuselages, nose cones and rocket engines. Prerequisite, 568.

573 Astrodynamics (3)**Miele**

Two-body problem; three-body problem; n-body problem; ballistic transfer between orbits; continuous thrust transfer; optimum interplanetary trajectories; re-entry of space vehicles. Prerequisite, 550.

575 Thermo- and Electrodynamics of Continua (3)**Dill**

The application of the principles of the phenomenological theory of irreversible thermodynamics and of the electrodynamics of continuous media to fluids and solids. Prerequisite, 567.

580, 581, 582 General Theory of Continuous Media (3,3,3)**Dill**

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, thermo-mechanical, electromagnetic, and electromechanical constitutive equations. Prerequisite, 567.

583 Plastic Flow and Fracture of Solids (3)**Dill**

A study of the growth and decay of discontinuities in otherwise elastic-plastic continuous media. Application to the fracture of solids. Prerequisite, 582.

599 Special Projects (2-5, maximum 15)

An investigation on a special project by the student under the supervision of a staff member.

600 Research (*)

Prerequisite, permission of the Graduate Program Adviser.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.

CHEMICAL ENGINEERING

Chairman and Graduate Program Adviser: RALPH W. MOULTON, 37 Bagley Hall

The Department of Chemical Engineering offers courses leading to the degrees of Master of Science in Chemical Engineering, Master of Science in Engineering, (see page 150), and Doctor of Philosophy. Prospective candidates for the degrees of Master of Science in Chemical Engineering and Doctor of Philosophy are required to take four qualifying examinations prior to initial registration for graduate study. These examinations are designed to assess the student's knowledge and understanding of material normally contained in an undergraduate program with a major in chemical engineering, and their results are used to aid the faculty in advising the student on registration. They are usually given during the week preceding the opening of Autumn Quarter. Special arrangements will be made for students entering at other times.

MASTER OF SCIENCE IN CHEMICAL ENGINEERING. The requirements for this degree are 30 credits of course work and a thesis. The course work is usually divided in the ratio of about two to one between Chemical Engineering and other departments. At least half of these courses must be numbered 500 or above. No foreign language is required.

DOCTOR OF PHILOSOPHY. In addition to the general requirements of the Graduate School, students who wish to work toward the Ph.D. degree must pass a Preliminary Examination. This examination is normally taken after three quarters of satisfactory graduate study. It is designed to assess the student's comprehension of

both undergraduate and graduate material and especially his ability to apply fundamental concepts to new and varied situations.

ADDITIONAL INFORMATION. More detailed information on degree requirements is available from the Graduate Program Adviser.

COURSES

N381, N382 Field Trip (0,0)

384 Industrial Stoichiometry (4)

385 Chemical Engineering Thermodynamics (4)

451 Chemistry of Wood (3)

Sarkanen

452 Pulp and Paper Technology (3)

Sarkanen

453 Pulp and Paper Laboratory (2)

Sarkanen

470 Transport Process Principles (4)

471, 472 Unit Operations (3,3)

474, 475, 476 Unit Operations Laboratory (2,2,2)

481 Process Design Principles I (3)

482 Process Design Principles II (3)

483 Chemical Engineering Process Design (5)

485 Industrial Electrochemistry (3)

Moulton

(Offered when demand is sufficient.)

N520, N521, 522 Seminar (0,0,1)

523 Seminar in Chemical Engineering (0-3, maximum 12)

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)

McCarthy

Review of principles of thermodynamics; statistical foundations. Applications to problems in multiphase and multicomponent systems. Irreversible thermodynamics. (Formerly 575.) Prerequisite, undergraduate thermodynamics.

530 Introduction to Transport Phenomena (3)

Sather

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. (Formerly 570.) Prerequisite, 470 or permission.

531 Topics in Transport Phenomena (1-3, maximum 6)

Sather

A more comprehensive treatment of the material presented in 530 with particular emphasis on molecular mechanisms for transport in dense gases and liquids. Prerequisite, one year of graduate study or permission.

540, 541 Fluid Mechanics (3,3)

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. (540 formerly 574.) Prerequisites, 530 and Aeronautical Engineering 567 or permission.

542 Hydrodynamic Stability (3)

Sleicher

Methods used in analyses of hydrodynamic stability. Stability of accelerated interfaces, jets of immiscible fluids, vortex sheets, and rotating flow. Convective and magnetohydrodynamic instability, stability of parallel flows including boundary layers, the Orr-Sommerfeld equation. Prerequisite, 6 credits of graduate fluid mechanics.

543, 544 Fluid Turbulence (3,3)

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, phenomenological theories of energy transport, instrumentation, recent literature. Prerequisite, 6 credits of graduate fluid mechanics.

550 Heat Transfer (3)

David

Steady and unsteady state conduction with emphasis on numerical methods. Thermal radiation exchange between surfaces and in gas-filled enclosures. Basic concepts and recent developments in convective heat transfer theory and applications thereof. (Formerly 571.) Prerequisites, 525 and 530, or permission.

551 Topics in Heat Transfer (1-3, maximum 6)

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, 550 or permission.

560 Mass Transfer (3)

Heideger

Diffusion equations; transfer of material between phases; mathematical models. Dispersion in flow systems; residence time analyses. Simultaneous mass transfer and chemical reaction. (Formerly 572.) Prerequisite, graduate standing.

- 561 Topics in Mass Transfer (1-3, maximum 6)** **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.
- 565 Kinetics and Catalysis (3)** **Johanson**
Homogeneous and heterogeneous systems with emphasis on chemical engineering principles applied to industrial reactor design. (Formerly 581.) Prerequisite, 525.
- 566 Topics in Reaction Kinetics (1-3, maximum 6)** **Johanson**
Considerations of particular problems in chemical reactions, combustion, elevated temperature systems, reactor design. Prerequisite, 565 or permission.
- 570 Chemistry of High Polymers (3, maximum 6)** **McCarthy, Sarkanen**
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. (Formerly 586.) Prerequisite, an undergraduate sequence in organic chemistry.
- 571 Cellulose and Lignin (3)** **McCarthy, Sarkanen**
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. (Formerly 587.) Prerequisite, an undergraduate sequence in organic chemistry.
- 575 Topics in Analysis in Chemical Engineering (1-3, maximum 6)** **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.
- 580 Process Dynamics I (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.
- 581 Process Dynamics II (3)** **Garlid**
A continuation of 580. Statistical dynamics of control systems. Z-transforms and sampled data systems. Applications to flow and pressure systems, load and inventory systems, thermal dynamics, fractionating columns, stirred and tubular reactors. Optimization of over-all process design and operation, linear programming, dynamic programming. Prerequisite, 580.
- 588J Nuclear Chemical Separations Processes (3)** **Babb**
Applications of chemical engineering principles to processing of nuclear reactor materials and irradiated fuels. Fuel cycles; properties of irradiated fuel; theory of molecular separations processes; analysis of steady state and transient characteristics of chemical processing operations. Offered jointly with Nuclear Engineering. Prerequisites, 530, Nuclear Engineering 484, or permission.
- 599 Current Topics in Chemical Engineering (1-3, maximum 12)**
Readings or lectures and discussions of topics of current interest in the field of chemical engineering. Subject matter changes from year to year. Prerequisite, permission of the Graduate Program Adviser.
- 600 Research (*)**
Prerequisite, permission of the Graduate Program Adviser.
- 700 Thesis (*)**

CIVIL ENGINEERING

Chairman: CHARLES H. NORRIS, 201 More Hall

Graduate Program Adviser: S. SERGEV, 213A More Hall

The Department of Civil Engineering offers courses leading to the degrees of Master of Science in Engineering (see page 150), Master of Science in Civil Engineering, and Doctor of Philosophy.

MASTER OF SCIENCE IN CIVIL ENGINEERING. Graduate work leading to this degree is offered in the fields of hydraulic engineering, sanitary engineering, soil mechanics, engineering mechanics, structural engineering, and transportation (highway) engineering. The requirements are: a minimum of 39 credits, of which 30 credits must be in formal course work and 9 in thesis. No foreign language is required.

DOCTOR OF PHILOSOPHY. Students working for this degree must complete an approved program of studies and a research program which makes a definite contribution to knowledge. This research program may be in one of the following areas: hydraulics and fluid mechanics, sanitary engineering, soil mechanics, engineering mechanics, structural engineering, or transportation engineering.

COURSES**GENERAL**

- 520 Seminar (1, maximum 6)**
Students should register for H (hydraulics), M (mechanics), S (structures), T (transportation), or W (sanitary). Prerequisite, permission.
- 599 Special Topics (2-5, maximum 15)**
Special topics under the direction of staff members. Students should register for H (hydraulics), M (mechanics), S (structures), T (transportation), or W (sanitary). Prerequisite, instructor's permission.
- 600 Research (*)**
Special investigation by graduate students under the direction of staff members. Students should register for H, M, S, T, or W. Prerequisite, permission of the Graduate Program Adviser.
- 700 Thesis (*)**

GEOMETRONICS

- 415 Photogrammetry (3)** **Chittenden, Colcord**
- 417 Cadastral Surveys (2)** **Colcord**
- 419 Celestial Methods in Geodesy (2)** **Colcord**

TRANSPORTATION ENGINEERING

- 405 Critical Path Methods of Construction Scheduling (3)** **Horwood**
- 424 Highway Pavement Design (3)** **Ekse**
- 501 Quantitative Methods of Urban Analysis (3)** **Horwood**
Spatial and econometric models of urban land use and activities. Population distribution and allocation models. Programming theories and feedback and review techniques. Prerequisite, Mathematics 281 or Sociology 223 or equivalent.
- 502 Computer Applications to Urban Analysis (3)** **Horwood**
Data storage and retrieval systems and data bank design. Computer methods of mapping and graphing from card input data. Multiphasic data screening techniques and automation of records search. Prerequisite, 501 or permission.
- 503 Data Systems Development for Environmental Studies (3)** **Horwood**
Methods of handling large-scale data inputs. Computer methods of graphing and mapping from magnetic tape input data. Computer applications to statistical analysis and simulation models. Prerequisites, 502, Mathematics 374, Electrical Engineering 477, or permission.
- 504 Highway Finance, Policy and Programming (2)** **Hennes, Horwood**
Consideration of the factors affecting transportation planning and the establishment of priorities in construction scheduling. Alternative methods for financing road and street facilities. Prerequisite, graduate standing.
- 505 Economic Analysis of Public Works (2)** **Hennes, Horwood**
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. Prerequisite, graduate standing.
- 510 Traffic Engineering—Analysis (2)** **Sawhill**
Measurement and evaluation of characteristics of vehicular volume, speed, travel time and delay. Analysis of roadway and intersection capacity. On-street parking studies, analysis of traffic accidents, signal timing, and signal systems. Prerequisite, 410 concurrently or permission.
- 511 Traffic Engineering—Administration and Operations (2)** **Sawhill**
Comprehensive review of Uniform Vehicle Code and Manuals on Uniform Vehicle Control Devices. Warrants and use of signs, signals, markings, and channelization. Traffic engineering administration, federal, state, county, and municipal. Prerequisite, 410 or permission.
- 512 Traffic Engineering—Planning (2)** **Sawhill**
Application of origin and destination studies, traffic assignment and trip generation models to limited and comprehensive traffic studies. Traffic engineering functions in arterial street systems planning. Downtown traffic planning and traffic facilities location. On- and off-street parking and characteristics of special terminal facilities. Prerequisite, 410 or permission.
- 513 Traffic Engineering—Design (3)** **Sawhill**
Factors and elements in the geometric design of arterials, freeways, intersections, interchanges, and parking facilities. Special design studies and reports. Prerequisite, 410 or 512, or permission.
- 518 Geodesy (3)** **Colcord**
Introduction to problems of gravimetric and geometric geodesy. Potential attraction, gravity observation and reduction. Properties of the ellipsoid and geoid and computation of geodetic position and distances. Prerequisite, permission.
- 521 Seminar in Urban Transportation Planning (2)** **Hennes, Horwood**
Prerequisite, civil engineering or urban planning graduate, or permission.

- 522 Transportation Systems (3)** **Ekse, Hennes**
Inter-regional 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, 421.
- 523 Transportation Terminals (3)** **Ekse, Hennes**
Coordination of transportation facilities. Port and harbor installations. Airports. Rail belt lines and terminals. Prerequisite, 421.
- 524 Rapid Transit (3)** **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.

HYDRAULIC ENGINEERING

- 342 Fluid Mechanics I (4)** **Chenoweth, Kent, Moritz, Neco, Richey, Strausser**
- 345 Fluid Mechanics II (3)** **Chenoweth, Kent, Moritz, Richey, Strausser**
- 441 Intermediate Fluid Mechanics (3)** **Neco, Richey**
- 445 Hydraulic Machinery (3)** **Moritz**
- 446 Hydraulic Engineering (3)** **Richey**
- 447 Applied Hydrology (3)** **Campbell, Richey**
- 448 Reclamation (3)** **Campbell, Strausser**
- 542 Hydrodynamics I (3)** **Neco, Richey**
Fundamentals of potential flow theory. Two- and three-dimensional flow examples. Circulation, lift, vortex motion. Complex variables, conformal mapping, and other solution techniques. Prerequisite, 441 or permission.
- 543 Hydrodynamics II (3)** **Neco, Richey**
Viscous flows: the Navier-Stokes equations, and some exact solutions. Boundary layer theory. Instability of laminar flow. Introduction to turbulent flow and turbulent diffusion. Prerequisite, 442.
- 544 Wave Dynamics (3)** **Richey**
Basic water wave theories, with applications to engineering structures. Prerequisites, 542, Oceanography 411, or permission.
- 547 Advanced Hydrology (4)** **Campbell, Richey**
Theory and application of hydrology, with emphasis on water power development. Precipitation, runoff, maximum and minimum flows, flood routing. Economics of storage and transportation of water. Types of hydroelectric installations; multiple use projects. Special problems in hydrology and hydraulic power. Prerequisite, 346 or permission; not open to students with credit in 447.
- 549 Experimental Hydrodynamics (3)** **Neco**
Experimental studies of steady and unsteady flow phenomena. Model tests as used in hydraulic design. Instrumentation and experimental techniques. Prerequisite, 441 or permission.

SANITARY ENGINEERING

- 350 Sanitary Engineering I (3)** **Bogan, Carlson, Christman, Oglesby, Sylvester**
- 452 Water Supply (3)** **Bogan, Carlson, Sylvester**
- 454 Sewerage (3)** **Bogan, Carlson, Sylvester**
- 455 Sanitary Biology (3)** **Carlson, Oglesby**
- 456 Process Chemistry for Sanitary Engineers (4)** **Bogan, Christman**
- 550 Sanitary Engineering Unit Operations I (3)** **Carlson**
Physical and biological operations involved in treatment of water-biological population control, solid-liquid separation, material and energy balances, design of biological operations. Prerequisite, 455 or permission.
- 551 Sanitary Engineering Unit Operations II (3)** **Bogan**
Design of chemical operations employed in the treatment of water and wastes including solids separations, chemical coagulation, ion exchange, and gas transfer. Theoretical development of design parameters and evaluation of functional performances, reaction rates, mass balances, and power requirements. Prerequisite, 456.
- 552 Treatment Process and System Design (3)** **Bogan, Carlson**
Functional design of processes and systems for the treatment of water and waste water to meet specific situations. Comprehensive design of specific process including selection and design of equipment and control elements, plant layout and site development, and cost studies. Introduction to use of systems analysis methods and mathematical description of process performance. Prerequisites, 550 and 551.
- 553 Advanced Sanitary Biology (3)** **Carlson, Oglesby**
Impoundment, estuarine and stream environments; normal biota and ecological changes resulting from introduction of pollutants; study of laboratory microcosms before and after addition of organic wastes. Prerequisites, 455 and 456.

- 554 Advanced Process Chemistry for Sanitary Engineers (3)** **Bogan, Christman**
Properties of colloidal systems, natural and synthetic organic materials encountered in water and waste water treatment, and laboratory methods for their analysis. Prerequisite, 456 or permission.
- 555 Topics in Analysis and Design of Sanitary Systems (3)** **Bogan**
Mathematics of treatment processes and systems of interest to the sanitary engineer. Use of analog and digital computers for simulating multi-use river systems treatment processes and operations, and water distribution networks. Computer programming for design optimization and system control. Prerequisite, one year of graduate study or permission.
- 556 Bio-Engineering Aspects of Waste Treatment (3)** **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, 550 or permission.
- 557 Water and Waste-Water Treatment (3)** **Sylvester**
Objectives of water and waste-water treatment; associated physical, chemical, and biological phenomena; design of common treatment systems. Prerequisites, 452, 454, or permission.
- 558 Water Quality Management (3)** **Sylvester**
Water quality control objectives, methods, criteria, philosophies; receiving water characteristics; dispersion and behavior of pollutants; treatment required for various water usages. Prerequisites, 455, 456, or permission.
- 559 Water Resource Management and System Designs (3)** **Sylvester**
Engineering, social, and economic factors involved in water resource development and management. Design considerations for regional water resource systems. Prerequisite, 558 or permission.
- 560 Topics in Environmental Health Engineering (3)** **Sylvester**
Survey of environmental health practices and problems with emphasis on the role of sanitary engineering.
- 561 Air Resources Engineering I (3)** **Rossano**
Production, emission, and transfer of contaminants through the atmosphere. Detection, analysis, and control of air pollution. Prerequisite, 350 or permission.
- 562 Air Resources Engineering II (3)** **Rossano**
Fundamental and applied air resource engineering; physics and chemistry of the atmosphere; biologic and economic effects of air pollution; design of air pollution control systems. Prerequisite, 561 or permission.
- 563 Air Resources Management (3)** **Rossano**
The atmosphere as a vital natural resource. Administrative and legal aspects of air conservation; quality criteria and emerging problems. Prerequisite, 561 or permission.

ENGINEERING MATERIALS AND SOIL MECHANICS

- 363 Construction Materials I (3)** **W. Miller, Vasarhelyi**
- 364 Construction Materials II (3)** **Ekse, Mittet**
- 466 Soil Mechanics (3)** **Hennes, Mosse**
- 467 Earthwork Engineering (3)** **Hennes, Mosse**
- 565 Airphoto Interpretation in Soil Engineering (3)** **Colcord**
Use of aerial photographs for terrain evaluation in soil mapping and material surveys, route location problems, urban planning and engineering site locations. Prerequisites, 415, Geology 310, or permission.
- 556 Engineering Properties of Clay (3)** **Meese**
Shearing strength, consolidation characteristics, structural concepts, and related properties of clay. Prerequisite, 466.
- 568 Seepage and Slope Stability (2)** **Hennes**
Control of landslides; effect of seepage and porewater pressure on the stability of earth masses. Prerequisite, 467 concurrently.
- 569 Applied Soil Mechanics (3)** **Hennes, Meese**
Soil mechanics in engineering practice; the application of theory to the analysis of footings, piling, retaining walls, tunnels, and other substructures. Prerequisites, 466 and graduate standing.

STRUCTURAL ANALYSIS AND DESIGN

- 380 Basic Structural Engineering (2)** **Clanton, A. L. Miller, Mittet, Rhodes**
- 381, 382 Structural Analysis I, II (3,3)** **Hartz, A. L. Miller, Mittet, Rhodes**
(Formerly 370, 371.)
- 481 Bridge Design (3)** **Clanton, Rhodes**
- 482 Advanced Reinforced and Prestressed Concrete (3)** **Clanton, Mittet**
- 483 Structural Design I (4)**
(Formerly 470.)
- 484 Structural Design II (5)**
(Formerly 480.)

- 485 Applied Structural Analysis (3)** **A. L. Miller**
- 494 Introduction to the Mechanics of Continuous Media (3)** **Hartz**
- 580 Strain Measurements (3)** **Hartz, Vasarhelyi**
Experimental determination of strain under static and dynamic loads; mechanical, optical and electrical strain gages; transducers for displacement, velocity and acceleration; photo-elasticity, strain rosette, brittle coating and other methods; problems of instrumentation, and analysis of data. (Formerly 570.) Prerequisite, graduate standing in engineering.
- 581 Advanced Structures (3)** **A. L. Miller, Vasarhelyi**
Multi-story, multi-bay rigid frames including wind and earthquake loads. Theory of flexure of members of nonuniform section. Nonrectangular rigid frames. Moment-area and moment-distribution methods. Prerequisite, graduate standing in civil engineering.
- 582 Advanced Structures (3)** **A. L. Miller, Vasarhelyi**
Truss deflection and secondary stresses. Trussed arches. Multi-span trusses. Redundant members. Mueller-Breslau Maxwell-Mohr, and strain-energy methods. Prerequisite, graduate standing in civil engineering.
- 583 Advanced Structures (3)** **A. L. Miller, Vasarhelyi**
Ideal, two-hinged and hingeless elastic arches. Influence lines for statically indeterminate structures. Castigliano's theorem and strain-energy methods applied to curved members of nonuniform section. Prerequisite, graduate standing in civil engineering.
- 584 Plastic Design of Structures (3)** **Vasarhelyi**
Plastic (inelastic) behavior of structural materials. Applications to the design of structural members and systems. Principles of upper and lower bound. Limitations and economy of the procedure. Prerequisite, 581.
- 586 Structural Materials and Design (3)** **Vasarhelyi**
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.
- 587 Design of Welded Structures (3)** **Vasarhelyi**
A broad review of the factors such as the function of the structure, the mechanical properties of the base metal and welds, structural details, and type of loading which must be considered in the design of a welded structure. Prerequisite, 586.
- 590 Structures Under Wind (3)** **Farquharson**
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 result of wind action. Prerequisite, graduate standing in engineering.

STRUCTURAL AND ENGINEERING MECHANICS

- 570 Advanced Mechanics of Materials I (3)** **Sergev**
Torsion of non-circular and hollow members, open and closed sections. Membrane stresses in shells. Introduction to the theory of elasticity, Airy's stress function. Beam columns. Thick-walled cylinders. Prerequisite, 470 or graduate standing.
- 571 Advanced Mechanics of Materials II (3)** **Sergev**
Beams on elastic foundations. Bending of circular and rectangular plates. Introduction to bending theory of shells. Prerequisite, 570 or permission.
- 572 Advanced Mechanics of Materials III (3)** **Sergev**
Theory of elastic stability. Columns. Buckling of frameworks. Lateral and torsional buckling of beams. Stability of plates and shells. Prerequisite, 571 or permission.
- 573 Structural Mechanics I (3)** **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.
- 574 Structural Mechanics II (3)** **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, 573 or permission.
- 575 Structural Mechanics III (3)** **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, 574 or permission.
- 576 Theory of Plates and Shells (3)** **Sergev, Wilson**
General methods and advanced topics in the bending of thin plates. General theory for the deformation of thin shells. Boundary conditions. Approximate theories. Translational shells and shells of revolution. Prerequisite, 571 or permission.
- 591 Theory of Elasticity I (3)** **Hartz, Wilson**
Elementary formulation of plane elasticity theory. Airy's stress function. Polynomial solutions. Series solutions in rectangular and polar coordinates. Saint-Venant's theory of torsion. Solution by energy methods. Prerequisite, graduate standing in engineering.

- 592 Theory of Elasticity II (3)** **Hartz, Wilson**
Formulation of classical theory in terms of cartesian tensors. Complex representation of Airy's stress function. Solution by application of conformal mapping and Cauchy integrals. Prerequisite, 591 or Aeronautics and Astronautics 530 or Mechanical Engineering 551, or permission.
- 593 Theory of Elasticity III (3)** **Hartz, Wilson**
Invariant formulation of nonlinear theory including effects of large displacements, finite rotations, and finite deformations. Stability of equilibrium configurations. Linear problems for three-dimensional isotropic and anisotropic bodies. Prerequisites, 592 and Aeronautics and Astronautics 580.
- 594 Wave Propagation in Solids (3)** **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. Prerequisite, 574 or 592, or permission.

ELECTRICAL ENGINEERING

Chairman: AUSTIN V. EASTMAN, 211 Electrical Engineering

Graduate Program Adviser: W. E. ROGERS, 304 Electrical Engineering

The Department of Electrical Engineering offers courses leading to the degrees of Master of Science in Electrical Engineering, Master of Science in Engineering (see page 150), Master of Electrical Engineering, and Doctor of Philosophy.

No foreign language is required for the master's degrees.

Students who received their undergraduate training at other institutions are expected to have substantially the same training as that given to students at this University. In case of deficiencies, students may be required to take certain undergraduate courses in addition to the normal graduate program.

MASTER OF SCIENCE IN ELECTRICAL ENGINEERING. A total of 36 credits of course work and a suitable thesis (normally 9 credits) are required for this degree. Course work should be divided between electrical engineering and supporting courses in other fields in the ratio of approximately two to one. The courses must include 510 and N520-N521-522. Other electrical engineering courses must be chosen from those numbered 500 or above, with the following exception: On the approval of the student's Supervisory Committee, not more than two of the following senior elective courses, 441, 469, 479, 485, may be applied to this degree. University of Washington graduates are expected to include 441 and one of the others in their undergraduate programs.

MASTER OF ELECTRICAL ENGINEERING. This is a more advanced degree than that of Master of Science in Electrical Engineering. A total of 72 credits of course work and a more extensive thesis are required. Other requirements are similar to those for the Master of Science degree. Certain physics courses may be used in partial satisfaction of the major requirements.

DOCTOR OF PHILOSOPHY. This is primarily a research degree. It is not conferred as a result of course work, no matter how faithfully or long it is pursued. The granting of the degree under the sponsorship of the faculty in this Department is based essentially on general proficiency and distinctive attainments in electrical engineering, particularly on the demonstrated ability to pursue independent research. Evidence of research investigation is the production of a doctoral dissertation which makes a definite contribution to knowledge and is presented with a satisfactory degree of literary skill. In addition to the general requirements of the Graduate School (see page 150) the faculty in this Department selects prospective candidates for the doctor's degree from outstanding students at the master's level by means of a series of written examinations given each year in the Winter Quarter.

COURSES

The following 300-level courses and any 400 courses listed in the *College of Engineering Bulletin* may be used for minor or supporting courses for students from other departments, subject to approval by their Graduate Program Adviser. Graduate students majoring in electrical engineering may secure approval from the Graduate Program Adviser for one or two of the 400-level courses listed below.

- 321 Electromagnetic Fields and Waves I (4)**
To be taken concurrently with 322.
- 322 Electromagnetic Fields and Waves Laboratory I (1)**
To be taken concurrently with 321.
- 323 Electromagnetic Fields and Waves II (4)**
To be taken concurrently with 324.
- 324 Electromagnetic Fields and Waves Laboratory II (1)**
To be taken concurrently with 323.
- 325 Electromagnetic Fields and Waves III (4)**
To be taken concurrently with 326.
- 326 Electromagnetic Fields and Waves Laboratory III (1)**
To be taken concurrently with 325.
- 361 Physical Electronics (4)**
- 363 Electronic Devices and Circuits (4)**
To be taken concurrently with 364.
- 364 Electronics Laboratory I (1)**
To be taken concurrently with 363.
- 365 Electronic Circuits (4)**
To be taken concurrently with 366.
- 366 Electronics Laboratory II (1)**
To be taken concurrently with 365.
- 441 Linear Systems Analysis (3)**
- 445 Nonlinear Systems Analysis (4)** Lindsay
- 469 Advanced Field Theory (4)** Peden
- 479 Fundamentals of Automatic Control (4)** Bergsoth, Clark, Hsu, Noges
- 485 Introduction to Solid State Electronics (4)** Bjorkstam, Watt, Hanson
- 505 Analysis of Random Processes (3)** Lytle
Probability theory; discrete and continuous random variables; stochastic processes. Spectral analysis of random signals and noise. Introduction to Markov processes. Corequisite, 441.
- 510 Introductory Network Theory (5)** Hsu, Lewis, Lytle
Mathematical concepts applicable to network theory, including mesh and nodal formulations in matrix form. Linear transformations and relation of quadratic forms to energy functions. Elements of complex variable including conformal transformations and complex potential applied to fields and networks. Complex contour integration and evaluation of residues; application to Laplace transforms and determination of transient response. Prerequisite, 441.
- 511, 512 Network Synthesis I, II (3,3)** Lewis
Network representations 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. Corequisite, 510 for 511; prerequisite, 511 for 512.
- 514 Power System Analysis (5)** Bergsoth
Methods of analysis of power systems, with emphasis on the interrelations between generation, transmission, and distribution; symmetrical components; evaluation of system parameters and sequence networks; fault studies; transient and steady-state behavior of systems; elements of system protection. Offered when adequate enrollment develops prior to close of advance registration. Prerequisite, 343.
- 515 Measurements and Circuit Components (2)** Cochran
Measurements of circuit components from zero to one thousand megacycles, impedance and phase measurements at audio through UHF; use of electronic counters and precision frequency measuring equipment; noise figure measurements. Prerequisite, 323.
- N520-N521-522 Seminar (0-0-2)**
Required for all graduate students.
- 531 Solid State Electronics I (4)** Bjorkstam, Watt
Matrix formulation of quantum theory, perturbation theory; lattice vibrations; introduction to the band theory of solids; some properties of normal and super conducting metals; dielectric and magnetic properties of materials including some discussion of ferroelectricity and ferromagnetism; luminescence; fundamentals of magnetic resonance. Prerequisite, 485.

- 532 Solid State Electronics II (4)** **Bjorkstam, Hanson**
Solid state electronic devices including ferrites, parametric amplifiers, masers, semiconductor and superconductor devices. Prerequisite, 531.
- 535 Semiconductor Circuit Analysis (4)** **Hanson**
Topics in transistor characterization relating to high-frequency and switching behavior. Analysis and design of semiconductor circuits, principally involving transistors. An important part of the course is a laboratory assignment. Prerequisite, 485 or permission.
- 541 Microwave Circuit Techniques (4)** **Peden**
Microwave and antenna theory as related to experimental practice, representation and measurement of microwave circuits in terms of scattering coefficients, T and pi networks, canonical networks, properties of radiating structures. Prerequisites, 469 or equivalent.
- 551 Power System Protection (3)** **Bergsoth**
Protection of power systems and equipment against both overvoltages and overcurrents; includes power circuit breakers, fuses, relays, lightning arrestors, expulsion tubes, and the influence of neutral grounding methods in overvoltages. Offered when adequate enrollment develops prior to close of advance registration. Prerequisite, 514 or permission.
- 562 Physical Electronics (3)** **Shimada**
Basic analysis of vacuum tubes and gas discharges. Thermionic emission, work function, Schottky effect. Field emission and devices using field emission and cold emission. Space-charge-limited current flow. Application of conformal mapping in electrostatic field in tubes. Noise. Kinetic theory of gases; creation of charged particles. Modes of gas discharges; various regions in gas discharges. Microwave properties of plasma. Ion sheath; probe technique. Discussions on plasma energy convectors. Prerequisite, 441.
- 563 Electrical Noise I (3)** **Shimada**
The noise theory and its application to electron devices. Fourier analysis of stationary random process; correlation; noise power spectrum. Statistics; distribution functions; Gaussian distribution. Characterization of noisiness; noise ratio, noise figure, noise measure, noise temperature. Noise measurements; noise in quadratic detector. Prerequisite, 505 or permission.
- 564 Electrical Noise II (3)** **Shimada**
Noise in vacuum tubes, semiconductors; noise suppression, excess noise. Noise in transistors, mixers, detectors, parametric amplifiers, electron beam devices, masers, and other low noise devices. Prerequisite, 563.
- 566 Microwave Measurements (2)** **Harrison**
Measurements of wave length, admittance, power, dielectric constant, and losses in the microwave frequency region utilizing wave guide techniques. Problems in impedance matching and impedance transformation based on laboratory work. Includes one three-hour laboratory per week. Prerequisites, 323 and 365.
- 567 Microwave Vacuum Tubes (4)** **Harrison**
Theory of microwave vacuum tubes, including triodes, klystrons, traveling wave tubes, and magnetrons, and their modulation characteristics. Oscillator theory is considered in detail, with klystron oscillators used to illustrate general principles. Prerequisite, 566 or permission.
- 568 Microwave Electronics (3)** **Golds**
A selection of topics applicable to the study of microwave tubes. Formation and focusing of electron beams. Application of various theories to the interaction of electron beams with electromagnetic fields. Prerequisite, 469.
- 570 Antenna Theory (3)** **Reynolds, Swarm**
Theory of radiation; impedance characteristics and radiation patterns of thin linear antenna elements; properties and synthesis of antenna arrays; field intensity calculations. Prerequisite, 469.
- 572 Microwave Network Theory (4)** **Ishimaru**
Theory of uniform and non-uniform waveguides, radial and spherical waveguides. Eigenfunctions and Green's functions. Closed and open structures. Slow and leaky waves. Periodic structures. Discontinuities in waveguides. Anisotropic media. Prerequisites, 441 and 469.
- 574 Microwave Antennas (4)** **Ishimaru**
Microwave antennas on cylindrical, spherical, and other structures. Excitation of trapped surface waves and leaky waves. Green's functions for a continuous spectrum. Saddle point method. Watson transform. Radar cross section. Geometric and physical optics. Variational principles. Prerequisite, 572, and corequisite, Mathematics 429, or permission.
- 575 Microwave Propagation (4)** **Ishimaru**
Excitation and propagation of waves in layered media. Trapped surface wave, leaky wave, and Sommerfeld poles. Poles near saddle points. Lateral waves. Anisotropic media. Diffraction by obstacles and slits. Rayleigh and Kirchhoff approximations. Wiener-Hopf techniques. Partially coherent electromagnetic waves. Prerequisite, 574 or permission.
- 576 Communication Theory I (3)** **Lytle**
Mathematical theory of communication. Information theory for discrete and continuous systems. Channel capacity and coding. Prerequisite, 505 or permission.
- 577 Communication Theory II (3)** **Lytle**
Communication in the presence of noise. Analysis of systems with random inputs. Optimum linear systems, statistical detection of signals, decision theory. Statistical analysis of nonlinear systems. Prerequisite, 505 or permission.

- 578 Radio Propagation I (3)** **Swarm**
Theory of electromagnetic propagation over a finite conductive earth and in a horizontally stratified media; theory of scattering with applications to the troposphere. Prerequisite, 469.
- 579 Radio Propagation II (3)** **Swarm**
Theory of electromagnetic propagation in ionized medium with application to the ionosphere. Theory of ionospheric scattering, meteor reflection, and auroral propagation. Prerequisite, 469.
- 580 Electroacoustics (4)** **Rogers, Hill**
Vibration of strings, bars, and membranes; acoustical wave equation and solutions; electric, acoustic, and mechanical analogies; acoustical networks and measurements; architectural acoustics; properties of hearing; loudspeakers, microphones, and sound reproduction. Includes one four-hour laboratory on alternate weeks. Offered when adequate enrollment develops prior to close of advance registration. Prerequisite, 323.
- 581 Control System Measurements (2)** **Noges**
Theory and practice in measurement of control system parameters. Determination of transfer functions for various system components by transient and frequency response measurements. Prediction of feedback system performance from experimentally derived data, with experimental verification. Use of the analog computer in simulation. Prerequisite, 479.
- 582 Analytical Design of Control Systems (4)** **Clark**
Synthesis of linear automatic control systems to satisfy analytical performance criteria. Performance measures for control systems and minimization techniques. Elements of probability theory and statistical analysis of random, continuously varying time functions. Minimization of mean square error in the presence of noise. The adaptive control system problem. Prerequisites, 479, 505; 583 recommended.
- 583 Nonlinear Control Systems (3)** **Noges**
Dynamic analysis of nonlinear control systems. Graphical and numerical methods for solution of nonlinear differential equations. Limit cycles and other phenomena peculiar to nonlinear systems. Use of phase-space, describing function, and simulation techniques in the analysis of nonlinear servomechanisms. Self-adaptive control systems. Prerequisite, 479.
- 584 Sampled-Data Control Systems I (4)** **Hsu**
Sampling process and data reconstruction; Z-transform analysis of linear sampled-data systems; modified Z-transform analysis behavior of systems between sampling instants; multirate sampled-data systems; sampled-data systems with finite sampling duration; general design principles of sampled-data systems. Prerequisites, 441, 479, and Mathematics 427.
- 585 Sampled-Data Control Systems II (4)** **Hsu**
Digital compensation of control systems; sampled-data control systems with random input; nonlinear sampled-data control systems; other current topics on sampled-data control systems. Prerequisite, 584.
- 586 Electrical Computing Methods (4)** **Johnson**
Theory and practice of number systems, logical analysis, digital computer organization. Generalized and specific digital computer programming. Numerical techniques. Use of computation facilities of Computer Research Laboratory. Prerequisite, graduate standing.
- 587 Applications of Digital Computers to Engineering Problems (4)** **Johnson**
Stochastic methods, statistical analysis, error analysis, limitations of specific computers. Prerequisites, 505 and 586.
- 588 Logical Design of Digital Computers I (3)** **Johnson**
Circuit components and binary numbers, Boolean algebra and the simplification of Boolean functions. Memory element input and application equations. Digital computer memories, computer arithmetic units, control units. Computer design organization. Prerequisite, graduate standing.
- 589 Logical Design of Digital Computers II (3)** **Johnson**
Analysis and synthesis of digital systems from logical models, sequential and time independent logic, Boolean matrix analysis, "nand" and "nor" logic. Evaluation of various analysis and synthesis methods in application to logical problems. Prerequisite, 588.
- 599 Selected Topics in Electrical Engineering (*)**
Prerequisite, permission of the Graduate Program Adviser.
- 600 Research (*)**
Prerequisite, permission of the Graduate Program Adviser.
- 700 Thesis (*)**
Prerequisite, permission of supervisor.

MECHANICAL ENGINEERING

Chairman: CHARLES JACOB KIPPENHAN, 142 Mechanical Engineering
Graduate Program Adviser: BLAKE D. MILLS, 314 Mechanical Engineering

The Department of Mechanical Engineering offers courses leading to the degrees of Master of Science in Engineering (see page 150), Master of Science in Mechanical Engineering, and Doctor of Philosophy.

MASTER OF SCIENCE IN MECHANICAL ENGINEERING. This degree requires a 9-credit thesis and a minimum of 30 credits of approval course work, including seminar courses N518-N519-520. Subject to approval of the Graduate Program Adviser, students may select courses in accordance with their special interests and objectives. No foreign language is required.

Students working for this degree are expected to have had undergraduate training substantially equivalent to the current mechanical engineering program at the University of Washington, including mathematics through at least a first course in differential equations.

DOCTOR OF PHILOSOPHY. Students working for this degree must complete an approved program of studies and a research program which makes a definite contribution to knowledge. Admission to this program is limited to students whose previous graduate work has indicated marked aptitude for advanced study and original investigation.

COURSES

320	Thermodynamics I (5)	
321	Thermodynamics II (5)	
323	Thermodynamics (4)	
325	Thermodynamics (4)	
330	Experimental Thermodynamics (4)	
340	Engineering Materials (3)	
342	Industrial Materials and Processes (3)	
	Not open to engineering students.	
361, 362	Machine Design (3,3)	
367	Dynamics of Machines (3)	
368	Kinematics (3)	
410	Engineering Administration (3)	Schaller
411	Engineering Economy (3)	Ford, Holt, Schaller
414	Industrial Safety (2)	Anderson
415	Statistical Quality Control (3)	Druil, Owens
417	Methods Analysis (3)	Druil, Owens
418	Work Simplification (2)	Owens
419	Industrial Facilities Design (3)	
420	Engineering Reliability (3)	Owens
424	Power Plants (5)	Nordquist, Waibler
425	Air Conditioning (3)	Crain, Depew
426	Thermodynamics for Nonmajors (4)	Childs, Depew, Emery, Kauzlarich
428	Refrigeration (3)	Depew, McMinn
430	Introduction to Heat Transfer (3)	Childs, Costello, Nordquist, Waibler
432	Gas Dynamics I (3)	Childs, Costello
434	Advanced Mechanical Engineering Laboratory (3)	Firey, Nordquist
436	Friction and Lubrication (3)	Firey, Mills, Morrison
441	Automatic Control (3)	Balise, Galle
443	Instrumentation (3)	Balise, Galle
460	Kinematics and Linkage Design (3)	
464	Theory of Welding (3)	Holt
465	Welding Design (3)	Holt
468	Machine Design (3)	Kielling, Morrison
469	Introduction to Advanced Dynamics (3)	Merchant, Morrison
481	Internal Combustion Engines (3)	Firey, Guidon
482	Internal Combustion Engine Laboratory (3)	Firey, Guidon

- 483 Internal Combustion Engine Design (3)** **Firey, Guidon**
- 485 Rocket Propulsion (3)** **Guidon**
- 490, 491, 492 Naval Architecture (3,3,3)** **Bartlett, Rowlands**
- 516 Statistical Analysis of Engineering Measurements (3)** **Drui, Owens**
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, 415 and graduate standing in engineering, or permission.
- NS18-NS19-520 Seminar (0-0-1, maximum 6)**
- 521 Thermodynamics III (3)** **Childs, Costello, Nordquist**
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. Prerequisite, graduate standing in mechanical engineering or permission.
- 522 Thermodynamics IV (3)** **Waibler**
Selected topics from the thermodynamics and dynamics of fluid flow. The thermodynamics of reactive systems. Introductory kinetic theory of gases. Prerequisite, 521, or permission.
- 524 Combustion (3)** **Firey**
Chemical and physical processes of combustion, preparation of fuels, applications, design of combustion equipment. Prerequisite, graduate standing in mechanical engineering or permission.
- 526 Air Conditioning (3)** **Childs**
Study at the graduate level of heat-transfer aspects of air-conditioning problems; special problems in humidifying and dehumidifying; automatic control and zoning; noise and vibration control; laboratory and field tests of air-conditioning installations. Prerequisites, 425 and graduate standing, or permission.
- 529 Advanced Refrigeration (3)** **Depew**
Review of basic cycles and equipment, cold storage practice, refrigeration in food manufacture and distribution, industrial applications, frozen foods and other low temperature applications, capital and operating cost studies, and design problems. Prerequisites, 428 and graduate standing in mechanical engineering, or permission.
- 530 Radiative Heat Transfer (3)** **Depew**
Fundamentals of thermal radiation for black, gray, nongray, diffuse, and specular surfaces. Gaseous radiation and special applications of thermal radiation. Prerequisite, graduate standing in mechanical engineering or permission.
- 531 Heat Transfer (3)** **Costello, McFeron, Waibler**
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)** **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. Design of heat exchangers. Prerequisites, Civil Engineering 542 and graduate standing in mechanical engineering, or permission.
- 533 Gas Dynamics II (3)** **Childs, Costello, Emery, Kauzlarich**
A continuation of 432. 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, and turbines; wave phenomena; introduction to multidimensional flow; experimental techniques and measurements. Prerequisites, 532, Civil Engineering 542, or permission.
- 534 Experimental Heat Transfer (3)** **McFeron, Waibler**
Study of instrumentation and techniques used in heat transfer measurements; investigation of conduction, radiation, and convection phenomena. Liquid metal and water heat-transfer loops will be used for experiments to determine heat flux, film coefficients, boiling pressure drops, and other phenomena of current interest. Prerequisites, 530 and 532, or permission.
- 536 Gas Dynamics III (3)** **Childs**
A continuation of 533. A study of the dynamic and thermodynamic relationships for the flow of fluids; application of the basic laws in multidimensional flow; unsteady one-dimensional flow. Prerequisite, 533 or permission.
- 537 Boundary Layer Theory (3)** **Childs**
A study of the dynamic and thermodynamic relationships for the flow of real fluids considering effects of viscosity and heat conductivity; applications of basic laws to problems in flow through nozzles, diffusers and ducts; free turbulence; jets and wakes. Prerequisite, 533 or permission.
- 538 Turbulent Boundary Layer Theory (3)** **Childs**
A continuation of 537 with special emphasis on turbulent boundary layers. The origin of turbulence; turbulent flow through pipes; influence of pressure gradient on turbulent boundary layers; free turbulent flows, jets and wakes; application to base pressure and base heating problems. Prerequisite, 537 or permission.

- 541 Advanced Engineering Materials (3)** **Mills, Taggart**
Behavior of engineering materials as affected by various conditions of loading and environment. Lecture, laboratory, and studies of technical literature. Prerequisite, graduate standing in mechanical engineering or permission.
- 542 Topics in Engineering Materials (3)** **Mills, 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.
- 545 Automation (3)** **Balise**
Concepts in addition to feedback that are important in automatic production, including automatic data processing, computers, numerical control of machine tools, and integrated manufacturing systems. Prerequisite, graduate standing in mechanical engineering or permission.
- 549 Fluid Power Control (3)** **Balise**
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, 545 or 571, or permission.
- 551 Applied Elasticity (3)** **Day, Kobayashi, Sherrer**
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)** **Kobayashi, 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.
- 553 Applied Viscoelasticity (3)** **Kobayashi, Sherrer**
Time-dependent aspects of stress, 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.
- 554 Advanced Theory of Plasticity (3)** **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, Civil Engineering 572, or permission.
- 555 Thermoelasticity (3)** **Emery**
Basic equations of thermoelasticity for isotropic elastic solids. Analysis of discs, cylinders, spheres, beams and plates under steady temperatures and sudden and slow heating and cooling. Introduction to thermoelastic stability. Prerequisite, 551 or permission.
- 556 Experimental Stress Analysis (3)** **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. Principles and application of mechanical strain gauges. Lecture and laboratory. Prerequisite, graduate standing in engineering or permission.
- 557 Experimental Stress Analysis (3)** **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. Non-destructive methods of testing and inspecting structures and machine parts. Calibration of stress-analysis instruments. Prerequisite, 556.
- 558 Experimental Stress Analysis (3)** **Day**
Seminar and individual research on special problems in experimental stress analysis. Prerequisite, 557 or permission.
- 564 Mechanical Engineering Analysis (3)** **Balise, Galle**
Application of complex variable theory and vector analysis to various fields in mechanical engineering; analogs in heat transfer, fluid flow, stress distribution, dynamics, and feedback control systems. Prerequisite, graduate standing in mechanical engineering or permission.
- 565 Mechanical Systems Analysis (3)** **Balise**
Analytical methods for identifying characteristics of nonlinear and distributed systems, and random inputs; analogs for mathematically-related mechanical engineering systems, emphasizing aspects applicable to servomechanisms. Prerequisite, 564 or permission.
- 567 Advanced Dynamics (3)** **Kobayashi, Merchant, Sherrer**
Dynamics of particles and of rigid bodies, with emphasis upon applications involving machine parts and other engineering components. Generalized coordinates, La Grange's equations, Hamilton's principle. Prerequisite, graduate standing in mechanical engineering or permission.

- 568 Vibrations of Machinery (3)** **Kobayashi, Merchant, Shorror**
Study of mechanical vibration phenomena, linear damped and undamped multi-degree-of-freedom and continuous systems, free and forced vibration, analytical and numerical methods. Prerequisite, graduate standing in mechanical engineering or permission.
- 571 Servomechanisms I (3)** **Balise**
Linear and introductory nonlinear close-loop system analysis and design on the complex plane and by frequency response; application to mechanical components; analogs. Prerequisite, 564 or permission.
- 572 Servomechanisms II (3)** **Balise**
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. Prerequisites, 565 and 571, or permission.
- 581 Magneto-Gasdynamics (3)** **Kauzlarich**
The dynamics of ionized gases in magnetic fields. The properties of dissociated and ionized gases. Penetration and driving of shock-waves. Experimental observations and applications. Magneto-gasdynamics power generation and electric propulsion. Prerequisite, 537 or permission.
- 584 Gas Turbines (3)** **Guidon**
Applications of gas turbines; 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. Prerequisites, 432 and graduate standing in engineering, or permission.
- 589 Nonlinear Mechanical Vibrations (3)** **Merchant, Shorror**
Study of systems with nonlinear damping and restoring forces, applications of the phase-plane delta and the Ritz averaging method, and stability of nonlinear oscillations. Prerequisite, 568 or permission.
- 590 Random Mechanical Vibrations (3)** **Shorror**
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.
- 592 Impact (3)** **Shorror**
Theory and physical behavior of colliding solids. Study of stereomechanical impact, vibrational aspects of impact, and contact phenomena occurring in tool design, explosions, vehicle accidents, etc. Prerequisites, 551 and 568, or permission.
- 599 Special Projects (1-5, maximum 9)**
Prerequisite, permission of the Graduate Program Adviser.
- 600 Research (*)**
Prerequisite, permission of the Graduate Program Adviser.
- 700 Thesis (*)**

MINERAL ENGINEERING

Director and Graduate Program Adviser: DRURY A. PIFER,
328 Roberts Hall

The School of Mineral Engineering, through the Divisions of Ceramic, Metallurgical, and Mining Engineering, offers courses leading to the degrees of Master of Science in Engineering (see page 150), Master of Science in Mining, Coal Mining, Metallurgical, or Ceramic Engineering; and Master of Science in Ceramics or Metallurgy. No foreign language is required for these degrees. The School also offers preparation for the degree of Doctor of Philosophy in the field of metallurgy.

Materials Engineering

Courses in materials engineering are offered jointly by the several degree-granting divisions of the School of Mineral Engineering. These courses are part of a core which constitutes the base in materials science upon which the specific branches are founded.

COURSES

- | | |
|--|----------------|
| 351 Mineral Processing I (4) | Brien |
| 352 Mineral Processing II (2) | Brien |
| 412 Introduction to X-ray Diffraction (3) | Mueller |
| 481 Mineral Industry Economics (3) | Pifer |

- 512 X-ray Diffraction Analysis I (3)** **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 X-ray Diffraction Analysis II (3)** **Flanagan**
 Advanced theory of diffraction by crystals and amorphous materials. Utilization of the reciprocal lattice concept and Fourier analysis in the study of defects and atomic arrangements in crystals. Laboratory in single crystal techniques. Prerequisite, 512 or equivalent.
- NS20 Engineering Materials Science Colloquium (0)**
 Discussion of theoretical and fundamental aspects of engineering materials.

Ceramic Engineering

MASTER OF SCIENCE IN CERAMIC ENGINEERING. A total of 36 credits of course work and a suitable thesis are required for this degree. A comprehensive oral examination completes the requirements. Students may select courses and research in accordance with their special interests and objectives. Graduate work is largely concerned with advanced materials science as applied to ceramics; however, courses may be selected which also prepare for plant operation and management. Graduates of accredited ceramic engineering curricula and graduates of other accredited engineering curricula who complete the basic undergraduate courses in ceramic engineering and in science may become candidates.

MASTER OF SCIENCE IN CERAMICS. Students with undergraduate majors in science, particularly chemistry or physics, may work for this degree after completing basic undergraduate courses in ceramics.

DOCTOR OF PHILOSOPHY. Students working for this degree must complete an approved program of studies and a research program which makes a definite contribution to knowledge.

Graduates of accredited ceramic engineering curricula and graduates of other engineering or science curricula who complete the basic undergraduate courses in ceramic engineering may become candidates. On interview and oral examination during the first graduate year will evaluate the prospective candidate's potential to proceed toward the Ph.D. One of the two required foreign languages must be French, German, or Russian; the other may be a foreign language of use in the field and acceptable to the student's Supervisory Committee.

COURSES

- | | |
|--|-----------------|
| 312 Physical Ceramics: Structure and Rheology (5) | Mueller |
| 314 Physical Ceramics: Ceramic Equilibria I (3) | McNeilly |
| 315 Vitreous State (4) | McNeilly |
| 401 Process Ceramics: Drying and Firing (4) | Campbell |
| 402-403 Equipment and Plant Design (2-2) | Campbell |
| 410 Physical Ceramics: Ceramic Equilibria II (3) | McNeilly |
| 421 Ceramic Bodies Laboratory (3) | Shevlin |
| 422 Ceramic Petrography (3) | Brien |
| 440 Glass Technology (3) | Mueller |
| 450 Pyroprocessing of Nonmetallics (3) | Bauer |
| 460 Ceramic-Metal Systems (3) | Shevlin |
| 470 Refractories (3) | Mueller |
| 501 Process Ceramics: Production Control (3) | Campbell |
- Application of industrial management and production control methods in the ceramic industry; production characteristics and their effects on the product; explanation and analysis of standards for products and their effects on manufacturing methods in the ceramic industry.

- 502 Process Ceramics: Unit Process Control (3)** **Campbell**
Principles of process control as applied to the ceramic industry; methods of measurement and evaluation of data for the control of partial size, viscosity, moisture content, fusion points, workability, humidity, temperature, drying rates, furnace atmospheres and pressures, time-temperature relationships, body and glaze textures, and imperfection causes; application of control data to plant production.
- 503 Research Techniques (3)** **Campbell**
Principles and methods for deriving heat transfer, optical characteristics, electrical response, surface dependent properties, rheological behavior, and dynamic, thermal, gravimetric, and mechanical analyses in ceramic research.
- 511 Advanced Physical Ceramics I (3)** **McNeilly**
Theories and principles of diffusion; concepts of sintering and solid state reactions with emphasis upon the role of diffusion; the effect of the defect nature of solids upon these phenomena.
- 512 Advanced Physical Ceramics II (3)** **Shevlin**
Multiphase high temperature reactions: phase equilibria involving gas, liquid, and solid phases; material balance interpretation; kinetics as related to equilibrium; surface phenomena.
- 513 Advanced Physical Ceramics III (3)** **Mueller**
Ceramic vitreology: composition and formation of glasses in ceramic bodies; their effect on such properties as mechanical and dielectric strength, porosity, hardness, chemical durability, refractoriness, and resistance to erosion. Prerequisite, 511 or 512.
- 520 Seminar (1, maximum 6)**
Required for all graduate students.
- 521 Mechanical Behavior of Ceramics (3)** **Shevlin**
Internal stresses; composites in terms of ceramic constituents; theory of glass, adherence to ceramic and metal surfaces; deformations and fracture. Prerequisite, 511 or permission.
- 590 Industrial Minerals Research (*)**
- 599 Special Topics in Ceramics (*)**
- 600 Research (*)**
Prerequisite, permission of the Graduate Program Adviser.
- 700 Thesis (*)**

Metallurgical Engineering

MASTER OF SCIENCE IN METALLURGICAL ENGINEERING. A total of 36 credits in course work and a suitable thesis for 9 credits are required for this degree, and a comprehensive oral examination completes the requirements. Students may select courses in accordance with their special interests and objectives. Graduate work is largely concerned with advanced materials science as applied to physical metallurgy, extractive metallurgy, or mineral processing. However, courses may also be selected which prepare for plant operation and management. Graduates of accredited metallurgical engineering curricula and graduates of other engineering curricula who complete the basic undergraduate courses in metallurgical engineering may become candidates.

MASTER OF SCIENCE IN METALLURGY. Students with undergraduate majors in science, particularly physics or chemistry, may work for this degree after completing basic undergraduate courses in metallurgy.

DOCTOR OF PHILOSOPHY (METALLURGY). Students who have completed one year of graduate work may request an examination to determine whether or not the faculty will advise proceeding to the Ph.D. General Examination. A critical examination of the applicant's record, recommendations, and proposed course of study will be pertinent to this decision. The language requirement will be satisfied by passing the scheduled examinations in any two of either German, French, or Russian. In addition to course work, a student will be expected to study independently for examination on a list of subjects prepared by his Supervisory Committee. General Examinations will be taken at the end of the second year or during the third year of residence. The General Examinations will be sufficiently comprehensive to demonstrate the student's ability to deal with broad aspects of materials science, as well as his specialized subject area. Each student will present a written dissertation based on his research program which makes an original and independent contribution to knowledge. Proficiency in basic research will be of

paramount importance and the research will be conducted in the University laboratories. The Final Examination will consist of the candidate's oral defense of his dissertation.

COURSES

- | | |
|---|----------------------------|
| 321 Metallurgical Stoichiometry II (3) | Polonis |
| 322 Metallurgical Thermodynamics I (3) | Archbold |
| 324 Chemical Metallurgy Laboratory (1) | |
| 361, 362, 363 Physical Metallurgy I, II, III (4,4,4) | Roberts, Polonis, Archbold |
| 421 Metallurgical Thermodynamics II (4) | |
| 422 Chemical Metallurgy: Process Calculations (2) | |
| 424 Metallurgical Experimental Techniques (2) | Flanagan |
| 441 Engineering Physical Metallurgy (3) | Polonis |
| 442 Engineering Physical Metallurgy Laboratory (1)
May be taken concurrently with 441. | Polonis |
| 450 Light Metals (3) | Roberts |
| 460 Deformation of Metals (3) | Polonis |
| 461 Advanced Physical Metallurgy (3) | Roberts |
| 464 Applied Physical Metallurgy (3) | Flanagan |
| 466 Theory of Metals (3) | Flanagan |
| 520 Seminar (1, maximum 6)
Review of research problems and recent literature. Required for all graduate students. | |
| 525 Thermodynamic Topics in Metallurgy (3)
Selected topics in the application of classical and statistical thermodynamics to systems of current metallurgical interest. Prerequisite, 322. | Archbold |
| 531 Advanced Metallurgy (*)
Study of selected problems, with particular attention to recent publications and scientific applications in physical or extractive metallurgy. | |
| 541 Theoretical Structural Metallurgy I (3)
Detailed study of structural imperfections in metal-crystals; vacant lattice sites; influence of foreign atoms; fundamentals of dislocation theory including geometry, motion, interactions, and stress fields of dislocations; correlation of theory with experimental evidence of dislocation. Prerequisite, 363. | Polonis |
| 542 Theoretical Structural Metallurgy II (3)
Structure of liquid metals; thermodynamics and kinetics of vapor-solid and liquid-solid transformations; metal crystal growth from vapors and aqueous solutions; detailed consideration of solidification including single crystal growth, substructure, segregation phenomena, and zone melting; interface and internal boundaries. Prerequisite, 541. | Polonis |
| 543 Theoretical Structural Metallurgy III (3)
The fundamental view of mechanical properties and deformation of metals; elasticity, anelasticity, and internal friction; anisotropy; plastic deformation of single crystals and polycrystalline aggregates; theories of plastic flow and work hardening involving applications of dislocation theory; effects of temperature and composition on deformation behavior of metals and alloys. Prerequisite, 541. | Polonis |
| 551 Special Topics in Advanced Physical Metallurgy (*, maximum 6)
Selected topics concerned with current developments in physical metallurgy. | Flanagan |
| 561 Phase Transformations in Solid Metals I (3)
An advanced treatment of phase transformations from the standpoint of crystallography, and thermodynamics. Prerequisite, 363. | Roberts |
| 562 Phase Transformations in Solid Metals II (3)
Kinetics of solid state reaction in metals. Basic equations and their derivation. Applications to specific metal and alloy transformations. Growth-control reactions and reactions dependent on both nucleation and growth. Prerequisite, 561. | Roberts |
| 563 Phase Transformations in Solid Metals III (3)
Nucleation in solid state transformations. Theories of nucleation and grain growth. Transition lattices and other metastable phenomena. Prerequisite, 562. | Roberts |
| 566 Advanced Theory of Metals (3)
Modern theories of the metallic state and their relationship to the physical properties of metals. Prerequisite, 466. | Flanagan |
| 599 Special Topics in Metallurgy (*)
Prerequisite, permission of the Graduate Program Adviser. | |
| 600 Research (*)
Prerequisite, permission of the Graduate Program Adviser. | |
| 700 Thesis (*) | |

Mining Engineering

MASTER OF SCIENCE IN MINING ENGINEERING. The requirements for this degree are a minimum of 45 credits, of which 36 must be in formal course work and 9 in thesis. No foreign language is required. Students working for this degree may elect work in mining or mineral processing in accordance with their special interests. Special study in the fields of labor relations and management is available. The student may select courses in preparation for exploration and development, operation and management, engineering, or mining geology. Graduate studies in mineral processing cover the fields of metallic and nonmetallic minerals and coal, with special work on advanced theory and practice. Graduates of accredited mining engineering curricula and graduates of other accredited engineering curricula who complete the basic undergraduate courses in mining engineering and geology may be accepted in this program.

MASTER OF SCIENCE IN COAL MINING ENGINEERING. Students working for this degree may undertake research in the United States Bureau of Mines Seattle Coal Research Laboratory in cooperation with the staff of the Bureau. Study is available in mine engineering, operation, labor relations, and management. Graduates of other accredited engineering curricula must complete basic undergraduate courses in mining engineering.

COURSES

- | | |
|--|-----------------|
| 306 Mine Excursion (1, maximum 2) | |
| 322 Principles of Mine Production (4) | Anderson |
| 325 Mineral Land Valuation (2) | Anderson |
| 330 Mine Surveying (2) | Anderson |
| 331 Mine Mapping (1) | Anderson |
| 425 Rock Mechanics (2) | Pifer |
| 426 Exploration and Development of Mineral Deposits (3) | Pifer |
| 427 Exploration Geophysics: Introduction (2) | Anderson |
| 432 Mine Plant Design (5) | Anderson |
| 433 Mine Ventilation (3) | Anderson |
| 463 Mineral Processing: Flotation (3) | Brien |
| 464 Mineral Processing: Hydrometallurgy (4) | Brien |
| 465 Mineral Processing: Microscopy (2) | Brien |
| 466 Mineral Processing: Practices (2) | Brien |
| 467 Mineral Process Plant Design (2) | Brien |
| 476 Coal Preparation (2) | Brien |
| 483 Mining Laws (1) | Pifer |
| 485 Industrial Minerals (3) | Brien |
| 520 Seminar (1, maximum 6) | |
| Lectures and discussions; review of research problems and recent literature. | |
| 521 Metal Mining (*) | Anderson, Pifer |
| Production methods; mining control; support; applied efficiency methods; administration; equipment and machinery; deep-level mining; health and safety; special problems. Arranged in accordance with student's major interest. | |
| 522 Mine Shafts (3) | Pifer |
| Location and design, surface plant, and collar preparation; sinking, support, stations and bottoms, equipment and maintenance; safety and costs; rectangular, square, and circular shafts. | |
| 523 Mining Stratified Deposits (*) | Pifer |
| Studies in mining, with particular reference to mechanization. Prerequisite, graduate standing. | |
| 525 Rock Mechanics (3) | Pifer |
| Physical properties and mechanics of response by rocks under stress; theories of stress distribution around underground structures; dynamic stress in rock fragmentation; application to mine design and operations sequence; strata control. Prerequisite, 425. | |

560 Topics in Advanced Mineral Processing (*)	Brien
Special problems and research.	
561 Advanced Mineral Processing Theory I (3)	Brien
Unit process studies in comminution, sizing, classifying, and auxiliary processes.	
562 Advanced Mineral Processing Laboratory (*)	Brien
Experimental study of theoretical principles of preparation and concentration. Arranged concurrently with 561 and 563 or as required.	
563 Advanced Mineral Processing Theory II (3)	Brien
Physics and chemistry of beneficiation.	
564 Advanced Mineral Processing Design (*)	Brien
Plant layout studies, economics, and equipment design.	
571 Cooperative Research with United States Bureau of Mines (6)	
600 Research (*)	
Prerequisite, permission of the Graduate Program Adviser.	
700 Thesis (*)	

NUCLEAR ENGINEERING

Chairman and Graduate Program Adviser, Nuclear Engineering Group:
ALBERT L. BABB, Nuclear Reactor Building

The Nuclear Engineering Group offers courses of study leading to the degrees of Master of Science in Engineering and Doctor of Philosophy. The Master of Science in Engineering degree is designated as Major: Nuclear Engineering.

Faculty members in the Nuclear Engineering Group represent five departments in the College of Engineering which participate actively in the teaching and research programs.

Students entering the master's program should have completed in their undergraduate programs the following courses or their equivalents: Mathematics 221 (Elements of Differential Equations) and 225 (Intermediate Analysis); Physics 320 (Introduction to Modern Physics) and 323 (Introduction to Nuclear Physics); Materials Engineering 250 (Fundamentals of Materials Science); Mechanical Engineering 430 (Introduction to Heat Transfer); Nuclear Engineering 484 (Introduction to Nuclear Engineering). In case of deficiencies, students may be required to take the necessary undergraduate courses in addition to the normal graduate program.

MASTER OF SCIENCE IN ENGINEERING, MAJOR: NUCLEAR ENGINEERING. A total of 36 credits of course work and a thesis equivalent to 9 credits of course work are required. The course work is usually divided in the ratio of two to one between nuclear engineering courses and selected courses from other departments. All programs of study must be approved by the Chairman of the Nuclear Engineering Group and will normally include 500, 501, 505, 506, 510, 512, N521, N522, and 523. No foreign language is required, but at least 9 credits of advanced mathematics and physics are required.

Minor electives in a student's program may be chosen from such fields of study as: control systems and servomechanisms; electronics; chemical separations processes; numerical analysis; heat transfer; materials engineering; sanitary engineering.

DOCTOR OF PHILOSOPHY. The program of study must include preparation equivalent to the courses 444, 500, 501, 505, 506, 510, 512, 550, 560, 561; Physics 509, 510; Mathematics 427, 428, 429; and two years of seminar. Additional courses should be taken to meet requirements for specialization in one of the following categories:

1. NUCLEAR ANALYSIS OF NUCLEAR REACTORS

For students with a strong background and aptitude in physics and mathematics. Courses include: Mathematics 527, 528, 529; Physics 511, 513, 517, 518, 519.

2. ENGINEERING ANALYSIS OF NUCLEAR REACTOR SYSTEMS

For students with a mechanical engineering background and interest. Courses include: Mechanical Engineering 521, 522, 531, 532, 534, 556; plus supporting courses in mathematics.

3. NUCLEAR ENGINEERING MATERIALS

For students with a background and interest in metallurgy or ceramics. Courses include: 444, 445; Materials Engineering 512, 513; Metallurgical Engineering 541, 542, 543, 566; or alternate courses in Ceramic Engineering such as 511, 512, 513.

4. NUCLEAR-CHEMICAL PROCESSES

For students with a background and interest in chemistry and chemical engineering. Courses include: Chemical Engineering 525, 530, 531, 560, 561, 588J; Chemistry 418.

5. RADIOISOTOPE USAGE AND ENVIRONMENTAL CONTROL

For students with a background and interest in sanitary engineering. Courses include: 559; Civil Engineering 550, 551, 552, 560, 561; Chemical Engineering 530; Chemistry 418.

6. NUCLEAR REACTORS SYSTEM DYNAMICS

For students with a background and interest in electrical engineering. Courses include: Electrical Engineering 505, 510, 581, 582, 583, 584; plus supporting courses in mathematics.

Aspirants to the degree of Doctor of Philosophy must pass successively a written and oral qualifying examination, a General Examination for admission to candidacy, and a Final Examination. The qualifying examination may be taken after 30 credits of graduate work have been successfully completed or during the second year of regular graduate study. The qualifying examination is given once at the beginning of each Autumn and Spring Quarter. It is designed to assess the student's understanding of the basic scientific and engineering concepts upon which his doctoral work will be based. The subject material includes undergraduate fundamentals in mathematics, physics, and the engineering sciences as well as the material in the first year of graduate work in nuclear engineering.

In the oral General Examination the student is examined on topics related to his field of specialization in nuclear engineering and the area in which he plans to do his dissertation research. A student is not permitted to take the General Examination until he has demonstrated proficiency in two foreign languages related to his field of research and has been accepted by a member of the faculty as a research student. A student should take the General Examination as soon as possible after passing the qualifying examination, usually within one year. Passing the General Examination constitutes admission to candidacy for the Ph.D.

A prospective candidate for the degree is expected to conduct an original and independent investigation in one of the fields of nuclear engineering. The results of this research, which must yield a significant contribution to knowledge, are submitted as a dissertation. In his Final Examination, the student presents and defends these results orally.

COURSES

444 Nuclear Materials (4)	Polonis
445 Nuclear Metallurgy Laboratory (2)	Polonis
484 Introduction to Nuclear Engineering (4)	Babb
485 Nuclear Instruments (3)	Wilson
486 Nuclear Power Plants (3)	McFeron
487 Tracer Techniques in Engineering Measurements (3)	Firey

- 500, 501 Nuclear Reactor Theory (4,3)** **Garlid, Albrecht**
Consecutive lecture courses in fission reactor theory covering interactions of neutrons with matter; neutron production, dispersion, and slowing down; diffusion, age-diffusion, and multigroup treatment of homogeneous and heterogeneous systems; elements of intermediate and fast reactor theory; elements of reactor kinetics and dynamics; elements of perturbation theory, transport theory, and control rod theory. Prerequisites, 484, Physics 323 and Mathematics 225, or permission. Equivalent of Mathematics 428 recommended.
- 505 Nuclear Engineering Laboratory I (3)** **Garlid**
A laboratory course involving the use of a graphite moderated subcritical assembly, the U.W. nuclear reactor, a pulsed neutron generator, and analog and digital computers. The first part is devoted to the determination of reactor parameters including diffusion length, Fermi age, material buckling, effective pile size, and lattice parameters. The second part involves analog computer studies of reactor dynamics. Prerequisite, 500 or permission.
- 506 Nuclear Engineering Laboratory II (5)** **Babb**
An advanced laboratory course centered around the U.W. nuclear reactor. The first part is devoted to nuclear reactor characteristics including calibrations, reactivity effects, power measurements, and critical mass determination. The second part emphasizes utilization of research techniques in selected experiments involving 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, and time of flight equipment. (Formerly 502.) Prerequisite, 505 or permission.
- 510 Nuclear Reactor Engineering (3)** **Babb**
An 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, 501, or concurrent registration in 501.
- 512 Nuclear Reactor Design (3)** **McFeron**
A design laboratory course 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. (Formerly 539.) Prerequisite, 510.
- N521, N522, N523 Graduate Seminar (0,0,1)**
- 524 Seminar in Nuclear Systems Analysis (1-2, maximum 12)**
Studies of recent advances in nuclear systems analysis with students and faculty reporting on recent research and publications. Open only to students having the master's degree or equivalent.
- 550 Neutron Transport Theory (3)** **Garlid, Albrecht**
A lecture course in which detailed consideration is given to neutron migration and slowing down in a variety of media and the validity of and basis for approximations currently in use. Prerequisite, 501.
- 559 Control of Radioactive Wastes (3)** **Bogan**
Environmental problems resulting from utilization of nuclear reactions; radioactive waste disposal practice; decontamination of water supplies; reactor site location and control of stream and atmospheric pollution. Prerequisite, Physics 320 or permission.
- 560 Nuclear Reactor Dynamics I (3)** **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, 501, Mathematics 427, 428.
- 561 Nuclear Reactor Dynamics II (3)** **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.
- 588J Nuclear-Chemical Separations Processes (3)** **Babb**
Application of chemical engineering principles to processing of nuclear reactor materials and irradiated fuels. Fuel cycles; properties of irradiated fuel; theory of molecular separations processes; analysis of steady state and transient characteristics of chemical processing operations. Offered jointly with Chemical Engineering. Prerequisites, 484, Chemical Engineering 530, 562, or permission.
- 599 Special Topics in Nuclear Engineering (*)**
Discussions and readings of topics of current interest in the field of nuclear engineering research. Subject matter may include reactor fuels and materials, reactor dynamics and control, instrumentation, thermonuclear processes, and direct conversion problems.
- 700 Thesis (*)**

COLLEGE OF FISHERIES

Dean and Graduate Program Adviser: **RICHARD VAN CLEVE, Fisheries Center**

The College of Fisheries offers courses leading to the degrees of Master of Science and Doctor of Philosophy. Students entering the master's program must have completed the equivalent of an undergraduate major in fisheries or an

undergraduate major in a related field. A broad training in the basic sciences is desirable.

Students will be expected to attain a general knowledge of fisheries in addition to their specialization in specific areas of fisheries biology or food science. Graduate students may be required to take supporting courses in other selected departments of the University. The graduate program is determined by a Supervisory Committee in consultation with the student. All graduate students must complete 6 credits (three quarters) in Fisheries 520.

MASTER OF SCIENCE. Students must have the degree of Bachelor of Science in Fisheries or its equivalent. At least one year of approved study, with the completion of a research project, leads to the master's degree.

A total of not less than 36 credits in course work and thesis must be presented, as well as a certificate of proficiency in one foreign language.

DOCTOR OF PHILOSOPHY. Doctoral students must complete at least three years of graduate study including a dissertation. Credits earned for a master's degree may be applied toward the doctor's degree.

The doctoral student must present a certificate of proficiency in two foreign languages (one in addition to the Master of Science requirement).

COURSES IN FISHERIES

301 Anatomy of Fishes (5)	Welander
302 Microbiology of Fisheries (5)	Liston
303 Introduction to Invertebrate Fisheries (5)	Sparks
402 Economically Important Fishes (5)	Welander
405 Economically Important Mollusca (5)	Sparks
406 Economically Important Crustacea (5)	Sparks
425 Migrations and Races of Fishes (5)	De Lacy
426 Early Life History of Marine Fishes (5)	De Lacy
427 Ecology of Marine Fishes (5)	De Lacy
440 Application of Digital Computers to Biological Problems (2)	
451 Propagation of Salmonoid Fishes (5)	Donaldson
452 Nutrition of Fishes (5)	Donaldson
453 Fresh-Water Fisheries Management: Biological (5)	Donaldson
454 Communicable Diseases of Fishes (5)	Sparks
460 Water Management and Fish Resources (5) (Offered Spring Quarter only.)	M. C. Bell
461 Water Management and Fish Resources (5) (Offered Autumn Quarter only.)	M. C. Bell
465 Problems in Fish Biology (6) (Offered at Friday Harbor Summer Quarter only.)	
471 Principles of Aquatic Radioecology (3)	Seymour
472 Methods of Aquatic Radioecology (3)	Seymour
473 Radionuclides in the Aquatic Environments (3)	Seymour
480 Introduction to Commercial Fishing Industry (5)	F. H. Bell
501 On-the-Job Training (1-3, maximum 3 for M.S., maximum 9 for Ph.D.) Guided on-the-job training in governmental or industrial fisheries organizations. Prerequisite, permission.	
503 Systematic Ichthyology (5)	Welander
Principles and procedures of ichthyological taxonomy demonstrated by current problems and research. Prerequisites, 402 and permission.	
505 Research Techniques in Shellfish Biology (5)	Sparks
A field and laboratory course dealing with research methods in the reproduction, growth, and mortality of oysters and clams.	
507 Topics in Fish Ecology (1-5, maximum 15)	
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.	

- 510 Fish Behavior (3)** **Fields**
Behavior related to sensory-motor equipment. Design of experiments emphasized for studies ranging from naturalistic observation to controlled laboratory and field experiments. Prerequisite, permission.
- 511 Fish Behavior Laboratory (2-3, maximum 6)** **Fields**
Prerequisite, 510 or concurrent registration in 510.
- 520 Graduate Seminar (2, maximum 6)**
Training in methods of searching fisheries literature.
- 530 Biological Problems in Water Pollution (3)** **Katz**
Biological and ecological changes in the aquatic environment resulting from domestic, industrial, radioactive, and agricultural wastes and methods for their evaluation. Prerequisite, permission.
- 556 Age and Growth of Fishes (5)** **Paulik**
Principles of growth; methods of determining age and rates of growth in fresh-water and marine fishes. Prerequisites, 402, and Mathematics 383 or permission.
- 557 Population Enumeration (5)** **Paulik**
Methods of enumerating animal populations; availability; dominant age groups; gear selectivity. Prerequisite, 556 or permission.
- 558 Population Dynamics (5)** **Paulik**
Influence of natural and artificial factors on variation in abundance and yield from animal populations. Prerequisite, 557 or permission.
- 604 Research (*, maximum 3 for M.S., 10 for Ph.D.)**
- 700 Thesis (*)**

COURSES IN FOOD SCIENCE

- 481 Introduction to Food Technology (5)** **Liston**
- 482 Food Analysis I (3)** **Dollar**
- 483 Food Analysis II (3)** **Dollar**
- 484 Principles of Food Processing I (5)** **Dollar, Liston**
- 485 Principles of Food Processing II (5)** **Dollar, Liston**
- 486 Deteriorative Processes in Foods (5)** **Dollar, Liston**
- 487 Food Analysis III (3)** **Dollar, Liston**
- 504 Principles of Technological Research in Fisheries and Food (3)** **Liston**
A lecture and laboratory course designed to familiarize graduate students with the methods used in technological research. Prerequisite, permission.
- 604 Problems in Food Science (*, maximum 3 for M.S., 10 for Ph.D.)**
- 700 Thesis (*)**

COLLEGE OF FORESTRY

Dean: GORDON D. MARCKWORTH, 206 Anderson Hall

Graduate Program Adviser: DAVID R. M. SCOTT, 218 Anderson Hall

The objectives of the graduate program in forestry are to make available academic guidance, research facilities, and advanced training, both fundamental and professional, to students desiring intensification or specialization in appropriate disciplines beyond a baccalaureate degree.

Applicants who intend to work toward an advanced degree must apply for admission to the Graduate School and meet the requirements set forth by the Graduate School and the College of Forestry. *Graduate students must satisfy the requirements for an advanced degree which are in force at the time the degree is to be awarded.* The Master of Forestry, Master of Science in Forestry, and Doctor of Philosophy degrees are conferred by the Graduate School through the College of Forestry.

MASTER OF FORESTRY. To qualify for admission to the Master of Forestry degree program the student must have a bachelor's degree in forestry. Supporting course work is taken mainly in the field of forestry. Only 400- and 500-numbered courses, or those listed in this *Bulletin*, are acceptable. A foreign language is not required.

MASTER OF SCIENCE IN FORESTRY. To qualify for admission to the Master of Science in Forestry degree program, the student must have a bachelor's degree in forestry or equivalent. A minor in science, constituting one-third of the required course work, is required in support of the forestry major. Only 400- and 500-numbered courses, or those listed in this *Bulletin*, are acceptable. Students admitted with a forestry-equivalent bachelor's degree ordinarily require a minimum of two years to complete the degree. A foreign language is not required.

DOCTOR OF PHILOSOPHY. General requirements are listed in preceding sections. Additionally, doctoral students in forestry are required to pass the language examinations for this degree within the first academic year beyond the master's degree, or two academic years beyond the baccalaureate degree, whichever has preceded the doctoral program.

COURSES

310 General Forest Soils (4)	Gessel
401 Safety Practices in Forest Industries (2)	Pearce
403 Timber Physics (3)	Bryant
404 Timber Physics (5)	Bryant
406 Microtechnique (3)	Leney
407 Forest Economics (2)	Dowdle
408 Forest Economics (5)	Dowdle
409 Forest Policy and Administration (3)	Marckworth
410 Advanced Forest Soils (3)	Gessel
423 Application of Silvicultural Methods (3)	Scott
424 Advanced Silviculture (3)	Scott
430 Advanced Forest Fire Control (3)	Schaeffer
440 Construction (4)	Stenzel
441 Forest Engineering (5)	Pearce, Stenzel
442 Logging Engineering (5)	Pearce
446, 447, 448, 449 Logging Engineering Field Studies (3,5,5,3)	Pearce, Stenzel
455 Forest Influences (4)	Gessel, Scott
460 Forest Management (5)	Robertson
461 Forest Management (3)	Robertson
465 Forest Photo Interpretation (3)	Robertson
466, 467, 468, 469 Senior Management Field Studies (5,5,4,2)	Robertson
470 Forest Products Industries (5)	Erickson
471 Timber Design (3)	Bryant
472 Plywood, Lamination, and Glues (5)	Bryant
476 Wood Pulp (6)	Leney
478 Advanced Wood Technology (5)	Bryant, Erickson
481 Milling (5)	Thomas
482 Manufacturing Problems (5)	Thomas
483 Theory and Practice of Kiln Drying (3)	Thomas
484 Forest Products Field Studies (2)	Thomas
485 Forest Products Seminar (3)	
495 Research Methods Seminar (3)	Bryant
500 Graduate Seminar (1, maximum 10) Required of graduate students.	Marckworth
511 Seminar in Forest Soils (2) Prerequisites, 410 and permission.	Gessel
512 Soil Morphology and Classification (3) An advanced study of the principles of soil formation and classification; intensive coverage of these principles as applied to the survey and classification of forested lands; the factors of the environment that determine soil properties. Prerequisite, permission.	Gessel

- 513 Methods of Forest Soil Survey (5)** **Gessel**
A course of field studies to acquaint the student with forest soils of the Northwest and with soil classification and survey philosophies and procedures. (Offered alternate years; offered 1963-64.) Prerequisites, 512 and permission.
- 521 Advanced Silvics (3-5)** **Scott**
A consideration of current literature and topics in forest tree ecology and physiology. Prerequisite, permission.
- 522 Advanced Silviculture (3)** **Scott**
A detailed study of the literature dealing with the more recent applications of silviculture in world forestry. Prerequisite, permission.
- 523 Forest Tree Seed (2)** **Scott**
The study of forest tree seed, including structure, development, production, collection, provenance, storage, germination, dormancy, and stimulation. Prerequisite, permission.
- 525 Research Methods in Forest Ecology (2)** **Gessel, Scott, Turnbull**
Research philosophies and procedures as applied to forest biological problems. Required of all graduate students in forest management. Prerequisite, permission.
- 527 Forest Genetics (3)** **Stettler**
Tree-improvement breeding theory as related to elementary population genetics, variation in plant populations, and natural and artificial selection. Prerequisite, Biology 451 or permission.
- 541 Advanced Forest Engineering (5)** **Stenzel**
Logging organization and management; logging cost analysis and budgeting. Prerequisite, permission.
- 542 Advanced Logging Engineering (3)** **Pearce**
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.
- 571 Advanced Wood Preservation (3)** **Erickson**
Permeability of wood; theory of penetration; treating plants, their equipment and design. Prerequisites, 370 and 371.
- 572 Wood Chemistry and Analysis (3-5)** **Sarkanen**
Techniques for analyzing the chemical constituents of wood; the relationships between chemical properties and the structural properties and uses of various species of wood. Prerequisites, 307, 470, Chemistry 232, and permission.
- 573 Wood-Moisture Relations (2-3)** **Erickson**
Theories involved in relationships between wood and varying degrees of moisture content, conditions at fiber saturation point and between fiber saturation and zero moisture content. Prerequisites, 307, 404, and permission.
- 574 Wood-Resin Relations (3)** **Bryant**
The technology of synthetic resins as wood adhesives, wood impregnants, binders, overlays, the surface coatings. Prerequisites, 472 and permission.
- 575 Forest Products Economics (3)** **Thomas**
Economic considerations in planning for profitable and complete utilization of the forest resource under a variety of circumstances. Prerequisites, 482 and permission.
- 590 Graduate Studies (1-5)**
Study in fields for which there is not sufficient demand to warrant the organization of regular courses.
- 600 Research (*)**
- 700 Thesis (*)**

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, field, and laboratory work. The courses are offered in all quarters and credits can vary from 1 to 5. Prerequisites include graduate standing and permission of the instructor. Credits are individually arranged for each course.

- 1-5 Per Qtr* *M. x 15*
- 510 Graduate Studies in Forest Soils (1-5)** **Gessel**
- 515 Graduate Studies in Forest Influences (1-5)** **Gessel, Scott**
- 520 Graduate Studies in Silvics and Silviculture (1-5)** **Scott**
- 526 Graduate Studies in Forest Genetics (1-5)** **Stettler**
- 530 Graduate Studies in Forest Fire Control (1-5)** **Schaeffer**
- 540 Graduate Studies in Logging Engineering (1-5)** **Pearce, Stenzel**
- 550 Graduate Studies in Forest Recreation (1-5)** **Brockman**
- 555 Graduate Studies in Wildlife Management (1-5)** **Brockman**
- 560 Graduate Studies in Forest History and Policy (1-5)** **Marckworth**
- 563 Graduate Studies in Forest Mensuration (1-5)** **Turnbull**

565 Graduate Studies in Forest Management (1-5)	Robertson
566 Graduate Studies in Forest Photogrammetry (1-5)	Robertson
568 Graduate Studies in Forest Finance (1-5)	Dowdle
570 Graduate Studies in Forest Products (1-5)	Bryant, Erickson, Leney, Thomas

GRADUATE SCHOOL OF PUBLIC AFFAIRS

Director: BREWSTER C. DENNY, 266 Smith Hall

Graduate Program Adviser: GEORGE A. SHIPMAN, 266 Smith Hall

The Graduate School of Public Affairs offers graduate professional education for the public service. The School is concerned with education in public affairs that is professional in objective, interdisciplinary in nature, centered in the role of the public administrator, and integrated with the profession as it is practiced.

The Graduate School of Public Affairs administers an interdisciplinary program designed for students preparing themselves for the public service at all levels—local, state, national, and international. The School offers appropriate courses in public administration and public policy and also relies heavily upon courses offered in other divisions of the University to give the students the greatest possible breadth of scope and discipline. The faculty of the School, therefore, includes participating members drawn from the University at large. In this way, the interests and capacities of the University as a whole in the field of public affairs contribute to the activities of the School.

MASTER OF PUBLIC ADMINISTRATION. The School offers a program leading to the degree of Master of Public Administration. Admission to this program requires formal admission to the Graduate School as well as acceptance by the Graduate School of Public Affairs. There are no specific requirements for undergraduate preparation. The School invites applications from students of such varied backgrounds as political science, economics, business administration, history, social work, engineering, public health, and other fields in the social and physical sciences to undertake a program leading to professional public service. The student will ordinarily need a background in the social sciences, in the nature and historical background of American institutions, basic preparation in general economics, and a mature capacity to digest reading and to express himself in clear and lucid English. The student who lacks sufficient background in these areas may be required to make up these deficiencies by taking or auditing appropriate courses in addition to the course requirements for the degree. Ordinarily, the degree of Master of Public Administration is awarded upon the successful completion of two years of course work, a summer internship, a degree project and a comprehensive examination. This is a nonthesis program. There is no formal language requirement.

Students may select their field of emphasis from two general concentrations: *public administration*, for students primarily interested in general administrative or managerial positions in the public service; and *public policy*, for students preparing for government positions which require professional preparation in one or more particular areas of public policy such as foreign and defense policy, natural resources and the like. The student, with the approval of the Graduate Program Adviser, selects courses from among those offered by the School and by other departments of the University.

In addition to the basic course work and the summer internship, the student has the opportunity to participate in the General Seminar at which distinguished public servants appear, in workshops and conferences sponsored by the Graduate School of Public Affairs, and in the activities of the Institute for Administrative Research. A recent addition to the program of the School is the sponsorship of the Public Policy Seminars. These are faculty seminars in which professors from several colleges, schools, and departments of the University and distinguished

experts from off-campus discuss a particular problem area of public policy. Students participate as auditors at the invitation of faculty members. The first such Seminar, on natural resources, was scheduled weekly throughout Winter and Spring Quarters of 1963. This Seminar and seminars on other subjects are planned for 1963-64.

THE INSTITUTE FOR ADMINISTRATIVE RESEARCH. The Institute for Administrative Research was established by the University to provide a means whereby members of the Graduate School of Public Affairs faculty, together with other University faculty members, may sponsor and reinforce programs of research activity which express the shared research interests of the faculty and the needs of the professional field. It provides a means and a facility for seeking and administering grants and contracts in support of these research efforts. Primary concern is with interdisciplinary, group-executed projects involving the nature of the governmental administrative process and the analysis of public policy. The Institute also provides consulting services to assist in the practical application of the results of research. Questions concerning the work of the Institute should be directed to Prof. George A. Shipman, Director of the Institute.

COURSES

PUBLIC ADMINISTRATION

501-502-503 The Administrative Process (3-3-3)

Kroll

An analysis of the administrative process relying primarily upon case materials and emphasizing policy formation, organization behavior, the nature of administrative roles, and the mechanism of responsibility. Same as Political Science 570-571-572.

511-512-513 Administrative Problems (3-3-3)

Shipman

Methods employed in the analysis of administrative problems, programs, organization, process, procedure, and staffing; the design of organizations and operations. Same as Political Science 576-577-578. Prerequisite, permission.

521-522-523 Public Management (3-3-3)

Lyden

Expression of public policy through program activity, program planning, programming and scheduling, budgeting, staffing, fiscal and other operating controls, evaluations of effectiveness. Same as Political Science 573-574-575. Prerequisite, permission.

600 Research (*)

PUBLIC POLICY

500 General Seminar

532 National Security Policy and Administration (3)

Denny

Foreign and defense policy formation and execution. Administration of national security programs: White House, Congress, State and Defense Departments, special problems and case studies. Prerequisite, Political Science 528.

600 Research (*)

POLITICAL SCIENCE

528 Seminar in National Security Policy Formation (3)

Denny

The principal elements of national security. Constitutional, historical, theoretical, and administrative analysis of United States foreign and defense policy formation and execution.

562, 563, 564 Public Law (3,3,3)

Cole

General legal concepts applicable to the conduct of governmental activities.

580, 581, 582 Seminar in Metropolitan and Urban Planning Problems (3,3,3)

Webster

The metropolitan community: nature, characteristics, functions, governmental structure; intergovernmental relationships. 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.

ECONOMICS

Economics of Public Activity: This field of study consists of selected courses offered by the Department of Economics.

SOCIOLOGY

Sociology of Organizations: This field of study consists of selected courses offered by the Department of Sociology.

In addition, individual students may elect courses approved by their adviser as pertinent to their career objectives from among courses listed elsewhere in this *Bulletin*.

Further questions concerning the program should be addressed to the Director or Graduate Program Adviser, Graduate School of Public Affairs.

INTERDISCIPLINARY PROGRAMS

GEOPHYSICS

Chairman, Geophysics Committee: JOOST A. BUSINGER, 201B Atmospheric Sciences Building

While no formal degree program in geophysics has been established, the University does at this time offer courses and interdisciplinary research in geophysics, under the direction of the Graduate School Geophysics Committee. Inquiries regarding courses and research in geophysics may be directed to the Chairman of the Executive Committee, Graduate School Geophysics Committee, 3 Administration Building.

COURSES

Geophysics 403J Introduction to Geophysics: The Atmosphere (5)

Offered jointly with the Department of Atmospheric Sciences.

Geophysics 404J Introduction to Geophysics: The Ocean (5)

Offered jointly with the Department of Oceanography.

Geophysics 405J Introduction to Geophysics: The Earth (5)

Offered jointly with the Department of Geology.

NUCLEAR ENGINEERING

**Chairman and Graduate Program Adviser: ALBERT L. BABB,
Nuclear Reactor Building**

The Nuclear Engineering Group, with members from the Departments of Chemical, Civil, Electrical, Mechanical, and Metallurgical Engineering, supervises the interdepartmental program in nuclear engineering and the research activities relating to the release, control, and utilization of energy from nuclear sources. The group offers courses of study leading to the degrees of Master of Science in Engineering and Doctor of Philosophy.

Details of the program may be found on page 173 of this *Bulletin*. Additional information may be obtained by writing to: Chairman, Nuclear Engineering Group, Nuclear Reactor Building.

RADIOLOGICAL SCIENCES

**Chairman, Radiological Sciences Group: GEORGE W. FARWELL,
3 Administration Building**

Graduate Program Adviser: LAUREN R. DONALDSON, 110 Fisheries Center

The degree of Master of Science in Radiological Science is offered by the Radiological Sciences Group of the Graduate School. Candidacy for this degree is open to students with bachelor's degrees in physical or biological science or in engineering. The curriculum is suitable for holders of AEC Fellowships in Health Physics and USPHS Radiological Health Traineeships, but is not limited to these.

The general requirements of the Graduate School for master's degrees apply. These are given in detail in this *Bulletin*. Specific course requirements of the two

options for the degree Master of Science in Radiological Science are outlined below. Topics for thesis research may be chosen in the radiological sciences or in related fields, subject to approval of the Graduate Program Adviser. More detailed information concerning specific course content may be obtained by consulting the *Bulletins* of the College of Arts and Sciences, the College of Engineering, and the School of Medicine.

A minimum of 42 credits, including 9 credits for thesis, must be presented in accordance with either of the two schedules which follow. A student who has completed any of the required courses of his program at a prior time may be permitted to substitute from the list of approved electives; other electives may be chosen after consultation with the Graduate Program Adviser.

A student with a deficiency in one area of the prerequisites may be accepted for the program provided he removes the deficiency during the first year of graduate study. Credit toward the degree is not ordinarily granted for a course used to remove a deficiency.

PHYSICAL SCIENCE OPTION. Prerequisites include Physics 323 (Introduction to Nuclear Physics) or the equivalent, Mathematics 221 (Differential Equations) or the equivalent, and a year of general biology at the college level.

REQUIRED COURSES*	Credits
Chemistry 410 Radiochemical Techniques and Radioactivity	
Measurements or	3
Nuclear Engineering 485 Nuclear Instruments.....	3
Fisheries 473 Radionuclides in the Aquatic Environments	3
Nuclear Engineering 484 Introduction to Nuclear Engineering.....	4
Nuclear Engineering 559 Control of Radioactive Wastes.....	3
Physics 471, 473 Atomic and Nuclear Physics Laboratory.....	3,3
Radiology 481, 482 Biological Effects of Ionizing Radiation.....	3,3
Radiology 485 Radiation Dosimetry	4
Radiology 493 Special Problems in Radiological Health.....	2
Radiological Sciences 520 Radiological Science Seminar.....	2
Radiological Sciences 700 Thesis	9
Total Required Credits	42

*Modifications in these requirements may be made in special cases at the discretion of the Graduate Program Adviser.

ELECTIVES	Credits
Anatomy 530 Biological Tracer Techniques.....	2
Atmospheric Sciences 301 Introduction to Atmospheric Science.....	5
Biochemistry 401 Biochemistry	5
Biology 451, 451L Genetics and Genetics Laboratory.....	3,2
Biology 472 Principles of Ecology.....	3
Biology 508, 509 Cellular Physiology.....	3,3
Chemistry 418, 419 Radiochemistry and Radiochemistry Laboratory.....	3,2
Chemistry 455, 456, 457 Physical Chemistry.....	4,3,3
Chemistry 513 Advanced Nuclear Chemistry.....	2
Civil Engineering 561 Air Resources Engineering I.....	3
Fisheries 472 Methods of Aquatic Radioecology.....	3
Microbiology 400 Fundamentals of Bacteriology.....	6
Nuclear Engineering 500 Nuclear Reactor Theory I.....	4
Nuclear Engineering 501 Nuclear Reactor Theory.....	3
Nuclear Engineering 506 Nuclear Engineering Laboratory II.....	5
Pharmacology 531 Toxicology	2
Preventive Medicine 420 Introduction to Epidemiology and	
Biostatistics	3
Preventive Medicine 477 Statistical Methods in Biological Assay.....	3

BIOLOGICAL SCIENCE OPTION. Prerequisites include a bachelor's degree in a biological science, courses in mathematics through differential and integral calculus and statistics, and chemistry through quantitative analysis and organic chemistry.

REQUIRED COURSES*

Credits

6 credits in 500-level courses in biological sciences. (Courses are to be selected which will develop proficiency in the student's field of major interest.).....	6
Chemistry 350 Elementary Physical Chemistry.....	5
Chemistry 410 Radiochemical Techniques and Radioactivity Measurements or.....	3
Fisheries 472 Methods of Aquatic Radioecology.....	3
Fisheries 473 Radionuclides in the Aquatic Environments.....	3
Physics 320 Introduction to Modern Physics.....	3
Physics 323 Introduction to Nuclear Physics.....	3
Radiology 481, 482 Biological Effects of Ionizing Radiation.....	3,3
Radiology 493 Special Problems in Radiological Health.....	2
Radiological Sciences 520 Radiological Science Seminar.....	2
Radiological Sciences 700 Thesis.....	9
Total Required Credits	42

* Modifications in these requirements may be made in special cases at the discretion of the Graduate Program Adviser.

ELECTIVES

Advanced courses in biochemistry, genetics, microbiology, zoology, botany, pharmacology, physiology and biophysics, pathology, anatomy, and biology.

Anatomy 530 Biological Tracer Techniques.....	2
Chemistry 418, 419 Radiochemistry and Radiochemistry Laboratory.....	3,2
Chemistry 429 Microquantitative Analysis.....	3
Chemistry 513 Advanced Nuclear Chemistry.....	2
Preventive Medicine 420 Introduction to Epidemiology and Biostatistics.....	3
Radiology 485 Radiation Dosimetry.....	4

Further information regarding the program in Radiological Sciences may be obtained by writing to the Director, Center for Radiological Sciences.

SCHOOL OF LIBRARIANSHIP

Director and Graduate Program Adviser: IRVING LIEBERMAN, 111 Library

The program in librarianship is intended to prepare a selected group of college graduates for a professional career in library work. Programs are offered leading to the degrees of Master of Librarianship and Master of Law Librarianship. The basic professional curriculum is organized around a group of studies designed to provide a sound foundation in the principles and methods of librarianship. These studies are required of all students pursuing a degree in librarianship. In addition, the student elects courses which will prepare him for a special field of library service. Programs in special fields of library service are those designed for children and young people's work, school library work, and law librarianship. Other programs may be designed in accordance with the individual needs of the student. The School of Librarianship is accredited by the American Library Association and is a member of the Association of American Library Schools.

ADMISSION. The approval of both the Graduate School and the School of Librarianship is necessary for admission. The full program may be entered in either Summer or Autumn Quarter. The preferred starting period for the student who intends to pursue the full program for four consecutive quarters is Autumn

Quarter. *The deadline for submission of application and complete credentials for Autumn Quarter is July 15, and for Summer Quarter, May 15.* It is recommended that candidates for admission write to the School of Librarianship for its *Announcement*, which describes in detail the programs offered and the requirements for admission and the degrees.

SUMMER PROGRAM. The full program for the Master of Librarianship degree is available to Summer Quarter students. Basic required courses are offered every summer, and continuations of these courses are given in alternate summers. Additional course offerings vary from year to year but are planned to enable students to complete requirements for the degree by attendance during summers only.

LIBRARY FACILITIES. The School of Librarianship is in the south wing of the Henry Suzzallo Library.

The book collection of the School contains the essential materials on librarianship, the William E. Henry collection of rare books, an outstanding collection of children's books, and a high school library collection. These materials are supplemented by the University Library with its numerous departmental and research libraries containing more than one million volumes. Students have access to the facilities of the Pacific Northwest Bibliographic Center and the University's Audio-Visual Services. The Seattle Public Library, the King County Public Library, and many school, college, and special libraries are available for observation and field work.

COURSES

- | | |
|---|-------------------|
| 451 Children's Books (3) | Peterson, Wheeler |
| 452 Storytelling (3) | Wheeler |
| 460 School Library Administration (3) | Turner |
| 462 Reading of Young People (3) | Turner |
| 470 History of the Book (3) | Bevis |
| 500 Libraries, Librarians, and Society (2) | Lieberman |
| Objectives and principal fields of library services. Major trends and problems. | |
| 501 Libraries, Librarians, and Society (2) | Bevis |
| Continuation of 500. Prerequisite, 500. | |
| 502 Library Organization and Administration (3) | |
| 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. | |
| 509 Directed Field Work (2-4) | Bevis, Lieberman |
| Four weeks of professionally supervised field work in various types of libraries. | |
| 510 Evaluation of Library Materials (4) | Bevis, Turner |
| Sources of information about books; criteria of evaluation for selection; evaluation of general reference materials; procedures of reader's services. | |
| 511 Library Materials in the Humanities and Social Sciences (3) | Bevis, Turner |
| Survey and evaluation of library resources in these fields. Included are reference tools, bibliographies, landmark books, and contemporary literature, with reference to the needs of different kinds of readers. Prerequisite, 510. | |
| 512 Library Materials in Science and Technology (3) | Bevis |
| Continuation of 511. Prerequisite, 510. | |
| 513 Government Publications (2) | Bevis |
| 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. | |
| 530 Organization of Library Materials: Theory and Principles (4) | Peterson |
| The organization of library materials for use; principles of cataloging, classification, and subject analysis; study of the Dewey Decimal and Library of Congress schemes of classification. | |
| 531 Organization of Library Materials: Comparative Methods (4) | Peterson |
| Cataloging practices and methods employed to meet varying needs. Prerequisite, 530. | |

- 532 Organization of Library Materials: Advanced Problems (2)** **Peterson**
Cataloging of special materials; maps, music, microfilm, and rare books; special classification schemes. Prerequisite, 531.
- 540 Advanced Legal Bibliography (2)** **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.
- 541 Selection and Processing of Law Library Materials (4)** **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)** **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)** **Wheeler**
The philosophy, organization, and administration of a children's department in a public library, together with an examination of its relationship to other social agencies in the community.
- 553 Library Work with Children (2)** **Wheeler**
Further study of the organization and function of a children's department in a public library, with special attention to the study of reference books, periodicals, library publicity, and cooperation with the schools. Includes actual practice in conducting library lessons and book talks. Prerequisite, 550.
- 554 Children's Literature (3)** **Wheeler**
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.
- 599 Methods of Research in Librarianship (2)**
A survey of problems and methods.
- 600 Research (*)**
Systematic investigation under faculty direction of a special project approved by the Director and the instructors concerned.
- 702 Degree Final (6)**
Limited to students completing a nonthesis degree program.

SCHOOL OF MEDICINE

Dean: GEORGE N. AAGAARD, C304 Health Sciences Building

In accordance with the general requirements of the Graduate School, the School of Medicine, as an integral part of the Division of Health Sciences, offers programs leading to the degrees of Master of Science and Doctor of Philosophy in the Departments of Anatomy, Biochemistry, Microbiology, Pathology, Pharmacology, and Physiology and Biophysics. In the Department of Surgery, a program leading to the degree of Master of Science is offered. Students who intend to work toward one of these degrees should confer with the Graduate Program Adviser of the department in which they intend to major.

Several other departments of the School offer courses, also listed below, which may be of interest to graduate students in related fields. The *School of Medicine Bulletin* contains more complete descriptions of courses numbered below 500.

ANATOMY

Chairman: N. B. EVERETT, G511 Health Sciences Building

**Graduate Program Adviser: E. C. ROOSEN-RUNGE,
G501 Health Sciences Building**

The Department of Anatomy offers courses leading to the degrees of Master of Science and Doctor of Philosophy. It is desirable that students pursuing graduate work in anatomy have a broad and well correlated knowledge of the general fields of biology, chemistry, physics, and mathematics.

Graduate work in anatomy does not rest upon any rigid or specific list of courses; the program will depend primarily on the applicant's field of interest. In addition to the usual courses in gross and microscopic anatomy, specialized training is offered in the fields of electron microscopy, X-ray diffraction, tracer biology, experimental cytology, cytochemistry, polarization microscopy, and microspectrometry.

COURSES

- 301 General Anatomy (4)**
- 328, 329 Gross Anatomy (6,4)**
- 330 Microscopic Anatomy (4)** Wood
- 331 Neuroanatomy (2)** Bodemer, Everett, Rieke
- Conjoint 400 Human Anatomy and Physiology (9)** (See Conjoint Courses, page 194.)
- 401-402-403 Gross Anatomy (8-4-4)** Bassett, Blevins
- 404 Human Embryology (3)** Blandau
- 405-406 Microscopic and Submicroscopic Anatomy (4-4)** Luft, Roosen-Runge
- Conjoint 409 Basis of Neurology (3,5 or 8)** (See Conjoint Courses, page 194.)
- 440 Special Topics in Dissection (1 or 2, maximum 6)** Bassett
- 444 History of the Morphological Sciences (2-3)** Bodemer
- 505 Advanced General Histology (3)** Roosen-Runge, Wood
Comparative study of tissues in selected phyla of vertebrates and invertebrates. Prerequisites, 330, 405, or permission.
- 510 Cytochemistry (4)** Szollosi
The finer distribution of chemical substances in cells and tissues; methods of cytochemistry and their theoretical basis and validity. Prerequisite, permission.
- 515 Biological X-ray Structure Analysis (3)** Jensen
Theory of X-ray diffraction, with emphasis on applications to biological systems. Prerequisite, permission.
- 518 Developmental Neurology (2)** Bodemer
Detailed consideration of the problems of development, growth, and regeneration of the nervous system and its functions. Prerequisites, Zoology 456 or equivalent, and permission.
- 521 Seminar in Molecular and Submicroscopic Anatomy (2)** Luft, Wood
The molecular and micellar basis of bodily structure. Prerequisite, permission.
- 525 Brain Dissection (2)** Everett
Laboratory work in dissection of the human brain, supplemented by lectures emphasizing developmental and functional aspects of neurology. Prerequisite, permission.
- 530 Biological Tracer Techniques (2)** Everett, Rieke
Techniques of using radioactive isotopes as tracers in biological research. Prerequisite, permission.
- 531, 532, 533 Electron Microscopy (1-5 each)** Luft, Wood
Theoretical and practical aspects of electron microscopy of biological material, including electron diffraction. Prerequisite, 405-406 or permission.
- 540 Embryology of the Heart (2)** Blandau
A detailed study of the embryology of the heart and great vessels during the first eight weeks of life. Prerequisite, 404 or permission.
- 550 Biological Polarization Microscopy (4)**
Theory, technique, and application of polarization microscopy in biological studies. Prerequisite, permission.
- 555 Mammalian Reproduction (3)** Blandau, Roosen-Runge
Fundamental processes of reproductive anatomy and physiology of laboratory animals. Prerequisite, permission.
- 557 Seminar (1, maximum 9)**
Prerequisite, permission.
- Conjoint 585 Surgical Anatomy (2-4, maximum 12)** (See Conjoint Courses, page 194.)
- 600 Research (*)**
Prerequisite, permission.
- 700 Thesis (*)**

BIOCHEMISTRY

Chairman: HANS NEURATH, C408 Health Sciences Building

Graduate Program Adviser: EARL W. DAVIE, 413 Health Sciences Building

Training in biochemistry begins at the advanced undergraduate or graduate level, and studies toward the degree of Doctor of Philosophy are recommended for students planning a career in this field. Biochemists occupy positions in academic teaching and research institutions, in hospitals, and in industry and government laboratories.

The Department offers courses in basic biochemistry for students in various areas of study in the University, including the natural sciences, medicine, dentistry, and others. Students who intend to work toward a degree of Master of Science or Doctor of Philosophy must present a bachelor's degree with a major in chemistry or its equivalent, and should have some background in biology.

COURSES

361 Biochemistry (3)

362 Biochemistry Laboratory (3)

363 Biochemistry Laboratory (2)

401, 402 Biochemistry (5,3)

403 Biochemistry Laboratory (3)

481, 482, 483 Biochemistry (3,3,3)

484 Biochemistry Laboratory (3)

520 Seminar (1-3, maximum 9)

Prerequisite, permission.

562 Physical Biochemistry (2)

This course acquaints the student with certain specialized applications of physical chemistry and their use in biochemical research. Quantitative aspects of methods especially applicable to the study of high molecular weight compounds and systems of biological interest are considered. (Offered 1963-64.) Prerequisites, 563, 564, and Chemistry 457, or permission.

563, 564 Proteins (2,2)

Neurath, Wilcox

Chemical composition, structure, and biological function of peptides and proteins; properties of protein solutions; methods of analysis and their interpretation. (Offered 1963-64.) Prerequisites, 402 or 483 or permission for 563; 563 for 564.

565, 566, 567 Enzymes and Enzyme Action (2,2,2)

Fischer, Davie

Preparation and properties of enzymes and enzyme systems, including methods of measurement, kinetic analysis, and theory of enzyme catalysis; classification and properties of individual enzymes, coenzymes, and enzyme systems. (Offered 1964-65.) Prerequisites, 482 and Chemistry 357, or permission for 565; 565 for 566; 566 for 567.

583 Advanced Biochemistry Laboratory (3)

Biochemical preparations and investigations of physical and chemical properties by special techniques, including spectrophotometry, polarimetry, ultracentrifuge, electrophoresis, isotope tracer applications, etc. Prerequisites, 483 and permission.

600 Research (*)

Prerequisite, permission.

700 Thesis (*)

MICROBIOLOGY

Chairman: CHARLES A. EVANS, G305 Health Sciences Building

**Graduate Program Adviser: HOWARD C. DOUGLAS,
H309 Health Sciences Building**

The Department of Microbiology offers courses leading to the degrees of Master of Science and Doctor of Philosophy. Candidates for these degrees may specialize in general and medical bacteriology, immunology, parasitology, medical mycology, virology, and physiology of bacteria. Course requirements vary according to the field chosen.

COURSES

- 301 General Microbiology (5) Nester
- 320 Media Preparation (*, maximum 5) Duchow
- 322 Applied Bacteriology (5) Sherris
- 400 Fundamentals of Bacteriology (*, maximum 6) Douglas, Ordal
- 430 Microbial Metabolism (3 or 5) Douglas
- 441-442 Medical Bacteriology, Virology, and Immunology (*, maximum 5 each)
Evans, Groman, Henry, Sherris, Weiser
- 443 Medical Mycology (*, maximum 2) Henry
- 444 Medical Parasitology (*, maximum 4) Groman
- 450 Topics in Immunology (5) Ridgway
Prerequisites, Genetics 451, biochemistry (10 credits), and permission.
- 510 Physiology of Bacteria (3) Whiteley
Fundamental physiological and metabolic processes of bacteria. (Offered alternate years; offered 1963-64.) Prerequisite, permission.
- 520 Seminar (1)
- 530 Comparative Morphology and Physiology of the Higher Bacteria (4) Ordal
Enrichment, isolation, and comparative morphology and physiology of selected bacteria with distinctive developmental cycles. (Offered alternate years; offered 1963-64.) Prerequisite, permission.
- 540 Virology (*, maximum 4) Evans, Groman, Holland
(Offered alternate years; offered 1963-64.) Prerequisites, at least one quarter of general microbiology and permission.
- 550 Advanced Immunology (*, maximum 5) Weiser
(Offered alternate years; offered 1964-65.) Prerequisites, 441- and permission.
- 600 Research (*)
- 700 Thesis (*)

PATHOLOGY

Chairman and Graduate Program Adviser: EARL P. BENDITT,
D505 Health Sciences Building

The Department of Pathology offers programs leading to the degree of Doctor of Philosophy in the field of experimental pathology. Graduate work in pathology is designed to give the student a sound basis in modern quantitative biology for future research in experimental pathology. Students admitted to this program must have at least a bachelor's degree with a major in physical or biological science. Course requirements will vary with the background of the student. Specialized approaches to problems of experimental pathology include histochemical and cytochemical, electron microscopic, immunologic, and others. Students may concentrate research activities in such areas as cardiovascular disease, cancer, inflammation at the cellular and molecular level, and neuro-pathological processes.

COURSES

- 310 General Pathology (2)
- 321 Medical Technology (5)
(Offered Summer Quarter only.)
- 322-323-424-425, 426 Medical Technology (6-6-6-6, 16)
- 441- General Pathology (6-)
- 442-443 Systemic Pathology and Laboratory Diagnosis (-9-7)
- 470 Surgical Pathology (*)
- 476 Clinical Pathological Conference (*)
- 500 Principles of Pathology (4 or 6)
The material covered is concerned primarily with the fundamental alterations in tissues and organs in disease processes and the results of these changes. This course is open to selected graduate students in the biological sciences. Prerequisite, permission.

- 503 Enzymatic Histochemistry (2-3)** **Benditt**
Development of basic concepts with technical and experimental applications. Elective open to medical students and graduate students by permission. Limited to six students. (Offered alternate Winter Quarters; offered Winter, 1965.)
- 504 Determinative Histochemistry (2-3)** **Lagunoff**
Principles and techniques of histochemical identification of proteins, polysaccharides, and lipids. Elective open to medical students and graduate students. (Offered alternate Winter Quarters; offered Winter, 1964.) Prerequisite, permission.
- 510 Anatomical Analysis of Disease (10, maximum 30)**
Prerequisites, 441-442-443, 500, or permission.
- 520 Seminar (2, maximum 10)**
Review of current problems of both research and practical nature by various members of the Department of Pathology with discussion of presentations by senior members of the Department. Prerequisite, permission of Department Chairman.
- 551 Experimental and Molecular Pathology (2-5, maximum 8)**
The purpose of the course is to introduce the student to the fundamental problems in experimental pathology. Both animal experiments and material derived from human disease are utilized. Techniques applicable to particular problems are illustrated. The relationship of alterations and structure, chemistry, and function are emphasized. Such problems as cellular alterations in disease from the fine structure and molecular standpoint, immunology and its relationship to carcinogenesis, allergic encephalitis, mechanisms of inflammation, pathogenesis of arteriosclerosis, and other similar problems are covered. Open only to graduate students, fellows, or trainees. Prerequisite, 231 or 441, and/or permission of Department Chairman.
- 552 Clinical Pathology (2-5, maximum 20)**
A study of the principles and techniques of the usual clinical chemical procedures or of the tests used to study diseases of the hematopoietic system. The control of precision and accuracy is stressed, as is the interpretation of the results obtained. The work in either biochemistry or hematology may be taken in the appropriate sequence. For graduate students and fellows who are assigned to the laboratory in clinical biochemistry.
- 553 Pediatric Pathology (*, maximum 10)**
Assignment according to need and background. By arrangement, for fellows and graduate students.
- 600 Research (*)**
Selected problems arranged in accordance with the student's needs. Prerequisite, permission of Department Chairman.
- 700 Thesis (*)**

PHARMACOLOGY

Chairman and Graduate Program Adviser: JAMES M. DILLE,
F421 Health Sciences Building

The Department of Pharmacology offers courses leading to the degrees of Master of Science and Doctor of Philosophy. Students who intend to work toward one of these degrees must present a bachelor's degree with a major in one of the sciences, such as zoology, chemistry, physics, pharmacy, psychology, or physiology.

COURSES

- 442-443 General Pharmacology (5-4)**
- 507 Journal Seminar (*, maximum 6)**
Presentation of comprehensive reports on recent medical and scientific literature in fields of current importance. Prerequisites, -443 and permission.
- N508 Research Seminar (0)**
Research progress reports and reports on results of completed research. Prerequisites, -443 and permission.
- 509 Survey of Pharmacological Techniques (3)** **Dille**
Principles and specific laboratory techniques for the evaluation of drug effects on the basic physiological systems. Prerequisites, 442-443 or 301-302 or 234, and permission.
- 511 Special Pharmacological Techniques (2)**
A laboratory treatment of biochemical, biophysical and surgical approaches employed in pharmacological investigation. Prerequisites, 442-443 or 301-302 or 234, and permission.
- 525 Cardiovascular Pharmacology (2)** **West**
A didactic consideration of drug action on electrical and mechanical events in the heart and vascular system with clinical correlation. (Offered alternate years; offered 1964-65.) Prerequisites, 442-443 or 301-302 or 234, and permission.

- 526 Autonomic Pharmacology (2)** **Elder**
An advanced treatment of pharmacologic effects on storage, release, and action of autonomic transmitter substances. (Offered alternate years; offered 1964-65.) Prerequisites, 442-443 or 301-302 or 234, and permission.
- 527 Biochemical Pharmacology (2)** **Horita**
Biochemical considerations of the mechanisms of action, structure-activity relationships and metabolism of pharmacologic agents. (Offered alternate years; offered 1964-65.) Prerequisites, 442-443 or 301-302 or 234, and permission.
- 528 Central Nervous System Pharmacology (2)** **Sabawala**
Concepts of the modification of the functions of the central nervous system by drugs. (Offered alternate years; offered 1963-64.) Prerequisites, 442-443 or 301-302 or 234, and permission.
- 529 Psychopharmacology (2)** **Holliday**
The principles and methods of determining the action of drugs modifying human behavior. (Offered alternate years; offered 1963-64.) Prerequisites, 442-443 or 301-302 or 234, and permission.
- 530 Gastrointestinal Pharmacology (2)** **Magee**
A functional basis for the effects of drugs on mechanical and secretory processes within the gastrointestinal tract. (Offered alternate years; offered 1963-64.) Prerequisites, 442-443 or 301-302 or 234, and permission.
- 531 Toxicology (2)** **Loomis**
A descriptive treatment of harmful effects of chemicals on biological tissue and chemical analytical aspects of forensic medicine. (Offered alternate years; offered 1963-64.) Prerequisites, 442-443 or 301-302 or 234, and permission.
- 600 Research (*)**
Participation in research projects already set in progress by members of the Department staff. Directed experience in research investigation. Prerequisites, 442-443 and permission.
- 700 Thesis (*)**

PHYSIOLOGY AND BIOPHYSICS

Chairman: T. C. RUCH, G405 Health Sciences Building

Graduate Program Adviser: THELMA T. KENNEDY, C405 Health Sciences

The Department of Physiology and Biophysics offers courses leading to the degrees of Master of Science and Doctor of Philosophy.

Physiology is based upon zoology, physics, chemistry, and mathematics. It interlocks closely with the other basic medical sciences—anatomy, biochemistry, pharmacology, and pathology—and with psychology. For this reason, physiology appeals to students with quite diverse backgrounds and goals. In the organization of the graduate program in physiology and biophysics, several specializations within the broad field of physiology are recognized, and the requirements and curricula are different for each, although there is considerable overlapping. The areas of specialization may be described as (1) mammalian and pathological physiology, (2) biophysics, for which undergraduate mathematics and physics are prerequisites, (3) physiology of behavior, in which undergraduate psychological training is a prerequisite. For students wishing a more equal distribution of time between physiology and psychology a conjoint Ph.D. degree program in these subjects is offered.

Biophysics emphasizes the physical aspects of organs and control systems, studied by the instruments and methods of thinking used by physicists. A bachelor's degree in physical science or equivalent is required.

The basic graduate courses in physiology and biophysics include 401-402 and Conjoint 409 (Basis of Neurology).

Graduate students in physiology and biophysics with a medical degree will have their curricula adjusted in accordance with their training.

Students who intend to work toward a degree of Master of Science or Doctor of Philosophy must meet the requirements of the Graduate School. Students with a bachelor's degree in zoology, psychology, chemistry, engineering, physics, or with an M.D. degree are acceptable as prospective candidates for M.S. and Ph.D. degrees.

COURSES

Conjoint 400 Human Anatomy and Physiology (9) (See Conjoint Courses, page 194.)

401-402 Advanced Human Physiology (7-7)

Conjoint 409 Basis of Neurology (3, 5, or 8) (See Conjoint Courses, page 194.)

411 Introductory Biophysics (4) Brown, Woodbury, Young

416 Biophysics (5) Woodbury, Young

424 Introductory Membrane Potentials (3) Woodbury

491 Medical Physics (2) Brown, Young

492 Selected Topics in Physiology and Biophysics (2)

494 Neurological Study Unit (2) Physiology, Neuroanatomy, Neurology, Neuropathology, Neurosurgery, and Psychiatry Staff

515-516-517 Physiological Proseminar (5-5-5)

A guided survey of the experimental literature of major topics in physiology. Course conducted as seminar with oral analysis of assigned papers and topics. Prerequisites, 401-402, Conjoint 409, and permission.

520 Physiology Seminar (2-5)

Selected topics in physiology.

521 Biophysics Seminar (2-5) Young

Selected topics in biophysics.

522 Biophysics of External Respiration (2-5) Young

Viscous and elastic properties of chest-lung system; flow of gases in tubes. Generalized alveolar air equations. Principle of infrared absorption and emission type of rapid gas analyzers. Prerequisite, permission.

523 Heat Transfer and Temperature Regulation (2-5) Young

Prerequisite, B.S. in physical science or permission.

524 Advanced Membrane Potentials (3) Woodbury

Quantitative analysis of electrical activity in nerve. Active sodium-potassium transport. Ionic flux equations. Conductance changes. Calculation of the action potential. Prerequisite, permission.

525, 526, 527 Advanced Mammalian and Clinical Physiology (*,*,*)

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.

528 Physiological Control Systems (2-5) Young

Theories of nonlinear mechanics and their applications to physiological control systems. Prerequisite, B.S. in physical science or permission.

529 Montoneuron Physiology (4) Towe, Woodbury

Electrical properties of surface membrane; excitatory and inhibitory reactions and their ionic mechanisms; properties of the spike potential; interaction of synaptic responses. Prerequisites, 515-516-517, 424, and permission.

530 Synapse and Reflex Seminar (4) Patton

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, 401-402, 515-516-517, and permission.

532-533 Basic Principles of Physiological Instrumentation (4-4) Young

Pulse generator; A.C. and D.C. high-gain amplifier circuits; oscilloscopes and oscillographs; recording of pressure, volume, and flow in liquids and gases; calorimetry and pyrometry; continuous gas analysis. Prerequisite, permission.

534 Applied Physiological Instrumentation (2-5)

Study and use of research instruments applicable to the nervous system (stimulators, amplifiers, and oscilloscopes), the cardiovascular system (cinefluorograph, electro- and stetho-cardiograph, oximeter, strain gauge manometers, etc.), and respiratory and metabolic activity (flow meters, minute volume integrator, infrared and paramagnetic gas analyzers, cardiatachometer, thermocouples, gradient calorimeter). Prerequisites, 532 and permission.

535 Operative Techniques in Neurophysiology (2-5) Patton, Smith

Deafferentation, decerebration and Sherrington reflex preparation; osteoplastic bone flap, Horsley-Clarke apparatus, implanted electrodes, and reconstruction of lesions; primate colony and operating room management. Prerequisite, permission.

536 Behavioral Techniques in Neurophysiology (2-3) Smith, Towe

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.

550 Cortical Potentials (4) Towe

Properties of continuous and evoked cortical potentials and their interactions. Relationship of cortical unit activity to cortical potentials. Prerequisites, 424, 515-516-517, and permission.

600 Research (*)

Prerequisite, permission.

700 Thesis (*)

PREVENTIVE MEDICINE**Chairman: J. THOMAS GRAYSTON, B506 Health Sciences Building****COURSES**

- 323 Introduction to Public Health Principles and Practices (3)** Wilkey
- 410 Principles of Communicable Disease Control and Biostatistics (2)** Portman
- 420 Principles of Epidemiology (2)** Alexander, Perrin
- 422 Introduction to Environmental Health (3)** Hatlen
- 424 Public Health Programs (3)** Merritt
- 440 Water and Waste Sanitation (4)** Hatlen
- 441 Milk and Food Sanitation (4)** Hatlen
- 442 Vector Control and General Sanitation (3)** Hatlen
- 450 Measurement and Control of Air Pollution (2)** Broyssse
- 453 Industrial Hygiene Techniques (3)** Broyssse
- 460J Field Training in Health Education (5)**
Offered jointly with the College of Education. (Offered Summer Quarter only.)
- 461 School and Community Health Programs (5)** Mills, Reeves
- 463 Community Organization for Health Education (3)**
- 464 Community Health Education Techniques (3)**
- 470 Introduction to Biometry (3)** Bennett
- 472 Applied Statistics in Health Sciences (2-4)** Perrin
- 476 Sample Survey Techniques (3-5)** Bennett
- 477 Statistical Methods in Biological Assay (3)** Bennett
- 478 Practice of Epidemiology (3)**
- 480 Public Health Problems (*, maximum 6)**
- 482 Field Practice in Public Health (2-6)**
- 483 Field Practice in Public Health (6)**
- 484 Field Practice in Public Health (3)**
- 490 Public Health Administration (3)** Ravenholt
- 492 Problems in International Health (2)** Grayston
- 506 Mammalian Cell Culture as a Tool for Virus Research (*, maximum 3)** Kenny
General concepts and techniques of cell culture as applied to problems of virus isolation and propagation. Prerequisites, 5 credits in microbiology, 5 credits in biochemistry, and permission.
- 510 Preventive and Community Medicine (4)** Grayston
Introduction to academic preventive medicine with emphasis on community agencies and resources for medical practice. Prerequisites, M.D. or Ph.D. in medical science and permission.
- 520 Epidemiology of Acute Diseases (3)** Alexander
A study of the principles and practice of epidemiology as derived from a study of communicable diseases. Prerequisites, M.D. or Ph.D. in medical science and permission.
- 521 Epidemiology of Chronic Diseases (3)** Ravenholt
A study of the principles and practice of epidemiology as applied to the noncommunicable diseases. Prerequisites, M.D. or Ph.D. in medical science and permission.
- 530, 531 Medical Biometry I, II (3,3)** Perrin
The application of mathematical and statistical techniques to the problems of advanced medical and epidemiological research. Prerequisites, M.D. or Ph.D. in medical science and permission.
- 540 Environmental Medicine (3)** Martin
Air and water pollution; industrial toxicology, and physical environmental factors affecting health. Prerequisites, M.D. or Ph.D. in medical science and permission.
- 600 Research (*)**
Selected problems arranged in accordance with the student's needs. Prerequisite, permission.
- 700 Thesis (*)**

CONJOINT COURSES

Conjoint courses are offered cooperatively by departments in the School of Medicine. They are designed to integrate basic medical training with clinical work and, in some cases, to integrate basic medical training in two or more fields. In the descriptions of these courses, the name of the department with primary responsibility for each course precedes the names of the other sponsoring departments.

COURSES

- 400 Human Anatomy and Physiology (9)** **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 jointly by the Departments of Anatomy and Physiology and Biophysics. Prerequisite, permission.
- 409 Basis of Neurology (3, 5, or 8)** **Everett, Patton, Ruch**
 An advanced course in the anatomy of the central nervous system, and its correlation with neurophysiology. Offered jointly by the Departments of Anatomy and Physiology and Biophysics. Prerequisite, permission for graduate students.
- 585 Surgical Anatomy (1-3, maximum 12)**
 An intensive course devoted to one region of the body each quarter, i.e., thorax, abdomen, upper extremity, head, and neck. Offered jointly by the Departments of Anatomy and Surgery. Prerequisite, permission.

PEDIATRICS

Chairman: RALPH P. WEDGWOOD, BB807 University Hospital

COURSES

- 496 Concept of the Child (3)** **Deisher, Tjossem**
- 505 Physical Growth of the Well Child (2)** **Jensen**
 Weekly seminars, eighteen hours. The correlation between growth and development and diseases in the child as pertaining to dental health. For graduate students in dentistry. Prerequisite, permission.

PSYCHIATRY

Chairman: HERBERT S. RIPLEY, B516 Health Sciences Building

The Department of Psychiatry offers courses designed to help students in medicine, nursing, psychology, social work, education, and others concerned with human problems to attain a scientific grasp of psychiatric principles. Using these principles, students will be able to evaluate interpersonal relationships and use to the greatest advantage their potentialities for understanding and dealing with personality reactions.

COURSES

- 450 Principles of Personality Development (2)** **Kaufman**
- 451 Principles of Personality Development (2)** **Heilbrunn**
- 452 Clinical Psychiatry (2)** **Schwartz**
- 553 Psychodynamics and Psychopathology (2)** **Heilbrunn**
 Heredity, constitution, physical changes, and family and social relationships as determinants in psychodynamics are discussed. Attention is paid to defense mechanisms such as anxiety, depression, resentment, evasion, withdrawal, repression, projection, and overcompensation as commonly encountered in psychopathology. Prerequisite, 267 or 451, or permission.
- 558 Seminar: Interviewing (2)**
 Case studies are presented by individual students for discussion of the psychodynamics and methods of dealing with personality problems. For graduate students who are having practical experience in interviewing. Prerequisite, permission.
- 559 Child Psychiatry (2)** **Kaufman**
 Series of discussions and lectures dealing with psychopathology of children. For nonmedical students. Prerequisite, 267 or 451, or permission.

565 Biological Foundations of Psychiatry (2)

Heilbrunn

Anatomical and physiological factors involved in various forms of psychopathology. For nonmedical students. Prerequisite, permission.

SURGERY

**Chairman and Graduate Program Adviser: HENRY N. HARKINS,
BB477 University Hospital**

The Department of Surgery offers courses leading to the degree of Master of Science. The purpose of this program is not to train students in the art of surgery or in surgical techniques, but to encourage basic science research in surgical problems on a graduate level.

Departmental requirements for admission to this program include an M.D. degree from an approved medical school and preferably a year of internship in a hospital approved by the Council on Medical Education and Hospitals of the American Medical Association.

Prospective candidates must earn a minimum of 45 credits, including not less than 15 credits of course work, exclusive of research, in surgery and allied graduate courses. A minor is to be taken in one of the basic medical sciences—anatomy, biochemistry, microbiology, pathology, pharmacology, or physiology and biophysics. The thesis must be based upon research carried out under the supervision of a member of the full-time teaching staff. The student must appear at an oral examination in which his thesis is defended and knowledge of his major and minor fields is demonstrated.

The examiners will consist of a committee appointed by the Department of Surgery.

COURSES**520 General Surgery Seminar (5)**

**Dillard, Fletcher, Harkins, Merendino, Nyhus,
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.

521 Orthopedic Research Seminar (*)**Clawson, Anderson**

Each week a current laboratory topic is discussed with members of the attending and resident staff. Active participation of the student is required. Prerequisite, graduate student.

522 Orthopedic Seminar (*)**Clawson**

Seminar in current topics of orthopedic interest. Prerequisite, senior medical student or graduate student.

525 Seminar in Plastic and Maxillo-Facial Surgery (*)**DeVito**

One two-hour session per week will be devoted to a discussion of principles, practice, and scope of plastic and maxillo-facial surgery. Prerequisite, senior medical student or graduate student.

529 Neurosurgery Seminar (1)

A weekly seminar centered around advanced clinical topics in neurosurgery with discussion by staff and students. Prerequisite, senior medical student or graduate student.

Conjoint 585 Surgical Anatomy (1-3, maximum 12) (See Conjoint Courses, page 194.)**590 Surgical Experimental Techniques (5)**

**Dillard, Fletcher, Harkins, Merendino, Nyhus,
Stevenson, Winterscheid**

Basis for graduate research and advanced thesis work, including supporting surgical laboratory techniques. Prerequisite, medical student or graduate student.

598 Seminar in Urology (*)**Ansell**

Problems in the field of urology discussed by various visiting members of the faculty of urology and of other departments to provide a well-rounded basic scientific and clinical presentation.

600 Research (*)**Harkins, Ansell, Merendino, Ward****700 Thesis (*)**

SCHOOL OF NURSING

Dean: MARY S. TSCHUDIN, C303 Health Sciences Building

Graduate Program Adviser: KATHERINE J. HOFFMAN,
C303 Health Sciences Building

The School of Nursing offers graduate curricula leading to the degrees of Master of Arts or Master of Nursing and a minor on the doctoral level for students matriculated in another discipline. Post-master's programs planned on an individual basis are also available.

MASTER'S PROGRAMS

The curricula provide for advanced professional preparation and research in a specialized area of nursing and in teaching, supervision, or administration. Majors are offered in the following areas: maternal-child nursing; medical-surgical nursing; psychiatric nursing, public health nursing, school nursing, and occupational health nursing; administration of nursing services; administration of schools of nursing.

Most programs are four quarters in length, but they may vary with the particular major field and the number of credits carried each quarter. At least half of the total credits taken must be at the 500 level or above. Each student in the master's degree program carries out original research in nursing and presents a written thesis. Within the first quarter of graduate study, the student should plan her entire program with the Graduate Program Adviser in order to insure a satisfactory sequence of courses.

Master of Nursing. This professional degree is offered with emphasis on advanced preparation in an area of specialization in nursing. Courses from two fields outside of nursing provide supporting work for the nursing major. A foreign language is not required for this degree. Requirements for the Master of Nursing degree are:

<i>Area of Study</i>	<i>Credit</i>
Major: nursing specialty courses	18
Related Fields: courses in two other disciplines	12
Research: courses in research and thesis	15
	<hr/> 45

Master of Arts. This academic degree is offered with a major in nursing and a minor in another discipline. Students are encouraged to select a minor which will serve as a basis for further post-master's study. Students are expected to meet the undergraduate prerequisites of the minor department. The required course work and exact number of credits for the minor are determined by the minor department. A candidate for this degree is required to demonstrate a reading knowledge of one foreign language. Requirements for the Master of Arts degree are:

<i>Area of Study</i>	<i>Credits</i>
Major: nursing specialty courses	18
Minor: courses in another discipline	12
Research: courses in research and thesis	15
	<hr/> 45

POST-MASTER'S PROGRAMS

Students who hold the master's degree may enroll for an additional period of study on the post-master's level. This may be for the purposes of gaining additional depth in the area of study begun on the master's level, for broadening one's area of specialized preparation through study in another area of nursing, or for obtaining additional knowledge and skill in nursing research. Post-master's study is offered in the areas of maternal-child nursing, medical-surgical nursing, adult and child psychiatric nursing, administration in schools of nursing, and research in

nursing. Individual programs of study may be planned in keeping with the student's interests and long-range professional goals.

The School of Nursing offers a minor on the doctoral level for those students who are matriculated in another discipline. The minor in nursing should total 35 credits in courses offering graduate credit, of which at least half must be at the 500 level. The recommended sequence of courses for each student is determined in the light of her previous work and future goals.

COURSES

- 430 Advanced Nursing Field Work (3)**
- 431 Advanced Nursing Field Work (2)**
- 435 Practice Supervision in Nursing (3)**
- 436 Practice Teaching in Nursing (3)**
- 454 Administration in Nursing (2)** Byerly
- 455 Administration of Schools of Nursing (3)** Hoffman
- 456 Nursing Service Administration (3)**
- 462 Teaching in Schools of Nursing (3)** Jenkin
- 463 Personnel Guidance in Nursing (3)** Nehren
- 464 The Nurse in Mental Health (3)** Batey
- 466 In-Service Education in Nursing (3)** Jenkin
- 467 Evaluation of Performance in Nursing (3)** Olcott
- 471NJ Advanced Directed Teaching: School Nursing (4)** Cobb, Corbally
Offered jointly with the College of Education.
- 481 The Nurse in School Vision Programs (2)**
- 485 School Health Problems (3)**
Formerly 485J.
- 486 Occupational Health Programs, Nursing Implications (3)**
(Not offered 1963-64.)
- 498 Methods of Supervision in Public Health Nursing (3)**
- 501 Development of Nursing Procedures (2)**
Nursing procedures as a basis for nursing service planning and as a teaching tool. Procedures analyzed against selected criteria and developed according to clinical needs.
- 502 Applied Group Development Principles (3)** Murray
Factors that contribute to productive group effort with application of group principles for professional health personnel. Formerly 502J. Prerequisites, permission, Speech 332 or equivalent.
- 504 Seminar in Occupational Health Nursing (2)**
Intensive analysis of selected problems. (Not offered 1963-64.)
- 505 Seminar in Administration of Schools of Nursing (3)** Hoffman, Gray
Discussion and analysis of situations in such administration. Prerequisite, 455 or equivalent.
- 506 Seminar in Nursing Service Administration (3)** Byerly
Discussion and analysis of situations in such administration. Prerequisite, 456 or equivalent.
- 507 Seminar in Nursing Problems in Mental Health (2)** Nehren
Psychiatric concepts in the nurse's therapeutic role in the family milieu. Prerequisites, 508 and permission.
- 508 Seminar in Advanced Psychiatric Nursing (2)** Batey
Exploration of interpersonal relations; the nurse's therapeutic role with the psychiatric patient and in the total milieu. To be taken concurrently with 430.
- 509 Seminar in School Nursing (3)**
The application of public health nursing concepts, principles, and research findings in the analysis and solution of school nursing problems.
- 510 Curriculum Development in Nursing Education (5)** Pedersen
Current patterns and trends in nursing education; development of materials; problems in the study and implementation of nursing curricula. Prerequisite, 417 or equivalent.
- 511 Psychosomatic Nursing (3)** Nehren
Seminar and clinical experiences centered on problems of interrelationships of physical and emotional aspects of illness. Prerequisite, basic psychiatric nursing or permission.
- 512 Advanced Fields in Psychiatric Nursing (3)** Batey
Practicum devoted to the solution of nursing problems in psychiatric situations. Specific interpersonal and interprofessional relationships in the care of mental patients. Prerequisite, permission.

- 513 Field Experience in Mental Health Nursing (3)** **Nehren**
Selected experience in the identification and analysis of mental health problems in family relationships; utilization of psychiatric concepts in developing therapeutic nursing relationships in the family milieu. Concurrent with 507.
- 515 Special Fields in Public Health Nursing (3)**
Investigation of public health nursing responsibilities. Emphasis varies with interest and needs of the students. Prerequisite, permission.
- 516 Seminar in Child Psychiatric Nursing (5)** **Critchley**
Analysis of concepts relating to normal and abnormal phenomena, drawn from nursing, psychiatry, and social sciences, underlying nursing of the emotionally disturbed child and his family. Seminars, readings, participation, and observation with normal children. Prerequisite, permission.
- 517 Seminar in Child Psychiatric Nursing (5)** **Critchley**
Intensive therapeutic nursing relationship with the emotionally disturbed child and his family; analysis of nursing problems; implementation of nursing actions; study of research findings applicable. Prerequisite, permission.
- 518 Seminar in Child Psychiatric Nursing (5)** **Critchley**
Continuation of 517 with major emphasis upon synthesis of a body of child psychiatric nursing knowledge. Prerequisite, permission.
- 519 Seminar in Child Psychiatric Nursing (5)** **Critchley**
Planning and implementing therapeutic group relationships with disturbed and defective children in a children's treatment center. Prerequisite, permission.
- 521 Methods of Research in Nursing (2)** **Hoffman**
Methods of research applied to the solution of problems in all fields of nursing.
- 530 Advanced Concepts in Maternal and Child Health and Implications for Nursing (3)** **Murray**
Consideration of changing philosophy in maternal and child care; factors influencing health; ways of meeting health needs; role of the nurse in solution of related problems. Prerequisite, permission.
- 535 Problems in Nursing Mentally Retarded Children (3)** **Chinque**
Analysis of significant problems in care of mentally retarded children and their families, through consideration of the complex biophysical, psychological, and sociocultural factors involved. Prerequisite, permission.
- 540 Seminar in Medical-Surgical Nursing (3)** **Giblin**
Criteria for judging the effectiveness of nursing actions used to help alleviate or prevent pathophysiological changes evidenced in physical illness. Prerequisite, permission.
- 542 Seminar in Cardiovascular Nursing (3)** **Giblin**
Analysis of nursing problems of such patients; potential pathophysiology and the physical and emotional factors involved. Prerequisites, 430 (medical-surgical), 464, or permission.
- 543 Seminar in Nursing in Gerontology (3)** **Patrick**
Research findings which identify changes due to aging applied to complex nursing problems in maintenance of health and restoration of maximum functioning of the aging.
- 550 Advanced Public Health Nursing (3)** **Burke**
Advanced developments in the sciences of nursing and public health.
- 558 Seminar in Advanced Public Health Nursing (3)** **Burke**
Application of principles and research findings in the analysis and solution of current and complex community health problems. Prerequisite, permission.
- 570 Seminar in Clinical Research in Nursing (3)** **Hoffman**
Philosophy, problems of design; use of criterion measures in terms of patient care. Prerequisite, permission.
- 600 Research (*)** **Hoffman**
- 700 Thesis (*)** **Hoffman**

COLLEGE OF PHARMACY

Dean and Graduate Program Adviser: JACK E. ORR, 102 Bagley Hall

The College of Pharmacy offers a program of graduate study encompassing a thorough education in the fundamentals and theories of the disciplines necessary for specialization in one of the pharmaceutical sciences; and a broad education in allied supporting sciences which will qualify the graduate to assume a place in teaching, research, manufacturing, or hospital pharmacy. The degrees of Master of Science and Doctor of Philosophy are offered.

The College of Pharmacy is accredited by the American Council on Pharmaceutical Education and is a member of the American Association of Colleges of Pharmacy.

Basic requirements for admission to graduate study in the pharmaceutical sciences are met by an undergraduate degree in pharmacy. Students with undergraduate majors in the biological or physical sciences may also be admitted, but they will be required to complete courses basic to their chosen field of study during their graduate careers. Applicants must demonstrate above-average scholastic ability and promise.

Undergraduates who have decided to pursue graduate work may expedite their programs by selection of pertinent electives. Although the choice of electives will vary with the identity of the student's selected field in the pharmaceutical sciences, it should be emphasized that graduate studies in the College of Pharmacy require adequate preparation in the physical and biological sciences, in mathematics, and in foreign language. Physical chemistry (calculus is a prerequisite), qualitative organic chemistry, biochemistry, and courses in the pharmaceutical sciences are basic. Students who have not completed certain desired courses during their undergraduate work may be permitted to do so during their graduate programs.

Specialization is offered in pharmaceutical chemistry, pharmacognosy, pharmacy, and hospital pharmacy. Graduate study toward an advanced degree in pharmacology is directed by the Department of Pharmacology of the School of Medicine. The hospital pharmacy program may include a hospital pharmacy internship or residency if desired by the student.

Graduate programs of study vary with the specialization selected. Although the programs are flexible, certain general recommendations may be made. In addition to studies in their chosen major, students with majors in pharmaceutical chemistry and pharmacy are required to follow programs of course work usually selected from advanced courses in organic chemistry, physical chemistry, biochemistry, or radiochemistry. A course in statistical methods or a course in computer programming is basic to all programs.

For hospital pharmacy majors, courses in the basic health sciences including biochemistry, microbiology, and pharmacology are necessary in addition to the specialized courses in hospital pharmacy and manufacturing pharmacy.

For pharmacognosy majors, courses in organic chemistry, biochemistry, and plant physiology are basic to most programs. These are generally best supplemented in the biological areas by courses in plant anatomy, taxonomy, microbiology, and mycology. In the physical area, specialized courses in organic chemistry, analytical chemistry, and physical chemistry are utilized.

All graduate students are encouraged to pursue additional courses in the pharmaceutical sciences other than their fields of specialization. Specific recommendations based upon individual interests and information concerning courses may be obtained from the chairman of the department concerned or from the Graduate Program Adviser.

MASTER OF SCIENCE. A student in this program must present at least 27 credits of course work, exclusive of thesis and nonthesis research. He must complete a research project, prepare an acceptable thesis (unless specifically excepted in a particular program), and pass a Final Examination. The student must present a certificate of proficiency in one foreign language.

DOCTOR OF PHILOSOPHY. A student in this program must present a minimum total of 56 credits of course work, exclusive of dissertation and nonthesis research. The credits earned for the master's may be applied toward the doctor's degree. The student must pass a General Examination for admission to candidacy for the doctor's degree, complete a research project, prepare an acceptable dissertation, and pass a Final Examination. The research for the doctor's degree must be done at the University of Washington (not applicable to students beginning their graduate studies prior to September, 1958). The doctoral student must present a certificate of proficiency in two foreign languages (one in addition to the Master of Science requirement).

COURSES**PHARMACEUTICAL CHEMISTRY**

- 430 Inorganic Medicinal Products (3)** McCarthy, Orr
- 440, 441, 442 Organic Medicinal Products (3,3,3)** Fischer, Krupski
- 480 Advanced Organic Medicinal Products Laboratory (3)** Huitric
(Offered alternate years; offered 1964-65.)
- 497 Toxicology (3)** Fischer
- 511, 512, 513 Advanced Pharmaceutical Chemistry (3,3,3)** Krupski
Chromatography, gas chromatography, ion exchange, and the use of various instruments for scientific investigations and vitamin determinations. (Offered every third year; offered 1964-65.)
- 520 Seminar (1, maximum 5)**
Graduate students must attend seminars and make one formal presentation per year while in residence; 1 credit per year is allowed.
- 521, 522 Advanced Organic Medicinal Products (3,3)** Huitric
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. (Offered alternate years; offered 1963-64.) Prerequisites, Chemistry 457, 531, and Biochemistry 482, or permission.
- 531, 532, 533 Plant Chemistry (3,3,3)** McCarthy
Alkaloids, volatile oils, steroids, and glycosides, including methods of isolation, proof of structure and configuration, and synthesis, with emphasis on materials of pharmaceutical interest. (Offered every third year; offered 1965-66.)
- 600 Research (*)** Fischer, Huitric, Krupski, McCarthy
- 700 Thesis (*)**

PHARMACOGNOSY

- 405 Advanced Pharmacognosy (3)** Tyler
- 406 Medicinal Plants (2)** Tyler
- 411 Hormones and Glandular Products (2)** Brady
- 412 Immunological Agents (2)** Brady
- 520 Seminar (1, maximum 5)**
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, maximum 2)** Tyler
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 Research (*)** Brady, Tyler
- 700 Thesis (*)**

PHARMACY AND PHARMACY ADMINISTRATION

- 420 Manufacturing Pharmacy (3)** Plein
- 483 Hospital Pharmacy (3-5)** Plein
- 520 Seminar (1, maximum 5)**
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)** Plein
The technology of parenteral preparations, ophthalmic solutions and ointments and specific problems in formulation of sterile pharmaceuticals. (Offered alternate years; offered 1964-65.) Prerequisite, permission.
- 570 Hospital Pharmacy Administration (5)** Plein
The organization and administration of the hospital pharmacy and the responsibility of the director of pharmacy services in a hospital. (Offered alternate years; offered 1964-65.) Prerequisite, permission.
- 580 Advanced Manufacturing Pharmacy (5)** Plein
A study of the methods of manufacture of pharmaceutical preparations on a semi-commercial scale. (Offered alternate years; offered 1964-65.) Prerequisites, Chemistry 457, or taken concurrently, and permission.
- 600 Research (*)** Hall, Hammarlund, Plein, Rising
- 700 Thesis (*)**

SCHOOL OF SOCIAL WORK

Dean: **CHARLES B. BRINK**, 102 Social Work Hall

Graduate Program Adviser: **J. L. KELLEY**, 111 Social Work Hall

The School of Social Work offers a two-year, six-quarter program leading to the professional degree of Master of Social Work. The professional program is accredited by the Council on Social Work Education. It provides an educational experience which has been designed to prepare students:

- a. To help individuals, groups, or communities with social situations that are unsatisfying to them or unsatisfactory to society. These are social situations where:
 - (1) An individual, group, or community is dissatisfied with his or its performance.
 - (2) An individual, group, or community violates explicitly stated requirements of society.
- b. To expand the knowledge upon which social work practice is based.
- c. To record and impart social work knowledge pertinent to social welfare.

During the course of study, students may emphasize an interest in social case work, social group work, social community organization, social agency administration, or social research. Among the areas of practice for which students are prepared by completion of the course of study are: adoptions, foster home care, institutional care, child protection, child guidance, family counseling, probation and parole, medical social work, school social work, public assistance service, community planning, community center work, and social group work programs.

MASTER OF SOCIAL WORK. Requirements for the degree include: Completion of the prescribed curriculum, a minimum of three quarters in residence at this School, the equivalent of field instruction in six quarters, and completion of either an individual thesis or a group research project. Each student must present a total of 72 quarter credits of passing work and maintain a B average in all courses numbered 400 and above. In addition, the student must present a minimum of 65 quarter credits of B work or better. The degree is awarded on the basis of the student's competence in theory and practice, as evidenced through satisfactory completion of courses. The field work performance is a further test of competence. There is no foreign language requirement.

The course of study is composed of courses concerned with the philosophy, organization, and administration of social service programs; the understanding of human growth and behavior; the use of professional social work methods, and the use of research methods. In addition, each student spends a portion of his time testing his developing knowledge and skill in a health, welfare, or group-service agency. This laboratory experience is under the supervision and instruction of carefully selected, professionally prepared social workers.

COURSES

300 Survey of Social Service Programs (3)

(Offered in Evening Classes and Summer Quarter only.)

391 Supervised Study (2-6, maximum 6)

400 Field of Social Welfare (5)

Kelley, Mundi

401 Principles of Interviewing (2)

Kelley, Mundi

502, 503, 504 Social Welfare Organization (2,2,2)

Parsons, Smith

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.

508 Basic Values and Concepts in Social Work Method (2)

Abrahamson, Maier

An identification and analysis of basic value concepts and principles underlying social case work, social group work, and social community organization practice.

- 509 Readings in Social Work (*, maximum 6)**
Prerequisite, permission.
- 510 Social Case Work (2)** **Abrahamson, Burg, Reiss**
The case work process in a variety of settings through the analysis and discussion of case records; consideration of basic interviewing principles; development of understanding of motivations in human behavior and application of this understanding in case work. Prerequisite, permission.
- 511 Social Case Work (2)** **Abrahamson, Burg, Reiss**
Continuation of generic case-work theory, with emphasis on diagnosis and case-work treatment. Prerequisite, 510.
- 512 Social Case Work (2)** **Abrahamson, Burg, Reiss**
Elaboration and intensification of basic case-work concepts and their application in practice to various types of agencies. Prerequisite, 511.
- 515 Field Instruction (4-8, maximum 12)** **C. Macdonald**
Prerequisite, permission.
- 520 Seminar (*, maximum 6)**
Prerequisite, permission.
- 521 Social Group Work (2)** **Maier, De Noon**
Professional social group work as a method and process; objectives, techniques, skills, and media of group work method, and criteria for evaluation of results. Prerequisite, permission.
- 522 Social Group Work (2)** **Maier**
Continuation of social group work study with emphasis on process in groups and identification of group goals.
- 523 Social Group Work (2)** **Maier**
Continuation of study in social group work with emphasis on method, skill, and analysis of the professional role.
- 524 Advanced Social Group Work (2)** **Maier**
Continued intensive study on social group work method with emphasis on the utilization of program media and the concept of program planning process.
- 525 Advanced Social Group Work (2)** **Maier**
Continued intensive study on social group work method with emphasis on structuring group situations, and application of the method to institutional settings.
- 526 Advanced Social Group Work (2)** **Maier**
Continued intensive study of social group work method with emphasis on the integration of prerequisite course content and the analysis of issues and trends in social group work practice.
- 530 Advanced Social Case Work (2)** **Abrahamson, Hunt, Reiss, Takagi**
Intensive study of the case-work 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, permission.
- 531 Advanced Social Case Work (2)** **Abrahamson, Hunt, Reiss, Takagi**
Continuation of intensive study of case material, with emphasis on sound direction in case-work treatment. Prerequisite, 530.
- 532 Advanced Social Case Work (2)** **Abrahamson, Hunt, Reiss, Takagi**
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 Case Work (2,2)** **Abrahamson, Hunt, Reiss**
Generic and differential factors in understanding and utilizing various administrative settings in social case-work practice. Study of developments and trends in social case-work practice. Prerequisite, permission.
- 535 Advanced Field Instruction (4-8, maximum 12)** **C. Macdonald**
Prerequisite, 515.
- 556 Social Aspects of Illness and Disability (2)** **R. Macdonald, Eymberts**
Physical growth and change of the individual as correlated with factors of emotional and social development; consideration of specific medical problems. Prerequisite, permission.
- 557 Social Work with Sick, Disabled, or Handicapped Persons (2)** **R. Macdonald**
Application of select behavioral science concepts to social work practice with persons who are ill, handicapped, or disabled. Prerequisite, 556.
- 570 Administration of Social Agencies (2)** **Parsons**
Problems of administration that confront the administrator and his staff in any public or private agency; relations with board and staff; problems of finance and budget making, office management. Emphasis on dynamic principles of the administrative process. Prerequisite, permission.
- 572 Social Community Organization (2)**
Problems of adjusting social welfare needs and resources; understanding the social forces of the community; methods used by public and private agencies to organize to meet social welfare needs; interpretation of agency programs to the community; the place of boards and committees. Prerequisite, permission.

573 Social Welfare Planning Process (2)

An examination of the process of promoting and sustaining an adjustment between social welfare resources and social welfare needs. Analysis of personal and social factors in specific community organization efforts and the nature of the professional worker's participation in them. Discussion based upon records of specific community situations. Prerequisite, 572.

580 Public Welfare (2)**Parsons**

Care of needy under poor laws, emergency relief and modern public assistance programs; characteristics of state assistance plans; administration of work relief; federal grants-in-aid; adult probation and parole; vocational rehabilitation service. Prerequisite, permission.

586 Statistics in Social Work (2)**Northwood**

Elementary statistical method applied to social welfare problems; sources for continuing statistical reports; interpretation and use of statistics in welfare administration. Prerequisite, permission.

587 Law and Social Welfare (2)**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, 591, 592 Social Work Research (2,2,2)**Northwood, Stutsman**

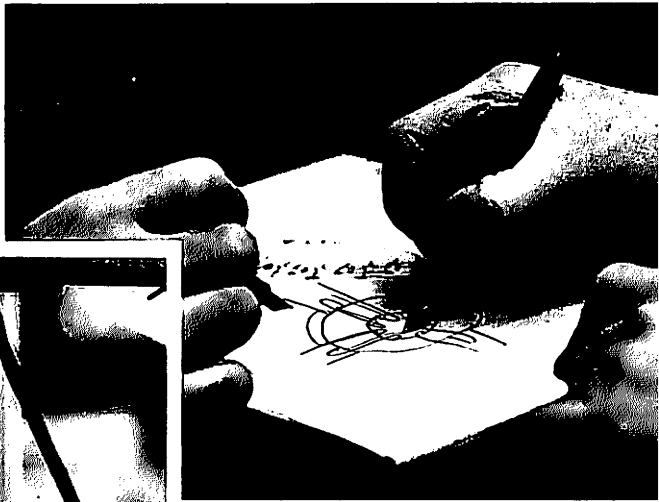
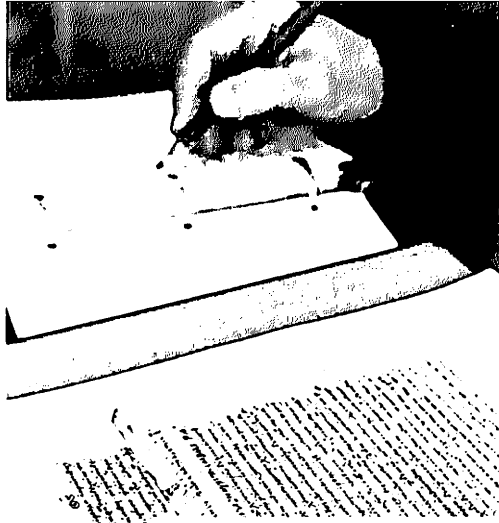
Methods used in the study of social work practice, program evaluation, and community needs and resources. Study of current social work research field practice through group research projects. Presentation and evaluation of research projects currently carried by students in the research program. Prerequisite, second-year graduate standing.

593-594-595 Field Practice in Research (2-2-2)

Field practice in a group project in lieu of an individual thesis. Includes development of research design, collection of data, tabulation and analysis, and report writing. Prerequisite, 590 or its equivalent.

700 Thesis (*)**702 Degree Final (6)**

Limited to students completing a nonthesis degree program.



**SPECIAL SCHOLARLY AND RESEARCH
ACTIVITIES AND UNITS**

SPECIAL SCHOLARLY AND RESEARCH ACTIVITIES AND UNITS

Research is of particular concern to the Graduate School since the advanced instruction of graduate students is largely guidance in research and since the continuing effectiveness of professors in instruction of graduate students rests largely upon continuation of the scholarly research activities of these professors. Thus the research policies and practices of the University are to a considerable degree developed through and administered by the Graduate School.

OFFICE OF UNIVERSITY RESEARCH

Director: Joseph L. McCarthy, 3 Administration Building

Associate Director: Edward C. Lingafelter, 3 Administration Building

Coordinator: Frank T. Watkins, 3 Administration Building

The Office of University Research has been established to assist in the further development of the research activities of the University and the community. Its two main responsibilities are (1) to aid members of the faculty in developing and maintaining their several research programs, and (2) to provide a central point of contact for off-campus agencies turning to the University for research assistance.

INTRA-UNIVERSITY SCHOLARLY AND RESEARCH SUPPORT

GRADUATE SCHOOL RESEARCH FUND COMMITTEE

INITIATIVE 171 SECTION (MEDICINE AND BIOLOGY)

EDWARD L. ULLMAN, *Chairman*

D. J. HANAHAN, *Biochemistry*

C. L. HITCHCOCK, *Botany*

T. H. HOLMES, *Psychiatry*

L. H. JENSEN, *Anatomy*

G. M. MARTIN, *Pathology*

A. G. MOTULSKY, *Medicine and Genetics*

W. F. ROYCE, *Fisheries*

D. R. M. SCOTT, *Forestry*

L. M. SREEBNY, *Pathology*

J. W. WOODBURY, *Physiology and
Biophysics*

GENERAL SECTION

EDWARD L. ULLMAN, *Chairman*

A. L. BABB, *Chemical Engineering*

OSCAR BUDEL, *Romance Languages*

K. C. CLARK, *Physics*

D. E. EMERSON, *History*

C. N. HENNING, *Business Administration*

F. W. JONES, *English*

O. N. LARSEN, *Sociology*

G. C. LEE, *Education*

D. C. NORTH, *Economics*

T. B. ROSENMEYER, *Classics*

THE GRADUATE SCHOOL RESEARCH FUND

Modest funds are available through the University to aid in the support of research activities of the faculty and graduate students. These monies are allocated by the Dean of the Graduate School with the advice of the Graduate School Research Fund Committee, appointed by the Dean, which reviews proposals for research support, formulates regulations concerning personnel and use of funds, and stimulates interest in investigative activities. The Committee is concerned with allocations of the Initiative 171 monies, which help to support research in medicine and biology, and of the other funds of the Graduate School, which support research primarily in the fields of the arts, humanities, and social sciences.

AGNES H. ANDERSON RESEARCH FUND

The Agnes H. Anderson Research Fund for the support of research was formed from the proceeds of a very generous gift donated by two anonymous friends of the University. Accepted by the Board of Regents in 1943, the fund is named in memory of the donor of Alfred H. Anderson Hall and the Agnes Healy Anderson Forestry Trust Fund. The selection of research projects and allocation of funds for their support are recommended to the President of the University by the Dean of the Graduate School after consultation with the Graduate School Research Fund Committee.

THE JOHN DANZ LECTURESHIPS

The John Danz Fund was established by a gift to the University from the late Mr. John Danz in 1961. The funds, in part, are used to bring to the University one or more distinguished scholars "of national and international reputation who have concerned themselves with the impact of science and philosophy on man's perception of the rational universe."

The first John Danz Lecturer was Sir Julian Huxley who came to the University from London during Spring Quarter, 1962.

WALKER-AMES AND VISITING PROFESSORSHIPS

The Walker-Ames Fund was founded in 1931 by Maud Walker Ames and her husband, Edwin Gardner Ames. Its purpose was to enable the University of Washington "to guarantee to the state of Washington the scholarly and educational services of the most distinguished minds available in this and other countries..." Since the first Walker-Ames visiting professor was appointed in 1936, well over one hundred notable scholars have come to the University as temporary members of the faculty and have enriched the intellectual life of the University community.

For information relating to the Walker-Ames Fund and to Walker-Ames Professorships, communications may be addressed to: University of Washington, The Chairman, Walker-Ames Committee, Graduate School, Seattle, Washington 98105.

THE GRADUATE SCHOOL CONSULTANTS FUND

Modest funds are available through the Graduate School to provide assistance in bringing distinguished scholars and scientists in the vicinity to the University for a day or for short periods for consultations and seminar discussions to assist members of the faculty and graduate students in carrying forward their research. For information relating to the Consultants Fund, communications may be addressed to the Dean of the Graduate School.

EXTRA-UNIVERSITY SCHOLARLY AND RESEARCH SUPPORT

GIFT, GRANT, AND CONTRACT RESEARCH FUNDS

Research requiring substantial amounts of faculty, graduate student, or other staff time or significant use of University facilities may be undertaken by the University under arrangements specified in a gift, grant, or contract agreement between the research sponsor and the University. The sponsor usually pays all

of the costs associated with the project, such as salaries, wages, supplies, travel, and special equipment needed for the research. Participation of faculty members in grant or contract research activities is on a voluntary basis, and assignments to such research are usually treated as part of the regular academic load. Graduate students, postdoctoral students, and full-time technical or professional research personnel may aid in carrying out the research program.

Whenever possible, results of sponsored research are published in appropriate technical or professional journals as soon as publication appears warranted.

Patent provisions may be made part of an agreement covering sponsored research work. In such a case, recognition is given to the interests of the sponsor, the research worker or inventor, the University, and the general public whose taxes and gifts support the University.

Grants are often made by foundations, industries, and other agencies for basic research in designated fields without explicit definition of projects or goals. Grants of this kind contribute in an especially important way to the advancement of knowledge through basic research.

The Graduate School is the academic agency of the University responsible for the admission of research funds supported by grants or contracts and for the final review and transmission of research proposals to outside agencies.

RESEARCH COOPERATION WITH BUSINESS OR INDUSTRY

University research cooperation with business or industry may be developed through the Office of University Research. This cooperation usually takes one of two forms. In one of these, a faculty member provides advice or other assistance toward the solution of a business or industrial problem in accordance with the terms of a consulting agreement. In the other, sponsorship of a research project is assumed by an outside agency through a research grant or a research contract established between the agency and the University. The Office of University Research is prepared to assist in the initiation of either type of arrangement. Requests for information and assistance should be addressed to: University of Washington, The Coordinator, Office of University Research, Graduate School, Seattle, Washington 98105.

SCHOLARLY FACILITIES OF GENERAL IMPORTANCE

Essential to graduate study and research and to the development of scholars and scholarship is the availability of study, research, and cultural facilities.

Some academic or research activities and facilities are of general significance in all or many fields of knowledge throughout the University. In certain cases, special University units have been established and are administered by the Graduate School.

A brief description of general facilities is given below, followed by more detailed description of facilities administered by the Graduate School.

The Henry Suzzallo Library and its branches presently contain over one million two hundred thousand volumes and receive about nineteen thousand current serial publications. The largest research library in the Pacific Northwest, it maintains collections serving all graduate areas of teaching and research in the University. Research collections and services in the humanities and the social sciences are centralized in the Main Library. In most of the sciences, in technology, and in many of the professional schools, specialized services are offered through the following branch libraries on the campus: Architecture, Art, Business Administration, Chemistry, Drama, Engineering, Far Eastern, Fisheries-Oceanography, Forestry, Geography, Health Sciences, Law, Mathematics-Physics, Music, Pharmacy, Political Science, and Social Work. There is also a branch library serving the Friday Harbor Laboratories on San Juan Island.

The libraries are a depository for state, federal, national, and international documents and are a member of such nation-wide programs as the Farmington

Plan and the Public Law 480 acquisition program. An active interlibrary loan office supplements the extensive facilities for photocopying, microfilming, and rapid copy services.

The Thomas Burke Memorial-Washington State Museum, housed in a newly constructed building, contains natural history collections and anthropological collections of the Pacific Northwest, Oceania, and the Far East. Three University theaters, the Showboat, the Penthouse, and the Playhouse, are used throughout the year in the School of Drama program. Radio Station KUOW, an FM station operated by the School of Communications, and television stations KCTS, a community-sponsored project with studios located at the University, are used both for student training and for public service in communications. The Henry Art Gallery offers a program of frequently changing exhibitions of recent work in painting, sculpture, printmaking, photography, and the craft media, film programs, musicales, and other special events. The Center for Asian Arts promotes the study and performance of the music, art, and drama of the Orient.

Related to many departments and colleges on the campus are service-research organizations which provide clinical training for graduate students, conduct research, and offer consulting services.

The Language Laboratory, operated jointly by the language departments and the Film Center, makes it possible for students to practice hearing and speaking a foreign language at their own pace.

BUREAU OF GOVERNMENTAL RESEARCH AND SERVICES

Director: Donald H. Webster, 3935 University Way N.E.

Associate Director: Ernest H. Campbell, 3935 University Way N.E.

The Bureau of Governmental Research and Services was established in 1934 as a research and service arm of the University of Washington to carry out community responsibilities to the state by contributing toward the solution of governmental problems and in helping to advance the science of public administration. The Bureau is administratively a part of the Graduate School.

The primary purpose of the Bureau is to provide research and advisory services to the governmental agencies of the state and its political subdivisions. The published research of the Bureau appears in the form of reports, information bulletins, and research memoranda. Although the Bureau has specialized in municipal research, its services are available to all levels of state and local government. It functions as a central organization to which inquiries may be directed and provides information concerning governmental problems. In addition, its personnel serve as advisers and consultants to quasi-public agencies and various civic organizations.

Another major function of the Bureau is organizing and sponsoring educational and training conferences, the most important of which is the annual Institute of Government. The Bureau also engages in a number of supplementary activities, including maintenance of a library reference service and ordinance file, a news and publicity service, and the training and placement of governmental administrators, teachers, and research personnel.

Through the facilities of the Bureau of Governmental Research and Services, graduate students are afforded special opportunities for study and research in problems of state and local government.

CENTER FOR GRADUATE STUDY AT HANFORD

Director: Kermit B. Bengtson, Richland, Washington

The Center for Graduate Study at Hanford, located at Richland, Washington, is an off-campus facility maintained by the University of Washington in coopera-

tion with Washington State University and Oregon State University. The facility is available for graduate study and research to students associated with the participating universities, as well as other institutions of higher learning in the Pacific Northwest and elsewhere. Course work completed through the Center and research performed in the Hanford laboratories, upon approval in advance, may be applied toward the fulfillment of the requirements for certain advanced degrees offered by the University of Washington and other institutions.

The Center particularly serves professionally trained people working at the Hanford Atomic Products Operation and others who wish to obtain advanced degrees. The courses available in most cases correspond closely with those included in the advanced degree programs available on the Seattle campus. Currently, upper-division and graduate-level courses are available in business administration, chemistry, librarianship, mathematics, physics, radiology, and in chemical, electrical, mechanical, metallurgical, and nuclear engineering. Atomic Energy Commission-owned laboratory facilities, operated by the General Electric Company, are available for research purposes on an individual arrangement basis and provide an exceptional opportunity to do research work requiring facilities not available at most institutions of higher learning.

Most of the students and faculty of the Center are employees of the Atomic Energy Commission or its prime contractor, the General Electric Company, although such employment is not a prerequisite for enrollment at the Center or appointment to the faculty. Classes at the Center are presently held only in the evening or late afternoon. Employment at the Hanford Atomic Products Operation and access to Atomic Energy Commission laboratories are generally available only to citizens of the United States.

All requests for information concerning the activities and the programs of study and research at the Center, availability of facilities, admission to activities, and for copies of the Center's *Bulletin* containing general information and course offerings should be addressed to: The Director, Center for Graduate Study at Hanford, University of Washington, Richland, Washington.

CENTER FOR RADIOLOGICAL SCIENCES

Acting Director: Joseph L. McCarthy, 3 Administration Building

Coordinator: Kenneth Jackson, 104 Fisheries Building

The Center for Radiological Sciences, located in the Fisheries Building on the University of Washington campus, is an organization and a set of facilities maintained to coordinate teaching, research, and service programs relating to the radiological sciences. During recent years, knowledge relating to radiations of various types has expanded rapidly, and the effects of radiation on materials and biological systems are of much scientific interest as well as practical importance. Since these developments have occurred and are proceeding within several of the conventional fields of science, the Center functions to bring together faculty members, research scientists, and graduate students interested in one or another of the various fields of science relating to radiation. Specialized laboratories and facilities for research in the radiological sciences are available in the Center and close relations are maintained with research scientists in the laboratories of the Hanford Atomic Products Operations at Richland, Washington. For students interested in graduate degrees related to the radiological sciences, a program leading to the degree of Master of Science in Radiological Science is available (see page 182 in section on Graduate Programs), as well as a number of programs leading to the degree of Doctor of Philosophy.

Requests for information concerning the activities, facilities, and programs of study and research coordinated through the Center and for copies of Center literature should be addressed to: University of Washington, The Director, Center for Radiological Sciences, Seattle, Washington 98105.

FRIDAY HARBOR LABORATORIES

Director: Robert L. Fernald, 201 Johnson Hall

The Friday Harbor Laboratories, the marine laboratories of the University of Washington, are administered by the Dean of the Graduate School with the aid of a committee of the faculty. The staff of the Laboratories is made up of professors from various departments of the University (Atmospheric Sciences, Botany, Fisheries, Oceanography, and Zoology) and visiting professors from other institutions.

The Friday Harbor Laboratories are located approximately eighty miles north of Seattle near the town of Friday Harbor on San Juan Island. This island is one of the largest of the 172 which make up the San Juan Archipelago located in the northwest section of the state of Washington between Vancouver Island and the United States mainland.

The islands of the San Juan Archipelago are, in general, rocky and wooded, with precipitous shores. Many are deeply indented by narrow, fjord-like inlets. They have been strongly glaciated, leaving valleys filled with drift and occasional lakes, swamps, and sphagnum and peat bogs. The Laboratories are located on a state game preserve of 484 acres of wooded land with about two miles of shore line. This is an admirable location for the study of various aspects of marine science and for many types of investigations.

Within a relatively short distance from the Laboratories are sea waters varying from oceanic to those highly diluted by streams, with depths to 1,000 feet, bottoms varying from mud to rock, and water movements ranging from those of quiet bays and lagoons to those of swift tideways.

The waters about the San Juan Archipelago have exceptionally abundant and varied marine flora and fauna. The area is rich in both phytoplankton and zooplankton. Brown, green, blue-green, and red algae are present in quantity.

Representatives of all major and most minor phyla of invertebrates can be collected within a reasonable distance from the Laboratories. Shore collecting and dredging in the many diverse ecological situations provide an abundance of forms for ecological, experimental, morphological, and systematic work.

The laboratory buildings are provided with aquaria and running sea water supplied through either polyethylene or glass pipes and fittings which deliver water free from metallic contamination.

During the summer, the Laboratories offer an opportunity for independent and supervised research, as well as a varied program of instruction primarily for graduate students (exceptional, advanced undergraduates are occasionally admitted). The program of courses usually includes work in algology, fish biology, oceanographic meteorology, oceanography, invertebrate zoology, invertebrate physiology or embryology. An annual bulletin is published describing the summer program and the facilities available. Throughout the year, the use of the facilities of the Laboratories for research in various areas of marine science is encouraged.

All requests for information concerning the program of study and research, availability of facilities, and admission to the Laboratories should be addressed to: University of Washington, The Director, Friday Harbor Laboratories, Seattle, Washington 98105.

THE INSTITUTE OF FOREST PRODUCTS

Director: Ben S. Bryant, 303 Anderson Hall

Associate Director: K. V. Sarkanan, 303 Anderson Hall

Assistant Director: B. Dowdle, 305 Anderson Hall

The Institute of Forest Products, established by action of the 1947 Legislature of the State of Washington, was transferred in 1959 to the administration of the University of Washington through the Graduate School.

Objectives of the Institute program are: To provide students with increased opportunity for advanced study and research in fields relative to products of the forest; to provide for additional new and important research results in fields relative to forest products; to provide for increased University research cooperation with industry and government in fields relative to forest products.

The Institute grants research assistantships to graduate students who are or will become candidates for doctor's or master's degrees in fields relating to forest products. These Institute students are sponsored and supervised by members of the faculty and the students conduct graduate study and research in the usual academic programs, Forestry, Forest Products, Chemistry, Chemical Engineering, Mechanical Engineering, Economics, and Marketing, in the corresponding Colleges of Forestry, Engineering, Arts and Sciences, and Business Administration. Research proposals are made by members of the faculty, and the Scientific Committee of the Institute approves as many as possible in favor of recommended graduate students.

Postdoctoral research assistantships are also available to provide for part-time or full-time devotion to the study of significant fundamental problems in fields relating to forest products.

Excellent research facilities are established. Complete equipment is available in the Forest Products Laboratory for research on wood anatomy (microscopy and photomicrography), wood preservation, wood chemistry, lumber and plywood adhesives, mechanical properties testing, mechanical pulping and wood-moisture relations. Three forests, a sawmill, a bark-chipper unit, and an experimental dry kiln are available in the College of Forestry. In the Chemical Engineering and Chemistry laboratories, equipment is available for chemical pulping studies, the isolation and identification of chemical components of wood, the processing of cellulose and paper and related products, as well as excellent general apparatus and facilities for research in chemical engineering and chemistry. Electron microscopes, IBM 650 and 709 high-speed machine computing equipment, and extensive libraries are available. Many important forest products industry laboratories are situated near the University in the Pacific Northwest region.

The Institute serves as a point of contact between the University and the forest products industry. Short courses and special conferences for members of the industry may be provided, as well as technical information. Institute seminars are held fortnightly through the academic year. A new Forest Science Laboratory will soon provide additional housing and laboratory facilities for use by the Institute.

All requests for information concerning the programs of study and research of the Institute, the availability of facilities, admission to activities, and for copies of the Institute's literature should be addressed to: University of Washington, The Director, Institute of Forest Products, Seattle, Washington 98105.

LABORATORY OF RADIATION BIOLOGY

Director: Lauren R. Donaldson, 110 Fisheries Center

Associate Director: Allyn H. Seymour, 110 Fisheries Center

The Laboratory of Radiation Biology, a research unit supported by the U.S. Atomic Energy Commission and administered through the Graduate School, conducts long-term investigations of the biological distribution and effects of radioactivity in the environment, particularly the aquatic environment.

Research programs are conducted in various parts of the Pacific Ocean, at a field station at Fern Lake in Kitsap County, and in the Laboratory's home facilities. In its graduate training aspects, the work of the Laboratory helps fill the need for specialists trained in the techniques of environmental radiobiology and prepared to undertake studies requiring knowledge of both the physical and biological sciences.

Graduate students desiring training should hold degrees in the biological sciences

with supporting course work in physics, chemistry, and mathematics, or degrees in chemistry or physics with supporting work in the biological sciences.

Requests for information or for admission to activities should be addressed to: University of Washington, The Director, Laboratory of Radiation Biology, Seattle, Washington 98105.

OFFICE OF SCHOLARLY JOURNALS

Acting Director: Emily Johnson, Parrington Annex 7

The University maintains an Office of Scholarly Journals in association with the Graduate School. The function of the Office is to provide assistance to members of the University faculty who have editorial responsibilities in relation to the publication of the many scholarly journals now associated with the University of Washington.

Requests for information concerning the activities and facilities of the Office should be addressed to: University of Washington, The Director, Office of Scholarly Journals, Graduate School, Seattle, Washington 98105.

RESEARCH COMPUTER LABORATORY

Director: David B. Dekker, B12 Mechanical Engineering

The Research Computer Laboratory, established in September, 1956, as an agency of the Graduate School, provides electronic calculating facilities and auxiliary punched-card equipment for use by faculty and research personnel of the University. The facilities of the Research Computer Laboratory are also available to neighboring institutions which do not have their own computers.

The facilities include an IBM 650, an IBM 709 with a 32K core, twelve tape units, complete off-line tape-to-card, card-to-tape, and tape-to-printer equipment, and an IBM 1401.

The Research Computer Laboratory is administered by the Dean of the Graduate School with the aid of a committee of the faculty of the University of Washington and a Pacific Northwest Research Computer Laboratory Committee consisting of faculty representatives from all interested colleges and universities of the Pacific Northwest.

All requests for information concerning the facilities of the Laboratory should be addressed to: University of Washington, The Director, Research Computer Laboratory, Seattle, Washington 98105.

UNIVERSITY OF WASHINGTON PILOT SCHOOL

Director: C. R. Strother, 3737 Brooklyn Ave.

Opportunities for research and training in various aspects of special education were expanded by the establishment of the Pilot School on September 1, 1960. This was made possible by a grant from a private source. The objectives to be achieved are threefold:

1. To provide training and experience for appropriate University students who will serve during their professional life to assist handicapped children. Students from the fields of education, psychology, speech and hearing, medicine, nursing, social work, and others may participate.

2. To provide for research on central nervous system impairments, to be carried out by University faculty and graduate students and other interested and qualified persons.

3. To provide high quality diagnostic and educational assistance to a small number of neurologically impaired children and, in addition, to provide a model

applicable elsewhere for the establishment and maintenance of special classes for handicapped children.

The Pilot School is in operation in temporary facilities located adjacent to the University campus. The school serves children between the ages of two and fifteen. Children are selected to participate in the Pilot School program by an Admissions Committee. Only a limited number of children can be accommodated. The service aspects of the program are extended only to the extent that they are needed to serve the research and training objectives of the program.

The Pilot School represents an interdisciplinary, cooperative program administered by the Graduate School. The University Pilot School Committee has representatives from such disciplines as: pediatrics, psychology, psychiatry, speech and hearing, education, and social work. A lay Advisory Board works with the Pilot School Committee in consideration of policies and in relating the work of the School to that of different agencies and groups concerned with problems of handicapped children. This program provides an important opportunity for improved training of teachers and professional workers. It also offers important opportunities for research in fields of special education, psychology, psychiatry, and medicine.

Requests for information concerning the activities, facilities, and programs of study and research available through the Pilot School and for copies of the Pilot School's literature should be addressed to: University of Washington, The Director, Pilot School, Seattle, Washington 98105.

UNIVERSITY OF WASHINGTON PRESS

**Director: Donald R. Ellegood, University of Washington Press Building
Northeast 41st Street and University Way Northeast**

The University of Washington Press (established in 1909) is the book publishing division of the University. Now in its fifty-fourth year, the Press has published over three hundred scholarly books of both specialized and general interest, and occasionally original works in the arts. It also prints and distributes textbooks and other publications of certain University laboratories and bureaus. The Press manages all details of editing and design of its books. Its publications are manufactured in various plants, including both the University's Department of Publications and Printing, which is separate and distinct from the Press, and commercial firms. The Press has sales agents and representatives in this country and abroad for the effective distribution of its books, and carries on a continuous program of advertising, publicity, and promotion of its publications.

Editorial control of the imprint of the Press is vested in the Committee on the University Press, of which the Dean of the Graduate School is Chairman. The Committee formulates policy, reviews manuscripts, authorizes the use of the Press imprint, and promotes the interests of the Press.

The editors of the Press welcome inquiries from prospective authors in the early stages of preparing manuscripts for publication. All inquiries and requests for information should be addressed to: The Director, University of Washington Press, Seattle, Washington 98105.

The University of Washington Press is a member of the Association of American University Presses and the American Book Publishers Council.

FACULTY OF THE GRADUATE SCHOOL

(As of July 1, 1963)

A single date following the name indicates the beginning of service in the University. When two dates are given, the second, in parentheses, is the date of promotion to present academic rank.

- Aagaard, George Nelson, 1954, *Professor of Medicine; Dean of the School of Medicine*
B.S., 1934, M.B., 1936, M.D., 1937, Minnesota
- Abernathy, Robert Harwood, 1960 (1962), *Associate Professor of Slavic Linguistics*
B.A., 1945, Arizona; M.A., 1946, Ph.D., 1951, Harvard
- Abrahamson, Arthur Clarence, 1956 (1963), *Professor of Social Work*
B.A., 1924, Augustana College; M.A., 1947, Minnesota
- Adams, Robert Pardee, 1947, *Associate Professor of English*
B.A., 1931, Oberlin; Ph.D., 1937, Chicago
- Ahlstrom, Harlow Garth, 1962, *Assistant Professor of Aeronautics and Astronautics*
B.S., 1957, M.S., 1959, Washington
- Akeson, Wayne Henry, 1961, *Assistant Professor of Surgery*
M.D., 1953, Chicago
- Albrecht, Robert William, 1961, *Assistant Professor of Electrical Engineering*
B.S. in E.E., 1957, Purdue; M.S. in N.E., 1958, Ph.D., 1961, Michigan
- Alden, Dauril, 1959 (1960), *Assistant Professor of History*
A.B., 1950, M.A., 1952, Ph.D., 1959, California
- Allendoerfer, Carl Barnett, 1951, *Professor of Mathematics*
B.S., 1932, Haverford College; B.A., 1934, M.A., 1939, Oxford (England); Ph.D., 1937, Princeton
- Alps, Glen Earl, 1945 (1962), *Professor of Art*
B.A., 1940, Colorado State College of Education; M.F.A., 1947, Washington
- Alvord, Ellsworth C., Jr., 1960 (1962), *Professor of Pathology*
B.S., 1944, Haverford College; M.D., 1946, Cornell
- Ames, William E., 1957 (1963), *Associate Professor of Communications; Director of the School of Communications*
B.S., 1948, South Dakota State, M.S., 1952, Iowa State; Ph.D., Minnesota, 1962
- Anderson, Arthur G., Jr., 1946 (1957), *Professor of Chemistry*
A.B., 1940, Illinois; M.S., 1942, Ph.D., 1944, Michigan
- Anderson, Berton Emmett, 1948 (1959), *Professor of Dental Science and Literature; Assistant Dean of the School of Dentistry; Director of Post-graduate Dental Education; Chairman of Admissions*
D.M.D., 1925, Oregon

- Anderson, Donald Lorraine, 1947 (1959), *Associate Professor of Mineral Engineering*
B.Sc., 1938, St. Francis Xavier University; B.S., 1941, Illinois
- Anderson, Frederick Neil, 1945 (1959), *Associate Professor of Art*
B.A., 1943, Washington; M.F.A., 1954, Minnesota
- Ansell, Julian Samuel, 1959 (1961), *Associate Professor of Surgery*
B.A., 1947, Bowdoin; M.D., 1951, Tufts; Ph.D., 1959, Minnesota
- Archbold, Thomas Frank, 1961 (1962), *Assistant Professor of Mineral Engineering*
B.S.Met.E., 1955, M.S., 1957, Purdue
- Archer, Stephen H., 1956 (1960), *Associate Professor of Finance*
B.A., 1949, M.A., 1953, Ph.D., 1958, Minnesota
- Arestad, Sverre, 1937 (1958), *Professor of Scandinavian Languages; Chairman of the Department of Scandinavian Languages*
B.A., 1929, Ph.D., 1938, Washington
- Arsove, Maynard Goodwin, 1951 (1961), *Professor of Mathematics*
B.S., 1943, Lehigh; Sc.M., 1948, Ph.D., 1950, Brown
- Avann, Sherwin Parker, 1946 (1962), *Associate Professor of Mathematics*
B.S., 1938, Washington; M.S., 1940, Ph.D., 1942, California Institute of Technology
- Babb, Albert Leslie, 1952 (1960), *Professor of Chemical Engineering; Director of the Nuclear Reactor Laboratories*
B.A.Sc., 1948, British Columbia; M.S., 1949, Ph.D., 1951, Illinois
- Babb, Warren, 1955, *Assistant Professor of Music*
B.A., 1938, M.A., 1939, Harvard
- Badgley, Franklin Ilsley, 1950 (1959), *Associate Professor of Atmospheric Sciences*
B.S., 1935, Chicago; M.S., 1948, Ph.D., 1951, New York
- Baer, Donald M., 1957 (1961), *Associate Professor of Psychology*
A.B., 1950, Ph.D., 1957, Chicago
- Baily, Athol Romaine, 1949 (1955), *Associate Professor of Industrial Education*
B.S., 1931, Kansas State Teachers College; M.A., 1936, Ed.D., 1949, Missouri
- Baker, Marshall, 1962, *Associate Professor of Physics*
A.B., 1953, Ph.D., 1958, Harvard
- Balise, Peter Louis, Jr., 1950 (1961), *Professor of Mechanical Engineering*
S.B., 1948, S.M., 1950, Massachusetts Institute of Technology
- Ballantine, John Perry, 1926 (1937), *Professor of Mathematics*
A.B., 1918, Harvard; Ph.D., 1923, Chicago
- Banse, Karl, 1960 (1963), *Associate Professor of Oceanography*
Ph.D., 1955, University of Kiel
- Barksdale, Julian Devreau, 1936 (1949), *Professor of Geology*
A.B., 1930, Stanford; Ph.D., 1936, Yale
- Barnes, Clifford Adrian, 1947 (1955), *Professor of Oceanography*
B.S., 1930; Ph.D., 1936, Washington
- Barnowe, Theodore Joseph, 1947 (1955), *Professor of Human Relations and Administration*
B.A., 1939, Morningside College (Iowa); M.A., 1940, Ph.D., 1946, Washington
- Barth, Ernest A. T., 1955 (1959), *Assistant Professor of Sociology*
B.A., Rochester, 1950; M.A., 1953, Ph.D., 1956, North Carolina
- Barzel, Yoram, 1961, *Assistant Professor of Economics*
B.A., 1953, M.A., 1956, Hebrew University (Jerusalem); Ph.D., 1961, Chicago
- Baskerville, Barnet, 1948 (1960), *Professor of Speech; Director of Honors in the College of Arts and Sciences*
B.A., 1940, M.A., 1944, Washington; Ph.D., 1948, Northwestern
- Bassett, David Lee, 1959, *Professor of Anatomy*
A.B., 1934, M.D., 1939, Stanford
- Batey, Marjorie Viola, 1956, (1958), *Assistant Professor of Psychiatric Nursing*
Diploma, 1947, Sacred Heart Hospital School of Nursing, Washington; B.S., 1953, Washington; M.S., 1956, Colorado

- Bauer, Harry C., 1945 (1947), *Professor of Librarianship; Secretary to the Faculty*
A.B., 1927, M.S., 1929, Washington University, St. Louis; Certificate of Librarianship 1931,
St. Louis Library School
- Baumgaertel, Gerhard, 1962, *Associate Professor of Germanic Literature*
M.A., 1953, Brown; Ph.D., 1954, Tübingen (Germany)
- Beale, James MacArthur, Jr., 1948 (1958), *Associate Professor of Music*
B.A., 1945, Harvard; B.Mus., 1946, M.Mus., 1947, Yale
- Beaumont, Ross Allen, 1940 (1954), *Professor of Mathematics*
A.B., 1936, M.S., 1937, Michigan; Ph.D., 1940, Illinois
- Beder, Oscar E., 1952 (1960), *Professor of Prosthodontics*
B.S., 1936, Rutgers; D.D.S., 1941, Columbia
- Benditt, Earl P., 1957, *Professor of Pathology; Chairman of the Department
of Pathology*
B.A., 1937, Swarthmore; M.D., 1941, Harvard
- Bentley, G. Nelson, 1952 (1957), *Assistant Professor of English*
A.B., 1941, M.A., 1945, Michigan
- Benson, Merritt E., 1931 (1948), *Professor of Communications*
LL.B., 1930, Minnesota; B.A., 1942, Washington
- Berg, Kenneth Bernard, 1950 (1957), *Professor of Accounting*
B.S.C., 1939, North Dakota; M.S., 1941, Ph.D., 1952, Illinois; C.P.A., 1954, State of
Washington
- Bergseth, Frederick Robert, 1947 (1957), *Professor of Electrical Engineering*
B.S. in E.E., 1937, Washington; S.M. in E.E., 1938, Massachusetts Institute of Technology
- Bestor, Arthur Eugene, Jr., 1962, *Professor of History*
Ph.B., 1930, Ph.D., 1938, Yale
- Bethel, James Samuel, 1962, *Professor of Forestry; Associate Dean of the
Graduate School*
B.S.F., 1937, Washington; M.F., 1939, D.F., 1947, Duke
- Bevis, Leura Dorothy, 1947 (1962), *Professor of Librarianship;
Associate Director of the School of Librarianship*
B.A., 1927, Pomona; B.S. in L.S., 1947, Southern California; M.A., 1951, Washington
- Bijou, Sidney William, 1948 (1951), *Professor of Psychology; Director of the
Bailey and Babette Gatzert Institute of Child Development*
B.S., 1933, Florida; M.A., 1936, Columbia; Ph.D., 1941, Iowa
- Bird, Winfred Wylam, 1928 (1946), *Associate Professor of Speech*
A.B., 1926, Lawrence College (Wisconsin); Ph.D., 1938, Iowa
- Birnbaum, Zygmunt William, 1939 (1950), *Professor of Mathematics; Director
of the Laboratory of Statistical Research*
LL.M., 1925, Ph.D., 1929, John Casimir (Lwow, Poland)
- Birnbrauer, Jay Spencer, 1960 (1962), *Assistant Professor of Psychology*
B.S., 1954, William and Mary; Ph.D., 1962, Indiana
- Bjorkstam, John Ludwig, 1955 (1960), *Associate Professor of Electrical
Engineering*
B.S. in E.E., 1949, M.S. in E.E., 1952, Ph.D., 1958, Washington
- Blair, John Sanborn, 1952 (1961), *Professor of Physics*
B.S., 1943, Yale; M.S., 1949, Ph.D., 1951, Illinois
- Blandau, Richard Julius, 1949 (1951), *Professor of Anatomy; Associate Dean of
the School of Medicine*
A.B., 1935, Linfield College; Ph.D., 1939, Brown; M.D., 1948, Rochester
- Blaser, Henry Weston, 1946 (1948), *Associate Professor of Botany*
B.S., 1931, A.M., 1933, Temple; Ph.D., 1940, Cornell
- Blevins, Charles Edward, 1962, *Instructor of Anatomy*
B.A., 1947, M.A., 1948, Stanford; Ph.D., 1961, California
- Bluestone, George, 1957 (1962), *Associate Professor of English*
B.A., 1949, Harvard; M.F.A., 1951, Iowa; Ph.D., 1956, Johns Hopkins
- Blumenthal, Robert McCallum, 1956 (1961), *Associate Professor of Mathematics*
B.A., 1952, Oberlin; Ph.D., 1956, Cornell

- Bodansky, David, 1954 (1963), *Professor of Physics*
B.S., 1943, M.A., 1948, Ph.D., 1950, Harvard
- Bodemer, Charles W., 1956 (1962), *Associate Professor of Anatomy*
B.A., 1951, Pomona College; M.A., 1952, Claremont Graduate School; Ph.D., 1956, Cornell
- Bogan, Richard Herbert, 1954 (1957), *Associate Professor of Civil Engineering*
B.S. in C.E., 1949, Washington; S.M., 1952, Sc.D., 1954, Massachusetts Institute of Technology
- Bolender, Charles Loeck, 1959 (1962), *Assistant Professor of Prosthodontics; Chairman of the Department of Prosthodontics*
D.D.S., 1956, M.S., 1957, State University of Iowa
- Boler, John Francis, 1960 (1962), *Assistant Professor of Philosophy*
B.A., 1950, Creighton; M.A., 1952, St. Louis; Ph.D., 1960, Harvard
- Bollard, R. John, 1961, *Professor of Aeronautics and Astronautics; Chairman of the Department of Aeronautics and Astronautics*
B.E., 1948, M.E., 1949, Canterbury College, New Zealand; Ph.D., 1954, Purdue University
- Bolton, Dale Leroy, 1962, *Assistant Professor of Education*
B.S., 1950, M.S., 1953, Oklahoma State; Ph.D., 1958, Wisconsin
- Bone, Hugh Alvin, 1948, *Professor of Political Science; Chairman of the Department of Political Science*
B.A., 1931, North Central College; M.A., 1935, Wisconsin; Ph.D., 1937, Northwestern
- Boozar, Mary Kathryn, 1960, *Assistant Professor of Medical-Surgical Nursing*
B.S.N., 1947, Colorado; M.N., 1955, Washington
- Boroughs, Homer, Jr., 1948 (1956), *Associate Professor of Education*
B.A., 1939, Western Washington College of Education; 1947, Ph.D., 1949, Washington
- Bostetter, Edward Everett, 1940 (1959), *Professor of English*
B.A., 1935, Franklin and Marshall (Pennsylvania); M.A., 1937, Ph.D., 1938, Princeton
- Bourque, Philip J., 1957 (1962), *Professor of Business Fluctuations*
A.B., 1949, Massachusetts, M.A., 1950, Ph.D., 1956, Pennsylvania
- Brabb, George J., 1956 (1960), *Associate Professor of Statistics*
B.S., 1950, M.S., 1954, Idaho; Ph.D., 1958, Illinois
- Brady, Lynn Robert, 1959 (1963), *Associate Professor of Pharmacy*
B.S., 1955, M.S., 1957, Nebraska; Ph.D., 1959, Washington
- Brandt, Edna Mae, 1954 (1958), *Assistant Professor of Medical-Surgical Nursing*
Diploma, 1939, St. Joseph's Hospital School of Nursing, Illinois; B.A., 1952, Redlands; M.N., 1953, Washington
- Brazeau, Wendell Phillips, 1945 (1963), *Professor of Art*
B.F.A., 1933, M.F.A., 1947, Washington
- Brewer, Stanley Harold, 1946 (1956), *Professor of Transportation*
B.A., 1942, M.B.A., 1943, Washington, I.C.C. Practitioner, 1948; F.M.B. Practitioner, 1950
- Bridgman, Jon Marshall, 1961, *Assistant Professor of History*
B.A., 1951, Ph.D., 1960, Stanford
- Brien, Frederick Blyth, 1954 (1963), *Professor of Mineral Engineering*
B.S. in Min.E., 1950, Alberta; M.S. in Min.E., 1951, Columbia
- Briggs, James Robert, 1952 (1955), *Associate Professor of Secretarial Studies*
A.B., 1935, M.A., 1950, Washington; D.Ed., 1954, Stanford
- Brockman, Christian Frank, 1946 (1957), *Professor of Forestry*
B.S., 1924, Colorado State; M.S., 1931, Washington
- Brockway, Doris J., 1951, *Associate Professor of Home Economics*
B.A., 1926, Washington State; M.A., 1939, Washington
- Broer, Marion Ruth, 1947 (1960), *Professor of Physical Education*
B.S., 1933, M.S., 1936, Wisconsin; Ph.D., 1954, New York
- Brosky, John Joseph, 1961, *Assistant Professor of Accounting*
B.S., 1956, B.S., 1957, M.B.A., 1958, Lehigh; Ph.D., 1961, Texas
- Brown, Arthur Charles, 1960 (1963), *Assistant Professor of Physiology and Biophysics*
A.B., 1948, M.S., 1954, Chicago; Ph.D., 1960, Washington

- Brown, David V., 1951 (1960), *Associate Professor of Pathology*
B.A., 1935, Reed College; M.D., 1939, Oregon
- Brown, Edward Gordon, 1948 (1949), *Professor of Business Policy*
A.B., 1929, Washington; M.B.A., 1932, Harvard
- Brown, Malcolm Johnston, 1946 (1956), *Associate Professor of English*
B.A., 1931, Ph.D., 1946, Washington
- Brown, Stephen Darden, 1930 (1937), *Associate Professor of Business Law*
LL.B., 1925, A.B., 1932, Washington; LL.M., 1938, Stanford
- Brownell, Francis Herbert, III, 1950 (1961), *Professor of Mathematics*
B.A., 1943, M.S., 1947, Yale; Ph.D., 1949, Princeton
- Bruno, Pauline Mary, 1958, *Assistant Professor of Medical-Surgical Nursing*
B.S.N., 1952, M.S.N., 1954, Catholic University
- Bryant, Benjamin Smyth, 1949 (1959), *Associate Professor of Forestry; Director of Institute of Forest Products*
B.S.F., 1947, M.S.F., 1948, Washington; D.F., 1951, Yale
- Buck, George Crawford, 1950 (1962), *Associate Professor of Germanic Literature*
B.A., 1942, Amherst; M.A., 1948, Ph.D., 1954, Yale
- Budel, Oscar, 1956 (1961), *Associate Professor of Italian Language and Literature*
Abitur, 1942, Dr. Phil., 1950, University of Wurzburg (Germany)
- Buettner, Konrad J. K., 1953 (1957), *Professor of Atmospheric Sciences*
B.S., 1922, Gymnasium (Pforte, Germany); Dr. phil., 1926, Göttingen (Germany);
Dr. phil. habil., 1934, Kiel (Germany)
- Burg, Mildred Marie, 1961, *Assistant Professor of Social Work*
B.A., 1931, Minnesota; M.A., 1949, Pennsylvania
- Burke, Agnes Evelyn, 1943 (1953), *Associate Professor of Public Health Nursing*
B.S., 1930, Akron Municipal; Diploma, 1930, M.A., 1941, Western Reserve; C.P.H.N.,
1943, Washington
- Burke, Robert Eugene, 1957 (1960), *Associate Professor of History; Chairman of the Department of History*
A.B., 1946, Chico State College; M.A., 1947, Ph.D., 1950, California
- Burns, Harry Hamilton, 1934 (1948), *Associate Professor of English*
B.A., 1928, Ph.D., 1935, Washington
- Burns, Wayne, 1948 (1963), *Professor of English*
A.B., 1938, Miami (Ohio); A.M., 1940, Harvard; Ph.D., 1946, Cornell
- Businger, Joost A., 1958 (1961), *Associate Professor of Atmospheric Sciences*
B.S., 1947, Doctoraallexamen, 1950, Ph.D., 1954, Utrecht (Netherlands)
- Butow, Robert J. C., 1960, *Associate Professor of Japanese History*
A.B., 1947, A.M., 1948, Ph.D., 1953, Stanford
- Cady, George Hamilton, 1938 (1947), *Professor of Chemistry; Chairman of the Department of Chemistry; Director of Bagley Hall Laboratories*
A.B., 1927, A.M., 1928, Kansas; Ph.D., 1930, California
- Campbell, Robert John, Jr., 1955 (1957), *Assistant Professor of Ceramic Engineering*
B.S. Ch.E., 1939, Oregon State; M.S. in Cer.E., 1954, Washington
- Campbell, Thomas Herbert, 1945 (1955), *Professor of Civil Engineering*
B.S. in C.E., 1934, Washington; M.S. in C.E., 1938, Massachusetts Institute of Technology
- Cantor, David Geoffrey, 1962, *Assistant Professor of Mathematics*
B.S., 1956, California Institute of Technology; Ph.D., 1960, California at Los Angeles
- Carlson, Dale Arvid, 1955 (1961), *Associate Professor of Civil Engineering*
B.S. in C.E., 1950, M.S. in C.E., 1951, Washington; Ph.D., 1960, Wisconsin
- Carr, Kenneth Mills, 1944 (1953), *Assistant Professor of Drama*
B.A., 1942, Eastern Washington College of Education; M.A., 1945, Washington
- Carrell, James Aubrey, 1939 (1947), *Professor of Speech; Director of the Speech and Hearing Clinic*
A.B., 1927, Nebraska Wesleyan; M.A., 1929, Ph.D., 1936, Northwestern

- Cartwright, Philip Windsor, 1947 (1960), *Professor of Economics*;
Associate Dean of the College of Arts and Sciences
 A.B., 1940, M.A., 1942, Ph.D., 1950, Stanford
- Cassinelli, Charles William, 1960 (1963), *Associate Professor of Political Science*
 A.B., 1948, M.A., 1950, California; Ph.D., 1953, Harvard
- Catton, William Robert, Jr., 1957 (1962), *Associate Professor of Sociology*
 A.B., 1950, Oberlin; M.A., 1952, Ph.D., 1954, Washington
- Chambers, Edward J., 1960 (1962), *Professor of Business Fluctuations*
 B.Comm., 1945, B.A., 1946, M.A., 1947, British Columbia; Ph.D., 1953, Nebraska
- Chang, Kun, 1951 (1963), *Professor of Far Eastern and Slavic Languages and Literature and of Linguistics*
 B.A., 1938, National Tsinghua (China); M.A., 1949, Ph.D., 1955, Yale
- Chapman, Douglas George, 1949 (1957), *Professor of Mathematics*
 B.A., 1938, Saskatchewan; M.A., 1940, Ph.D., 1949, California
- Chapple, Stanley, 1948, *Professor of Music; Director of Festival Opera; Director of the University Symphony*
 D.Mus. (Hon.), 1947, Colby College
- Chatrian, Gian Emilio, 1960, *Assistant Professor of Surgery and Medicine*
 M.D., 1951, Naples (Italy)
- Chenoweth, Harry Holt, 1946 (1957), *Associate Professor of Civil Engineering*
 B.S. in C.E., 1937, M.S. in C.E., 1957, Washington
- Chessex, Jean-Charles, 1928 (1948), *Professor of French*
 B.A., 1920, Gymnase Classique Lausanne (Switzerland); B.D., 1922, M.A., 1925, Lausanne (Switzerland)
- Childs, Morris Elsmere, 1954 (1961), *Professor of Mechanical Engineering*
 B.S. in M.E., 1944, Oklahoma; M.S. in M.E., 1947, Ph.D., 1956, Illinois
- Chiu, John S. Y., 1960 (1963), *Associate Professor of Accounting and Finance*
 B.A., 1952, National Taiwan University, Formosa; M.S., 1955, Kentucky; Ph.D., 1960, Illinois
- Church, Phil Edwards, 1935 (1948), *Professor of Atmospheric Sciences*;
Chairman of the Department of Atmospheric Sciences
 B.S., 1923, Chicago; M.A., 1932, Ph.D., 1937, Clark
- Clanton, Jack Reed, 1947 (1958), *Professor of Civil Engineering*
 B.S. in C.E., 1936, Missouri School of Mines; M.S. in C.E., 1939, Pittsburgh
- Clark, Kenneth Courtright, 1948 (1960), *Professor of Physics*
 B.A., 1940, Texas; A.M., 1941, Ph.D., 1947, Harvard
- Clark, Robert Newhall, 1957 (1959), *Associate Professor of Electrical Engineering*
 B.S. in E.E., 1950, M.S. in E.E., 1951, Michigan
- Clarke, Henry Leland, 1958 (1959), *Associate Professor of Music*
 A.B., 1928, A.M., 1929, Ph.D., 1947, Harvard
- Clawson, David Kay, 1958 (1961), *Associate Professor of Surgery; Head of the Division of Orthopedic Surgery*
 M.D., 1952, Harvard
- Cloney, Richard Alan, 1961, *Assistant Professor of Zoology*
 A.B., 1952, M.A., 1954, Humboldt State College; Ph.D., 1959, Washington
- Cobb, Mary Marguerite, 1953 (1958), *Assistant Professor of Public Health Nursing*
 B.S.N., 1949, M.N., 1957, Washington
- Cochran, Lyall Baker, 1923 (1952), *Professor of Electrical Engineering*
 B.S. in E.E., 1923, E.E., 1936, Washington
- Cohen, Joseph, 1932 (1941), *Assistant Professor of Sociology*
 B.A., 1925, M.A., 1927, Washington; Ph.D., 1935, Michigan
- Colcord, Josiah Edward, Jr., 1949 (1957), *Associate Professor of Civil Engineering*
 B.S., 1947, Maine; M.S. in C.E., 1949, Minnesota
- Cole, Kenneth Carey, 1924 (1936), *Professor of Political Science*
 B.Litt. in Law, 1924, Oxford (England); Ph.D., 1930, Harvard
- Conway, John Ashby, 1927 (1950), *Professor of Drama*
 B.A., 1927, Carnegie Institute of Technology

- Cook, Richard Irving, 1962, *Assistant Professor of English*
B.A., 1950, M.A., 1953, Washington University (St. Louis); Ph.D., 1960, California
- Coombs, Howard Abbott, 1934 (1949), *Professor of Geology; Chairman of the Department of Geology*
B.S., 1929, M.S., 1932, Ph.D., 1935, Washington
- Corbally, John Edward, 1927 (1942), *Professor of Secondary Education; Associate Dean of the College of Education; Acting Director of the Bureau of School Service and Research*
B.A., 1918, Whitworth College; M.A., 1925, Ph.D., 1929, Washington
- Cornu, Max Donald, 1928 (1953), *Professor of English*
LL.B., 1922, M.A., 1926, Ph.D., 1928, Washington
- Corson, Harry Herbert, 1958 (1962), *Associate Professor of Mathematics*
A.B., 1952, Vanderbilt; M.A., 1954, Ph.D., 1957, Duke
- Costello, Charles Pierce, Jr., 1958 (1961), *Associate Professor of Mechanical Engineering*
B.S. in M.E., 1954, Washington; M.S. in M.E., 1955, Ph.D., 1958, Stanford
- Costigan, Giovanni, 1934 (1948), *Professor of History*
B.A., 1926, B.Litt., 1930, M.A., 1930, Oxford (England); M.A., 1928, Ph.D., 1930, Wisconsin
- Costner, Herbert Lee, 1959 (1960), *Assistant Professor of Sociology*
A.B., 1953, Oklahoma; M.A., 1956, Ph.D., 1960, Indiana
- Crain, Richard Willson, Sr., 1936 (1953), *Associate Professor of Mechanical Engineering*
B.S. in E.E., 1930, B.S. in M.E., 1932, Colorado Agricultural and Mechanical College; M.S. in M.E., 1946, Washington
- Cramlet, Clyde Myron, 1920 (1948), *Professor of Mathematics*
B.S., 1916, Walla Walla College; M.S., 1920, Ph.D., 1926, Washington
- Creager, Joe S., 1958 (1962), *Associate Professor of Oceanography*
B.A., 1951, Colorado College; M.S., 1953, Ph.D., 1958, Agricultural and Mechanical College of Texas
- Creore, Alvin Emerson, 1940 (1953), *Associate Professor of Romance Languages and Literature*
A.B., 1934, M.A., 1936, Rochester; Ph.D., 1939, Johns Hopkins
- Crider, James Roberts, 1952 (1957), *Assistant Professor of Drama*
B.A., 1945, Cornell College (Iowa); M.A., 1950, Washington
- Crittenden, Alden LaRue, 1947 (1960), *Associate Professor of Chemistry*
B.S., 1942, Ph.D., 1946, Illinois
- Crowell, Laura Irene, 1949 (1955), *Associate Professor of Speech*
B.A., 1929, South Dakota; M.A., 1940, Ph.D., 1948, Iowa
- Crutchfield, James Arthur, 1949 (1963), *Professor of Economics*
A.B., 1940, M.A., 1942, California (Los Angeles); Ph.D., 1954, California
- Culbert, Sidney Spence, 1947 (1961), *Associate Professor of Psychology*
B.A., 1943, Ph.D., 1950, Washington
- Cutler, Russell Kelsey, 1946 (1948), *Associate Professor of Physical Education, Chairman of the Department of Physical Education for Men*
B.Ed., 1930, California (Los Angeles); M.S., 1934, Oregon; D.Ed., 1958, Stanford
- D'Ambrosio, Charles Anthony, 1960 (1963), *Associate Professor of Accounting*
B.S.C., 1955, Loyola (Chicago); M.S., 1958, Ph.D., 1960, Illinois
- Danelski, David Joseph, 1961, *Assistant Professor of Political Science*
LL.B., 1953, DePaul University (Chicago); B.A., 1955, Seattle University; M.A., 1957, Ph.D., 1961, Chicago
- Dash, Jay Gregory, 1960 (1963), *Professor of Physics*
B.S., 1944, New York City College; M.A., 1951, Ph.D., 1951, Columbia
- Dauben, Hyp Joseph, Jr., 1945 (1961), *Professor of Chemistry*
B.A., M.S., 1937, Ohio State; A.M., Ph.D., 1941, Harvard

- David, Jean Ferdinand, 1936 (1957), *Associate Professor of Romance Languages and Literature*
Bacc., 1923 College Grandchamp (Versaille, France); A.B., 1929, M.A., 1932, Saskatchewan; Ph.D., 1936, Johns Hopkins
- David, Morton Morris, 1953 (1962), *Professor of Chemical Engineering*
B.S. in Ch.E., 1942, Colorado; D.Eng., 1950, Yale
- Davidson, Ernest Roy, 1962, *Assistant Professor of Chemistry*
B.S., 1958, Rose Polytechnic Institute; Ph.D., 1961, Indiana
- Davie, Earl Warren, 1962, *Associate Professor of Biochemistry*
B.S., 1950, Ph.D., 1954, Washington
- Davis, Alanson Bewick, 1947 (1955), *Lecturer and Stage Designer in Drama*
A.B., 1947, Washington
- Davis, Howard Fred, 1961, *Assistant Professor of Physics*
S.B., S.M., 1954, Massachusetts Institute of Technology; Ph.D., 1960, Rochester
- Day, Emmett Elbert, 1947 (1954), *Professor of Mechanical Engineering*
B.A., 1936, East Texas State Teachers College; B.S., 1945, M.S., 1947, Massachusetts Institute of Technology
- DeCoster, Don Theodore, 1961, *Assistant Professor of Accounting*
B.B.A., 1954, West Texas State; M.B.A., 1958, Ph.D., 1961, Texas
- Dehmelt, Hans Georg, 1955 (1961), *Professor of Physics*
B.S., 1946, M.S., 1949, Ph.D., 1950, University of Goettingen (Germany)
- Dekker, David Bliss, 1948 (1959), *Associate Professor of Mathematics; Director of the Research Computer Laboratory*
A.B., 1941, California; M.S., 1943, Illinois Institute of Technology; Ph.D., 1948, California
- De Lacy, Allan Clark, 1946 (1958), *Professor of Fisheries*
B.S., 1932, M.S., 1933, Ph.D., 1941, Washington
- Delano, Myles S., 1958 (1960), *Associate Professor of Finance and Statistics*
A.B., 1943, Bates; M.A., 1947, Boston; Ph.D., 1960, Brown
- DeMarr, Ralph Elgin, 1962, *Assistant Professor of Mathematics*
B.S., 1952, Idaho; M.A., 1954, Washington State; Ph.D., 1961, Illinois
- Demmery, Joseph, 1928 (1934), *Professor of Real Estate*
Ph.B., 1920, M.A., 1924, Chicago
- Denny, Brewster Castberg, 1961, *Associate Professor of Public Affairs; Director of the Graduate School of Public Affairs*
A.B., 1945, Washington; M.A., 1948, Ph.D., 1959, Fletcher School of Law and Diplomacy
- Depew, Creighton Arthur, 1960, *Assistant Professor of Mechanical Engineering*
B.S. 1956, M.S., 1957, Ph.D., 1960, California
- Dietrichson, Paul, 1955 (1961), *Associate Professor of Philosophy*
A.B., 1947, Georgia; Ph.D., 1955, Yale
- Dietz, Robert Henry, 1947 (1958), *Professor of Architecture; Dean of the College of Architecture and Urban Planning*
B.Arch., 1941, Washington; M.Arch., 1944, Massachusetts Institute of Technology
- Dill, Ellis Harold, 1956 (1959), *Associate Professor of Aeronautics and Astronautics*
B.S. in C.E., 1954, M.S. in C.E., 1955, Ph.D., 1956, California
- Dillard, David Hugh, 1953 (1963), *Associate Professor of Surgery*
A.B., 1946, Whitman College; M.D., 1950, Johns Hopkins
- Dille, James Madison, 1936 (1946), *Professor of Pharmacology; Chairman of the Department of Pharmacology*
B.S., 1930, M.S., 1933, Nebraska; Ph.D., 1935, Georgetown; M.D., 1946, Illinois
- Dodd, Stuart Carter, 1947, *Professor of Sociology*
B.S., 1922, M.A., 1924, Ph.D., 1926, Princeton
- Dollar, Alexander Melville, 1959 (1962), *Associate Professor of Fisheries*
B.S., 1948, M.S., 1949, California (Berkeley); Ph.D., 1958, Reading (England)
- Donaldson, Lauren Russell, 1935 (1948), *Professor of Fisheries; Director of the Laboratory of Radiation Biology*
A.B., 1926, Intermountain Union College (Montana); M.S., 1931, Ph.D., 1939, Washington

- Douglas, Howard Clark, 1941 (1958), *Professor of Microbiology and Genetics*
A.B., 1936, Ph.D., 1949, California
- Dowdle, Barney, 1962, *Assistant Professor of Economics and Forestry; Assistant Director of the Institute of Forest Products*
B.S.F., 1957, Washington; M.F., 1958, Ph.D., 1962, Yale
- Draper, Edgar Marian, 1925 (1936), *Professor of Curriculum; Director of In-Service Teacher Training*
B.A., 1916, M.A., 1925, Ph.D., 1926, Washington
- Dubisch, Roy, 1961, *Professor of Mathematics*
B.S., 1938, M.S., 1940, Ph.D., 1943, Chicago
- Du Pen, Everett George, 1945 (1960), *Professor of Art*
B.F.A., 1937, Yale
- Dvorak, August, 1923 (1937), *Professor of Education; Assistant Director of the Division of Counseling and Testing*
B.A., 1920, Ph.D., 1923, Minnesota
- Earle, Frances M., 1931 (1941), *Associate Professor of Geography*
A.B., 1918, Winthrop College; M.S., 1926, Columbia; Ph.D., 1929, George Washington
- Eastman, Austin V., 1924 (1942), *Professor of Electrical Engineering; Chairman of the Department of Electrical Engineering*
B.S. in E.E., 1922, M.S. in E.E., 1929, Washington
- Eastman, Fred Scoville, 1927 (1943), *Professor of Aeronautics and Astronautics*
B.S. in E.E., 1925, Washington; M.S., 1929, Massachusetts Institute of Technology
- Eby, E. Harold, 1927 (1947), *Professor of English*
Ph.B., 1923, Chicago; Ph.D., 1927, Washington
- Edelstein, Alex, 1955 (1959), *Associate Professor of Communications*
A.B., 1946, San Francisco State College; M.A., 1948, Stanford; Ph.D., 1958, Minnesota
- Edmondson, Walles Thomas, 1949 (1957), *Professor of Zoology*
B.S., 1938, Ph.D., 1942, Yale
- Edwards, Allen L., 1944 (1948), *Professor of Psychology*
B.A., 1937, Central College (Chicago); M.A., 1938, Ohio State; Ph.D., 1940, Northwestern
- Eggers, David Frank, Jr., 1950 (1963), *Professor of Chemistry*
B.S., 1943, Illinois; Ph.D., 1950, Minnesota
- Ekse, Martin Ingvold, 1948 (1957), *Professor of Civil Engineering*
B.S., 1932, South Dakota State; M.S., 1948, Wisconsin
- Elder, John Thompson, Jr., 1957 (1963), *Assistant Professor of Pharmacology*
B.S., 1953, M.S., 1955, Massachusetts College of Pharmacy; Ph.D., 1959, Washington
- Ellis, Homer Godsey, 1962, *Assistant Professor of Mathematics*
B.A., 1955, M.A., 1958, Ph.D., 1961, Texas
- Emerson, Donald Eugene, 1946 (1953), *Associate Professor of History*
A.B., 1937, Johns Hopkins; M.A., 1938, Columbia; Ph.D., 1942, Johns Hopkins
- Emery, Ashley Francis, 1961, *Assistant Professor of Mechanical Engineering*
B.S., 1956, M.S., 1958, Ph.D., 1961, California
- Emery, Donald William, 1934 (1963), *Professor of English; Associate Director of the Bureau of School Services and Research*
A.B., 1927, A.M., 1928, Iowa
- English, Thomas Saunders, 1959 (1961), *Assistant Professor of Oceanography*
B.S., 1950, M.S., 1951, Iowa State College; Ph.D., 1961, Washington
- Enos, Lucy DeReid, 1954 (1958), *Assistant Professor of Medical-Surgical Nursing*
Diploma, 1942, Pennsylvania Hospital School of Nursing; B.S., 1946, M.A., 1954, Minnesota
- Erickson, Harvey D., 1947 (1959), *Professor of Forest Products*
B.S., 1933, B.S., 1934, M.S., 1936, Ph.D., 1937, Minnesota
- Erickson, John Wilbur, 1956 (1960), *Associate Professor of Art*
B.S., 1941, B.F.A., 1947, M.F.A., 1951, Illinois
- Etcheson, Warren W., 1954 (1960), *Professor of Marketing*
B.S., 1942, Indiana; M.A., 1951, Ph.D., 1956, Iowa

- Evans, Charles Albert, 1946, *Professor of Microbiology; Chairman of the Department of Microbiology*
B.S., 1935, B.M., 1936, M.D., 1937, Ph.D., 1942, Minnesota
- Everett, Newton Bennie, 1946 (1957), *Professor of Anatomy; Chairman of the Department of Anatomy*
B.S., 1937, M.S., 1938, North Texas State; Ph.D., 1942, Michigan
- Fairhall, Arthur William, 1954 (1963), *Professor of Physics; Professor of Chemistry*
B.Sc., 1946, Queens (Kingston, Ontario); Ph.D., 1952, Massachusetts Institute of Technology
- Fairservis, Walter A., Jr., 1962, *Associate Professor of Anthropology; Director of Thomas Burke Memorial Washington State Museum*
B.A., 1943, M.A., 1949, Columbia; M.A., 1951, Ph.D., 1958, Harvard
- Falls, Gregory Alexander, 1961, *Professor of Drama; Director of the School of Drama*
B.A., 1943, Park College; M.A., 1949, Ph.D., 1953, Northwestern
- Faris, Robert E. Lee, 1948, *Professor of Sociology; Chairman of the Department of Sociology*
Ph.B., 1928, M.A., 1930, Ph.D., 1931, Chicago
- Farwell, George Wells, 1948 (1959), *Professor of Physics; Associate Dean of the Graduate School*
S.B., 1941, Harvard; Ph.D., 1948, Chicago
- Fea, Henry Robert, 1954 (1959), *Associate Professor of Education*
B.A., 1942, B.Ed., 1947, M.Ed., 1948, Saskatchewan; Ph.D., 1950, California
- Fell, James Michael Gardner, 1956 (1960), *Associate Professor of Mathematics*
B.S., 1943, British Columbia; M.S., 1945, Ph.D., 1951, California
- Fernald, Robert Leslie, 1946 (1959), *Associate Professor of Zoology; Director of Friday Harbor Laboratories*
A.B., 1937, Monmouth College; Ph.D., 1941, California
- Fields, Paul Eldon, 1955, *Professor of Psychology*
A.B., 1926, A.M., 1927, Ohio Wesleyan; Ph.D., 1930, Ohio State
- Figley, Melvin M., 1958, *Professor of Radiology, Chairman of the Department of Radiology*
M.D., 1944, Harvard
- Finley, Theodore Newson, 1961, *Assistant Professor of Physiology and Biophysics, and Assistant Professor of Anesthesiology*
B.S., 1950, Washington; M.D., 1954, Johns Hopkins
- Firey, Joseph Carl, 1954 (1960), *Professor of Mechanical Engineering*
B.S. in M.E., 1940, Washington; M.S. in M.E., 1941, Wisconsin
- Fischer, Edmond H., 1953 (1961), *Professor of Biochemistry*
Ph.D., 1947, Geneva
- Fischer, Louis, 1929 (1945), *Professor of Pharmaceutical Chemistry; Associate Dean of the College of Pharmacy; Chairman of the Department of Pharmaceutical Chemistry*
B.S., Ph.C., 1926, M.S., 1928, Ph.D., 1933, Washington
- Flanagan, William Francis, 1959, *Assistant Professor of Metallurgical Engineering*
B.S. in Physics, 1951, M.S., 1953, Sc.D., 1959, Massachusetts Institute of Technology
- Fleagle, Robert Guthrie, 1948 (1956), *Professor of Atmospheric Sciences*
A.B., 1940, Johns Hopkins; M.S., 1944, Ph.D., 1949, New York
- Fleming, Richard Howell, 1951, *Professor of Oceanography; Chairman of the Department of Oceanography*
B.A., 1929, M.A., 1931, British Columbia; Ph.D., 1935, California
- Florey, Ernst, 1956 (1963), *Professor of Zoology*
Ph.D., 1953, University of Graz (Austria)
- Fogelson, Raymond D., 1962, *Assistant Professor of Anthropology*
B.A., 1955, Wesleyan; M.A., 1958, Ph.D., 1962, Pennsylvania
- Foltz, Eldon Leroy, 1950 (1958), *Associate Professor of Neurosurgery*
B.S., 1941, Michigan State; M.D., 1943, Michigan

- Foote, Hope Lucille, 1923 (1948), *Professor of Art*
A.B., 1920, Iowa State Teachers College; M.A., 1923, Columbia
- Forrin, Bert, 1961, *Assistant Professor of Psychology*
B.A., 1952, Toronto; M.A., 1953, Ph.D., 1958, Michigan
- Foster, Clifford Donald, 1959 (1962), *Associate Professor of Education*
B.S., 1947, Northeast Missouri State College; M.A., 1952, Ph.D., 1957, Washington
- Fowler, David Covington, 1952 (1963), *Professor of English*
B.A., 1942, Florida; M.A., 1947, Ph.D., 1949, Chicago
- Fox, Katharine Shirley, 1945 (1948), *Assistant Professor of Physical Education*
B.S., 1938, Washington; M.S., 1943, Oregon; Ph.D., 1955, Iowa
- Franzke, Albert Leonard, 1936 (1939), *Associate Professor of Speech*
B.A., 1916, M.A., 1923, Lawrence College (Wisconsin)
- Fredricksmeier, Ernest Adolph, 1961, *Assistant Professor of Classics*
B.A., 1952, Lakeland College; M.A., 1953, Ph.D., 1958, Wisconsin
- Freehill, Maurice Francis, 1962, *Professor of Education*
B.Ed., 1946, University of Alberta; M.A., 1947, Ed.D., 1948, Stanford
- French, Wendell L., 1958 (1962), *Professor of Personnel and Industrial Relations*
B.A., 1948, M.P.S., 1949, Colorado; D.Ed., 1956, Harvard
- Friedman, Lionel Joseph, 1962, *Associate Professor of Romance Languages*
B.A., 1943, M.A., 1946, Ph.D., 1950, Harvard
- Fuller, Steven D., 1946 (1958), *Associate Professor of Art*
B.A., 1939, M.F.A., 1948, Washington
- Fyfe, Ian Millar, 1959 (1962), *Associate Professor of Aeronautics and Astronautics*
A.R.T.C., 1950, Royal College of Science and Technology (Glasgow, Scotland);
M.M.E., 1954, Delaware; Ph.D., 1957, Stanford
- Galanter, Eugene Harrison, 1962, *Professor of Psychology; Chairman of the Department of Psychology*
B.A., 1950, Swarthmore; M.S., 1951, Ph.D., 1953, Pennsylvania
- Gallagher, Marian Gould, 1944 (1953), *Professor of Law; Law Librarian*
B.A., 1935, LL.B., 1937, B.A. in L.S., 1939, Washington
- Gallant, Jonathan Abraham, 1961, *Assistant Professor of Genetics*
B.S., 1957, Haverford; Ph.D., 1961, Johns Hopkins
- Galstaun, Vanick Samuel, 1950 (1959), *Assistant Professor of Drama*
B.A., 1946, San Francisco State College; M.A., 1948, Washington
- Gangolli, Ramesh Anand, 1962, *Assistant Professor of Mathematics*
B.A., 1954, Elphinstone College, Bombay; B.A., 1957, Peterhouse, Cambridge; Ph.D., 1961, Massachusetts Institute of Technology
- Ganzer, Victor Martin, 1947 (1953), *Professor of Aeronautics and Astronautics*
B.A., 1933, Augustana College (Illinois); B.S. in A.E., 1941, Washington
- Garfield, Viola Edmundson, 1937 (1955), *Associate Professor of Anthropology*
B.A., 1928, M.A., 1931, Washington; Ph.D., 1939, Columbia
- Garlid, Kermit L., 1960, *Assistant Professor of Chemical Engineering*
B.S., 1950, River Falls State College (Wisconsin); B.Ch.E., 1956, Ph.D., 1961, Minnesota
- Gartler, Stanley Michael, 1957 (1961), *Associate Professor of Medicine and Genetics*
B.S., 1948, California (Los Angeles); Ph.D., 1952, California
- Geballe, Ronald, 1943 (1959), *Professor of Physics; Chairman of the Department of Physics*
B.S., 1938, M.S., 1940, Ph.D., 1943, California
- Gehrig, John Duane, 1954, *Associate Professor of Oral Surgery*
D.D.S., 1946, M.D.S., 1951, Minnesota
- Gerhart, James Basil, 1956 (1961), *Associate Professor of Physics*
B.S., 1950, California Institute of Technology; M.A., 1952, Ph.D., 1954, Princeton
- Gerstenberger, Donna L., 1960 (1961), *Assistant Professor of English*
B.A., 1951, Whitman College; M.A., 1952, Ph.D., 1958, Oklahoma
- Gessel, Stanley Paul, 1948 (1961), *Professor of Forest Soils*
B.S., 1939, Utah State Agricultural College; Ph.D., 1950, California

- Getoor, Ronald Kay, 1956 (1960), *Associate Professor of Mathematics*
A.B., 1950, M.S., 1951, Ph.D., 1954, Michigan
- Giblin, Elizabeth Clare, 1959, *Associate Professor of Medical-Surgical Nursing*
B.S.N., 1943, M.N., 1954, Washington; Ed.D. 1959, Colorado
- Giles, Frederic Thomas, 1961, *Coordinator of College Relations and Professor of Education*
B.Ed., 1939, Eastern Washington College of Education; M.A., 1946, State College of Washington; Ed.D., 1961, Washington State University
- Gillingham, John Benton, 1947 (1960), *Associate Professor of Economics; Chairman of the Department of Economics*
A.B., 1939, Washington State; M.A., 1941, Wisconsin
- Glicksberg, Irving Leonard, 1962, *Professor of Mathematics*
B.A., 1945, Ph.D., 1951, California at Los Angeles
- Clickstein, Mitchell, 1961, *Assistant Professor of Physiology and Biophysics and Assistant Professor of Psychology*
B.A., 1951, Ph.D., 1958, Chicago
- Goldberg, Leonard D., 1947 (1963), *Professor of Business Law*
A.B., 1943, J.D., 1945, Chicago
- Golde, Hellmut, 1959, *Assistant Professor of Electrical Engineering*
Dip.-Ing., 1953, Technische Hochschule; M.S., 1955, Ph.D., 1959, Stanford
- Gonzales, Boyer, 1954, *Professor of Art; Director of the School of Art; Director, Henry Art Gallery*
B.S. in Architecture, 1931, Virginia; Student of McFee and Kuniyoshi
- Gorbman, Aubrey, 1963, *Professor of Zoology; Chairman of the Department of Zoology*
A.B., 1935, M.S., 1936, Wayne; Ph.D., 1940, California
- Gordon, Donald Flemming, 1950 (1962), *Professor of Economics*
B.A., 1944, Saskatchewan; M.A., 1946, Toronto; Ph.D., 1949, Cornell
- Gordon, Guy C., 1949 (1962), *Professor of Marketing; Coordinator of Faculty Research in the College of Business Administration*
B.A., 1949, M.B.A., 1950, Washington; Ph.D., 1957, California
- Gordon, Milton P., 1959 (1962), *Associate Professor of Biochemistry*
B.A., 1950, Minnesota; Ph.D., 1953, Illinois
- Gottfried, Alex, 1950 (1961), *Associate Professor of Political Science*
Ed.B., 1941, Chicago Teachers College; A.M., 1948, Ph.D., 1952, Chicago
- Gould, Florence Jones, 1948 (1958), *Associate Professor of English*
A.B., 1928, M.A., 1931, Oregon
- Grathwohl, Harrison L., 1958 (1960), *Associate Professor of Marketing*
B.S., 1951, M.B.A., 1952, D.B.A., 1957, Indiana
- Gray, Florence Irene, 1945 (1959), *Associate Professor of Nursing; Director of Undergraduate Programs in Nursing*
B.S.N., 1945, M.S., 1950, Washington
- Gray, Robert Simpson, 1939 (1961), *Associate Professor of Drama*
B.A., 1936, M.A., 1938, Washington
- Gregory, Norman Wayne, 1946 (1957), *Professor of Chemistry*
B.S., 1940, M.S., 1941, Washington; Ph.D., 1943, Ohio State
- Greengo, Robert E., 1957 (1962), *Associate Professor of Anthropology*
A.B., 1948, M.A., 1951, California; Ph.D., 1957, Harvard
- Griffiths, Gordon, 1959, *Associate Professor of History*
A.B., 1936, Ph.D., 1942, California (Berkeley); B.A., 1939, M.A., 1946, Oxford (England)
- Grimes, Wilma Horrell, 1953 (1961), *Associate Professor of Speech*
B.A., 1928, Wisconsin; M.A., 1947, Northwestern; Ph.D., 1953, Illinois
- Grimshaw, Austin, 1949, *Professor of Policy and Administration; Dean of the College of Business Administration*
S.B. in C.E., 1927, M.B.A., 1934, D.C.S., 1938, Harvard
- Groman, Neal Benjamin, 1950 (1963), *Professor of Microbiology*
S.B., 1947, Ph.D., 1950, Chicago

- Gronewold, David H., 1954 (1960), *Professor of Social Work; Acting Dean of the School of Social Work*
B.A., 1929, North Central College; M.A., 1952, Chicago
- Gross, Meredith Grant, 1961, *Assistant Professor of Oceanography*
A.B., 1954, Princeton; M.S., 1959, Ph.D., 1961, California Institute of Technology
- Gummel, William Charles, 1950 (1955), *Associate Professor of Classics*
A.B., 1937, St. Louis; A.M., 1940, Washington University (St. Louis); Ph.D., 1949, New York
- Guidon, Michael, III, 1946 (1956), *Associate Professor of Mechanical Engineering*
B.S. in M.E., 1942, Lehigh; M.S. in M.E., 1952, Washington
- Guilford, Edward Charles, 1959 (1961), *Associate Professor of Electrical Engineering*
B.A., 1942, M.A., 1950, Utah; Ph.D., 1959, California
- Gunther, Erna, 1923 (1941), *Professor of Anthropology*
A.B., 1919, Barnard; A.M., 1920, Ph.D., 1928, Columbia
- Haag, Richard, 1958 (1960), *Associate Professor of Landscape Design*
B.S.L.A., 1950, California (Berkeley); M.L.A., 1952, Harvard
- Haaga, Agnes Marie, 1947 (1960), *Associate Professor of Drama*
B.A., 1936, Siena College (Tennessee); M.A., 1952, Northwestern
- Hafermehl, C. Louis, 1957 (1960), *Associate Professor of Art*
B.F.A., 1940, Bethany College (Kansas); M.F.A., 1955, Cranbrook Academy of Art (Michigan)
- Haggis, Alex John, 1960 (1961), *Assistant Professor of Zoology*
A.B., 1949, M.S., 1951, Wayne State; Ph.D., 1955, Rochester
- Hall, Charles Potter, 1961, *Assistant Professor of Risk and Insurance*
B.B.A., 1954, Wisconsin; Ph.D., 1961, Pennsylvania
- Hall, Florence Turnbull, 1952, *Assistant Professor of Home Economics*
B.Sc., 1943, Manitoba; M.S., 1945, Minnesota
- Hall, James Winford, 1949 (1961), *Professor of English*
A.B., 1937, Kansas City; M.A., 1938, Wisconsin; Ph.D., 1949, Cornell
- Hall, Nathan Albert, 1952 (1962), *Professor of Pharmacy*
B.S., 1939, Ph.D., 1948, Washington
- Haller, Mary Elizabeth, 1931 (1949), *Associate Professor of Mathematics*
B.A., 1924, M.S., 1931, Ph.D., 1934, Washington
- Halpern, Isaac, 1953 (1960), *Professor of Physics*
B.S., 1943, City College of New York; Ph.D., 1948, Massachusetts Institute of Technology
- Halsey, George Dawson, Jr., 1951 (1958), *Professor of Chemistry*
B.S. in Ch.E., 1943, South Carolina; Ph.D., 1948, Princeton
- Hamack, Frank Hartmond, 1921 (1942), *Lecturer in Accounting*
LL.B., 1916, Georgetown
- Hamilton, Albert Charles, 1952 (1963), *Professor of English*
B.A., 1945, Manitoba; M.A., 1948, Toronto; Ph.D., 1952, Cambridge
- Hammarlund, Edwin Roy, 1960 (1962), *Professor of Pharmacy*
B.S., 1944, M.S., 1949, Ph.D., 1951, Washington
- Hanahan, Donald James, 1948 (1959), *Professor of Biochemistry*
B.S., 1941, Ph.D., 1944, Illinois
- Hanley, Clair Norton, 1952 (1956), *Associate Professor of Speech*
B.A., 1947, M.A., 1950, Ph.D., 1952, Iowa
- Hanneman, Carl Frederick, 1960, *Assistant Professor of Social Work*
B.A., 1949, Washington State; M.A., 1951, Indiana
- Hanson, Gordon Harold, 1960 (1963), *Associate Professor of Electrical Engineering*
B.A., 1949, M.A., 1951, British Columbia; Ph.D., 1957, Minnesota
- Hanson, Kermit Osmond, 1948 (1954), *Professor of Accounting, Finance, and Statistics; Associate Dean of the College of Business Administration*
A.B., 1938, Luther College (Iowa); M.S., 1940, Ph.D., 1950, Iowa State College

- Hanzeli, Victor Egon, 1957 (1961), *Assistant Professor of Romance Languages and Literature*
LL.B., 1947, Pazmany Peter University (Budapest); M.A., 1955, Ph.D., 1961, Indiana
- Harbold, William Henry, 1949 (1962), *Associate Professor of Political Science*
A.B., 1947, Pennsylvania State; M.A., 1949, Ph.D., 1953, Harvard
- Harder, Virgil E., 1955 (1959), *Associate Professor of Business Communications*
B.S.C., 1950, M.A., 1950, Iowa; Ph.D., 1958, University of Illinois
- Harkins, Henry Nelson, 1947, *Professor of Surgery; Chairman of the Department of Surgery*
B.S., 1925, M.S., 1926, Ph.D., 1928, M.D., 1931, Chicago
- Harper, Edward Burnette, 1962 (1963), *Associate Professor of Anthropology*
B.A., 1951, Reed; Ph.D., 1958, Cornell
- Harrington, Donal Francis, 1938 (1952), *Professor of Drama*
B.A., 1928, Montana; M.A., 1933, Columbia
- Harris, Edison Davis, 1947, *Associate Professor of Music*
B.S., 1942, New York
- Harris, Markham, 1946 (1957), *Associate Professor of English*
A.B., 1929, M.A., 1931, Williams
- Harrison, Arthur Elliot, 1948 (1952), *Professor of Electrical Engineering*
B.S. in E.E., 1936, California; M.S., 1937, Ph.D., 1940, California Institute of Technology
- Hartz, Billy J., 1955 (1957), *Associate Professor of Civil Engineering*
B.S. (C.E.), 1952, M.S. (C.E.), 1954, Ph.D., 1955, California
- Hatch, Melville Harrison, 1927 (1941), *Professor of Zoology*
B.A., 1919, M.A., 1921, Ph.D., 1925, Michigan
- Hayden, Alice Hazel, 1942 (1952), *Professor of Education*
Ph.C., 1928, B.S., M.S., 1929, Oregon State; Ph.D., 1932, Purdue
- Hayner, Norman Sylvester, 1925 (1937), *Professor of Sociology*
A.B., 1920, Washington; M.A., 1921, Ph.D., 1923, Chicago
- Heath, Willis Robertson, 1957 (1959), *Assistant Professor of Geography*
B.A., 1954, M.A., 1956, Ph.D., 1958, Washington
- Heathers, Louise Bussard, 1945 (1962), *Associate Professor of Psychology; Senior Clinical Psychologist in the Counseling Center*
B.A., 1933, Washington; Ph.D., 1940, Yale
- Heideger, William Joseph, 1957, *Assistant Professor of Chemical Engineering*
B.S., 1954, Carnegie Institute of Technology; M.S.E., 1955, Ph.D., 1959, Princeton
- Heilman, Robert Bechtold, 1948, *Professor of English; Chairman of the Department of English*
A.B., 1927, Lafayette; M.A., 1930, Ohio State College; M.A., 1931, Ph.D., 1935, Harvard
- Heinemann, Margot Edith, 1954 (1956), *Assistant Professor of Medical-Surgical Nursing*
B.S.N., 1945, Seattle University; M.N., 1954, Washington
- Heinitz, Eva, 1948 (1956), *Associate Professor of Music*
- Henderson, Joseph Edmonds, 1929 (1942), *Professor of Physics; Director of the Applied Physics Laboratory*
B.S., 1922, College of Wooster; Ph.D., 1928, Yale
- Henley, Ernest M., 1954 (1961), *Professor of Physics*
B.E.E., 1944, City College of New York; Ph.D., 1951, California
- Hennes, Robert Graham, 1934 (1947), *Professor of Civil Engineering*
B.S. in C.E., 1927, Notre Dame; M.S., 1928, Massachusetts Institute of Technology
- Henning, Charles Nathaniel, 1948 (1955), *Professor of Finance; Director of Publications in the College of Business Administration*
A.B., 1938, M.A., 1940, Ph.D., 1952, California at Los Angeles
- Henning, Dale A., 1955 (1962), *Professor of Policy and Administration and Production*
B.S., 1948, M.B.A., 1949, Pennsylvania; Ph.D., 1954, Illinois

- Henry, Bernard Stauffer, 1931 (1941), *Professor of Microbiology*
B.S., 1925, M.A., 1926, Ph.D., 1931, California
- Hewitt, Edwin, 1948 (1954), *Professor of Mathematics*
A.B., 1940, M.A., 1941, Ph.D., 1942, Harvard
- Hickey, Maurice J., 1956, *Professor of Oral Surgery; Dean of the School of Dentistry*
D.M.D., 1932, Harvard; M.D., 1937, Columbia
- Higgs, Paul McClellan, 1926 (1959), *Associate Professor of Physics*
B.S., 1919, Washington
- Hilen, Andrew Reuben, Jr., 1945 (1959), *Professor of English*
B.A., 1937, Washington; Ph.D., 1943, Yale
- Hill, W. Ryland, 1941 (1953), *Professor of Electrical Engineering; Associate Dean of the College of Engineering*
B.S. in E.E., 1934, Washington; M.S. in E.E., 1938, E.E., 1941, California
- Hitchcock, C. Leo, 1937 (1944), *Professor of Botany; Curator of Herbarium*
A.B., 1927, Pomona; A.M., 1929, Claremont Colleges; Ph.D., 1931, Washington University (St. Louis)
- Hitchner, Dell Gillette, 1947 (1963), *Professor of Political Science*
B.A., 1936, Wichita; M.A., 1937, Missouri; Ph.D., 1940, Wisconsin
- Hixson, William John, 1950 (1958), *Associate Professor of Art*
B.A., 1948, M.F.A., 1950, Oregon
- Hobby, Charles Ray, 1961, *Assistant Professor of Mathematics*
B.A., 1953, California; M.S., 1957, Houston; Ph.D., 1960, California Institute of Technology
- Hoffman, Katherine Janet, 1942 (1956), *Professor of Nursing; Assistant Dean of the School of Nursing; Director of the Graduate Programs in Nursing*
A.B., 1929, College of Puget Sound; Diploma, 1934, Tacoma General Hospital School of Nursing; M.N., 1941, Ph.D., 1956, Washington
- Holland, John Joseph, 1960 (1961), *Associate Professor of Microbiology*
B.S., 1953, Loyola; Ph.D., 1957, California at Los Angeles
- Holliday, Audrey Rose, 1962, *Assistant Professor of Pharmacology*
B.A., 1945, Oregon; M.S., 1949, Ph.D., 1957, Washington
- Holt, William Stull, 1940, *Professor of History*
A.B., 1920, Cornell; Ph.D., 1926, Johns Hopkins
- Hopkins, Billy Lee, 1962, *Assistant Professor of Psychology*
A.B., 1957, Emory; Ph.D., 1962, Indiana
- Hopkins, William Stephen, 1946, *Professor of Economics; Director of the Bureau of Labor Economics*
B.S., 1925, M.A., 1928, Oregon; Ph.D., 1932, Stanford
- Horita, Akira, 1954 (1961), *Associate Professor of Pharmacology*
A.B., 1950, M.S., 1951, Ph.D., 1954, Washington
- Horst, A. Paul, 1947, *Professor of Psychology*
B.A., 1927, California; Ph.D., 1931, Chicago
- Horton, George Plant, 1934 (1946), *Associate Professor of Psychology*
B.S., 1926, M.A., 1930, Ph.D., 1932, Princeton
- Horwood, Edgar Miller, 1946 (1962), *Professor of Civil Engineering*
B.S. in M.E., 1942, Georgia Institute of Technology; M.S. in Regional Planning, 1951, Washington; Ph.D., 1959, Pennsylvania
- Hosmer, Margaret George, 1948 (1954), *Lecturer in Home Economics*
B.S., 1918, North Carolina
- Hougie, Cecil, 1960, *Associate Professor of Pathology; Director, Hospital Clinical Hematology Laboratory*
M.R.C.S. (England), L.R.C.P. (London), 1945; M.B., B.S., 1946, University of London
- Hruby, Antonin Franz, 1961, *Assistant Professor of Germanic Literature*
Ph.D., 1946, Charles University (Prague)

- Hsiao, Kung-chuan, 1951 (1959), *Professor of Far Eastern Languages and Literature; Assistant Director of the Far Eastern and Russian Institute*
Graduate, 1920, National Tsinghua (China); B.A., 1922, M.A., 1923, Missouri;
Ph.D., 1926, Cornell
- Hsu, Chih-Chi, 1958 (1962), *Associate Professor of Electrical Engineering*
B.S., 1945, Chiao-Tung University, Shanghai, China; M.S.E., 1949, Michigan;
Ph.D., 1951, Ohio State University
- Hsu, Wellington Siang, 1944 (1960), *Professor of Zoology*
B.S., 1922, Illinois; M.S., 1924, D.Sc., 1928, Harvard
- Huber, J. Richard, 1939 (1949), *Professor of Economics*
B.A., 1931, College of Wooster; M.A., 1933, Ph.D., 1937, Princeton
- Hudson, G. Donald, 1951, *Professor of Geography*
Ph.B., 1925, A.M., 1926, Ph.D., 1934, Chicago
- Hufford, George Allen, 1958, *Assistant Professor of Mathematics*
B.S., Engr., 1946, California Institute of Technology; M.S.E.E., 1948, Washington;
M.A., 1952, Ph.D., 1953, Princeton
- Hughes, Eric Lester, 1951 (1963), *Associate Professor of Physical Education*
B.S., 1947, M.S., 1948, Illinois; D.Ed., 1956, Washington
- Hughes, Glenn Arthur, 1919 (1930), *Professor of Drama*
B.A., 1916, Stanford; M.A., 1920, Washington
- Huitric, Alain C., 1955 (1960), *Associate Professor of Pharmaceutical Chemistry*
B.S., 1950, Loyola; M.S., 1952, Ph.D., 1954, California
- Hunt, Marguerite, 1949 (1960), *Professor of Social Work*
A.B., 1929, Brown; M.S., 1936, Western Reserve
- Hurvitz, Leon Nahum, 1955 (1962), *Associate Professor of Japanese Language and Literature*
B.A., 1949, Chicago; M.A., 1951, Ph.D., 1959, Columbia
- Illg, Paul Louis, 1952 (1959), *Professor of Zoology*
A.B., 1936, M.A., 1941, California; Ph.D., 1952, George Washington
- Immerwahr, Raymond Max, 1958 (1960), *Professor of Germanic Languages and Literature*
B.A., 1934, Swarthmore; M.A., 1935, Northwestern; Ph.D., 1941, California
- Ingle, John Ide, 1948 (1959), *Professor of Periodontics and Endodontics; Chairman of the Department of Periodontics and Endodontics*
D.D.S., 1942, Northwestern; M.S.D., 1948, Michigan
- Irmscher, William Frederick, 1960, *Associate Professor of English; Director of Freshman English*
B.A., 1941, Louisville; M.A., 1947, Chicago; Ph.D., 1950, Indiana
- Irvine, Demar Buel, 1937 (1960), *Professor of Music*
A.B., 1929, M.A., 1931, California; Ph.D., 1937, Harvard
- Isbell, John Rolfe, 1957 (1962), *Professor of Mathematics*
B.S., 1951, Chicago; Ph.D., 1954, Princeton
- Ishimaru, Akira, 1954 (1961), *Associate Professor of Electrical Engineering*
B.S. in E.E., 1951, Tokyo; Ph.D., 1958, Washington
- Ivask, George, 1960 (1962), *Associate Professor of Russian Language and Literature*
Ph.D., 1954, Harvard
- Jackson, Kenneth L., 1963, *Assistant Professor of Radiology; Coordinator of the Center for Radiological Sciences*
A.B., 1949, Ph.D., 1954, California
- Jackson, William A. Douglas, 1955 (1960), *Professor of Geography and of Far Eastern and Slavic Languages and Literature*
B.A., 1946, M.A., 1949, Toronto; Ph.D., 1953, Maryland
- Jacobs, Melville, 1928 (1952), *Professor of Anthropology*
A.B., 1922, City College of New York; A.M., 1923, Ph.D., 1931, Columbia

- Jacobsohn, Boris Abbott, 1948 (1959), *Professor of Physics*
A.B., 1938, A.M., 1939, Columbia; Ph.D., 1947, Chicago
- Jacobson, Berthe Poncy, 1937 (1948), *Professor of Music*
Diploma, 1915, Conservatory of Music (Geneva); Diploma, 1917, Schola Cantorum (Paris);
Diploma, 1921, Dalcroze School (Geneva)
- Jacobson, Frederic Lloyd, 1950, *Associate Professor of Oral Diagnosis; Chairman of the Department of Oral Diagnosis*
D.M.D., 1934, North Pacific College of Oregon
- Jans, James P., 1957 (1960), *Associate Professor of Mathematics*
A.B., 1949, M.A., 1950, Ph.D., 1955, Michigan
- Jarolimek, John, 1962, *Associate Professor of Education*
B.S., 1943, Wisconsin State College; M.A., 1949, Ph.D., 1955, Minnesota
- Jensen, Lyle Howard, 1949 (1961), *Professor of Anatomy*
B.A., 1939, Walla Walla College; Ph.D., 1943, Washington
- Jessup, John Hunnicutt, 1926 (1927), *Associate Professor Educational Sociology*
A.B., 1920, Earlham College; M.A., 1924, Iowa
- Johanson, Lennart Noble, 1951 (1962), *Professor of Chemical Engineering*
B.S., 1942, Utah; M.S., 1943, Ph.D., 1948, Wisconsin
- Johnson, David Laurence, 1955 (1961), *Professor of Electrical Engineering*
B.S. in E.E., 1948, Idaho; Ph.D., 1955, Purdue
- Johnson, Dudley W., 1960, *Associate Professor of Finance*
B.A., 1950, Pacific University (Oregon); M.A., 1953, Ph.D., 1957, Northwestern
- Johnson, Fletcher Ormond, 1950, *Lecturer in Accounting*
B.B.A., 1924, Washington; C.P.A., 1925, States of Washington, Pennsylvania, California, Illinois
- Johnson, Harold Hunt, 1961, *Assistant Professor of Mathematics*
B.A., 1951, San Jose State; M.A., 1956, Ph.D., 1957, California
- Johnson, Martin Bruce, 1962, *Assistant Professor of Economics*
B.A., 1955, Carleton; M.A., 1960, Ph.D., 1962, Northwestern
- Johnson, Mary Louise, 1945 (1957), *Professor of Home Economics; Director of the School of Home Economics*
B.A., 1940, Hardin-Simmons (Texas); M.S., 1942, Wisconsin; D.Sc., 1954, Harvard School of Public Health
- Johnson, Pauline, 1941 (1958), *Professor of Art*
B.A., 1929, Washington; M.A., 1936, Columbia
- Johnson, Richard A., 1955 (1959), *Associate Professor of Policy and Administration, and Production*
B.B.A., 1949, M.B.A., 1952, Minnesota; D.B.A., 1958, Washington
- Johnson, Walter G., 1948 (1956), *Professor of Scandinavian Languages*
B.A., 1927, Augsburg College; M.A., 1929, Minnesota; Ph.D., 1935, Illinois
- Johnston, Norman John, 1960 (1961), *Associate Professor of Architecture and Urban Planning*
B.A., 1942, Washington; B.Arch., 1949, Oregon; Master of City Planning, 1959, Pennsylvania
- Jolivet, Vincent M., 1956 (1959), *Associate Professor of Finance*
B.S., 1952, McGill; M.B.A., 1954, D.B.A., 1957, Harvard
- Jones, Frank William, 1955, *Associate Professor of English and Comparative Literature*
B.A., 1934, Manitoba; Ph.D., 1941, Wisconsin; B.A., M.A., 1955, Oxford (England)
- Jones, Robert Cushman, 1960 (1962), *Assistant Professor of Art*
B.F.A., 1953, M.S., 1959, Rhode Island School of Design
- Joppa, Robert Glenn, 1945 (1957), *Associate Professor of Aeronautics and Astronautics*
B.S. in A.E., 1945, M.S. in A.E., 1951, Washington
- Kakiuchi, Hiroaki George, 1957 (1960), *Assistant Professor of Geography*
A.B., 1952, A.M., 1953, Ph.D., 1957, Michigan

- Kaminsky, Howard, 1957 (1962), *Associate Professor of History*
M.A., 1949, Ph.D., 1952, Chicago
- Kaplan, Alex, 1960, *Associate Professor of Biochemistry*
A.B., 1932, Ph.D., 1936, California
- Kast, Fremont E., 1951 (1961), *Professor of Policy and Administration and Production*
A.B., 1946, San Jose State College; M.B.A., 1949, Stanford; D.B.A., 1956, Washington
- Katz, Solomon, 1936 (1950), *Professor of History; Dean of the College of Arts and Sciences*
A.B., 1930, Ph.D., 1933, Cornell
- Kauzlarich, James Joseph, 1961, *Associate Professor of Mechanical Engineering School of Social Work*
B.S., 1950, State University of Iowa; M.S., 1952, Columbia; Ph.D., 1958, Northwestern
- Kehl, Richard Lee, 1962, *Instructor in Art*
B.F.A., 1959, M.F.A., 1961, M.A., 1961, Kansas City Art Institute
- Keller, Abraham Charles, 1948 (1963), *Professor of Romance Languages and Literature*
B.A., 1936, M.A., 1937, Ohio State; Ph.D., 1946, California
- Kelley, Jerry Lee, 1961, *Assistant Professor of Social Work; Assistant Dean of the School of Social Work*
A.B., 1944, Reed; A.M., 1949, Chicago
- Kennedy, Thelma Temy, 1961, *Assistant Professor of Physiology and Biophysics*
Ph.B., B.S., 1947, M.S., 1949, Ph.D., 1955, Chicago
- Kent, Joseph Chan, 1952 (1961), *Associate Professor of Civil Engineering*
B.S. in C.E., 1945, British Columbia; M.S. in C.E., 1948, Stanford; Ph.D., 1952, California
- Kenworthy, Ray W., 1929 (1950), *Associate Professor of Physics*
B.A., 1924, M.S., 1925, Iowa; Ph.D., 1938, Washington
- Kessel, John Howard, 1961, *Assistant Professor of Political Science*
B.A., 1950, Ohio State; Ph.D., 1958, Columbia
- Keyt, David, 1957 (1960), *Assistant Professor of Philosophy*
A.B., 1951, Kenyon College; M.A., 1953, Ph.D., 1955, Cornell
- Kidwell, M. Kathro, 1939 (1950), *Associate Professor of Physical Education*
B.S., 1927, Nebraska; M.S., 1928, Wisconsin; Ed.D., 1954, Columbia
- Kingston, John Maurice, 1940 (1959), *Associate Professor of Mathematics; Executive Secretary of the Department of Mathematics*
B.A., 1935, Western Ontario; M.A., 1936, Ph.D., 1939, Toronto
- Kippenhan, Charles Jacob, 1963, *Professor of Mechanical Engineering; Chairman of the Department of Mechanical Engineering*
B.S. in M.E., 1940, M.S. in M.E., 1946, Ph.D., 1948, State University of Iowa
- Klee, Victor L., Jr., 1953 (1957), *Professor of Mathematics*
B.A., 1945, Pomona College; Ph.D., 1949, Virginia
- Klutas, Edna May, 1960, *Assistant Professor of Occupational Health Nursing and Public Health Nursing*
Diploma, 1940, Columbia-Presbyterian School of Nursing, New York; B.S., 1951, Washington; M.P.H., 1957, Yale
- Knowles, Henry P., 1957 (1962), *Associate Professor of Policy and Administration*
B.S., 1935, U.S. Naval Academy; M.B.A., 1947, Harvard; Ph.D., 1961, Stanford
- Knudson, Harry R., Jr., 1958 (1961), *Associate Professor of Personnel and Human Relations*
B.S., 1952, M.B.A., 1953, Indiana; D.B.A., 1958, Harvard
- Kobayashi, Albert Satoshi, 1958 (1961), *Associate Professor of Mechanical Engineering*
B.S., 1947, Tokyo; M.S. in M.E., 1952, Washington; Ph.D., 1958, Illinois Institute of Technology
- Kohn, Alan Jacobs, 1961 (1963), *Associate Professor of Zoology*
A.B., 1953, Princeton; Ph.D., 1957, Yale

- Kolb, Keith Robert, 1952 (1960), *Associate Professor of Architecture*
B.Arch., 1947, Washington; M.Arch., 1950, Harvard
- Kolde, Endel Jakob, 1951 (1959), *Professor of International Business and Marketing*
B.S., 1940, National Military Academy (Estonia); D.H.S., 1947, Stockholm (Sweden);
M.A., 1951, D.B.A., 1954, Washington
- Korg, Jacob, 1955 (1962), *Associate Professor of English; Program Director of University of Washington Cooperative Education Program*
B.A., 1943, City College of New York; M.A., 1947, Ph.D., 1952, Columbia
- Kraus, Bertram S., 1957, *Professor of Physical Anthropology in Orthodontics*
A.B., 1934, Western Reserve University; M.A., Ph.D., 1949, Chicago
- Krebs, Edwin Gerhard, 1948 (1957), *Professor of Biochemistry*
A.B., 1940, Illinois; M.D., 1943, Washington University (St. Louis)
- Kroll, Morton, 1958 (1962), *Associate Professor of Political Science; Director of Correspondence Study*
B.A., 1946, Ph.D., 1952, California at Los Angeles
- Kruckeberg, Arthur Rice, 1950 (1960), *Associate Professor of Botany*
B.A., 1941, Occidental College; Ph.D., 1950, California
- Krupski, Edward, 1944 (1962), *Professor of Pharmaceutical Chemistry*
B.S., 1939, M.S., 1941, Ph.D., 1949, Washington
- Kunde, Norman Frederick, 1931 (1949), *Associate Professor of Physical Education*
B.S., 1928, M.S., 1932, Washington; D.Ed., 1946, New York
- LaGuardia, Eric, 1961 (1962), *Assistant Professor of English*
A.B., 1952, Hobart; A.M., 1955, Columbia; Ph.D., 1961, Iowa
- Larsen, Otto Nyholm, 1949 (1962), *Professor of Sociology; Director, Washington Institute for Sociological Research*
B.A., 1947, M.A., 1949, Ph.D., 1955, Washington
- La Russo, Dominic Anthony, 1951 (1956), *Assistant Professor of Speech*
B.A., 1950, M.A., 1952, Ph.D., 1956, Northwestern
- Law, David Barclay, 1947 (1949), *Associate Professor of Pedodontics; Chairman of the Department of Pedodontics*
D.D.S., B.S.D., 1938, M.S., 1941, Northwestern
- LeBreton, Preston P., 1960, *Professor of Business Policy; Chairman of the Department of Policy, Personnel Relations and Production*
B.S., 1947, M.B.A., 1949, Louisiana State; Ph.D., 1953, Illinois
- Lee, Gordon Canfield, 1961, *Professor and Dean, College of Education*
A.B., 1937, University of California; M.A., 1938, Ph.D., 1948, Columbia
- Leggett, Glenn Hubert, 1952, *Associate Professor of English; Vice Provost*
B.A., 1940, Middlebury College; B.A., 1941, Ph.D., 1949, Ohio State
- Leik, Robert Kendric, 1959, *Assistant Professor of Sociology*
B.S., 1953, Oregon; M.S., 1957, Ph.D., 1959, Wisconsin
- Leney, Lawrence, 1960 (1962), *Associate Professor of Forestry*
B.S., 1942, M.S., 1948, Ph.D., 1960, State University of New York (Syracuse)
- Levy, Fred Jacob, 1960 (1961), *Assistant Professor of History*
A.B., 1954, A.M., 1956, Ph.D., 1960, Harvard
- Lewis, Laurel Jones, 1946 (1954), *Professor of Electrical Engineering*
A.B., 1933, E.E., 1935, Ph.D., 1947, Stanford
- Li, Fang-kuei, 1949 (1950), *Professor of Chinese Linguistics and of Anthropology*
A.B., 1926, Michigan; A.M., 1927, Ph.D., 1928, Chicago
- Lieberman, Irving, 1956, *Professor of Librarianship; Director of the School of Librarianship*
B.S., 1935, New York; B.S. (L.S.), 1939, Ed.D., 1955, Columbia
- Lingafelter, Edward Clay, Jr., 1939 (1952), *Professor of Chemistry; Associate Dean of the Graduate School*
B.S., 1935, Ph.D., 1939, California

- Liston, John, 1957 (1960), *Associate Professor of Fisheries*
B.S., 1952, University of Edinburgh (Scotland); Ph.D., 1955, University of Aberdeen (Scotland)
- Little, Dolores Emma, 1951 (1958), *Assistant Professor of Nursing*
B.S., 1946, M.N., 1957, Washington
- Little, Robert Wilson, 1961, *Assistant Professor of Marketing*
B.S., 1953, M.B.A., 1956, D.B.A., 1961, Indiana
- Little, Wallace I., 1954 (1962), *Professor of Transportation*
B.S., 1943, M.S., 1947, Illinois; Ph.D., 1952, Wisconsin
- Lockard, Robert Bruce, 1962, *Assistant Professor of Psychology*
B.A., 1955, California (Santa Barbara); M.S., 1961, Ph.D., 1962, Wisconsin
- Loeb, Ernst Joseph, 1960 (1961), *Assistant Professor of Germanic Literature*
B.A., 1954, M.A., 1956, Pennsylvania; Ph.D., 1961, Washington University (St. Louis)
- Loomis, Ted Albert, 1947 (1957), *Professor of Pharmacology; State Toxicologist*
B.S., 1939, Washington; M.S., 1941, Ph.D., 1943, Buffalo; M.D., 1946, Yale
- Lord, Jere Johns, 1952 (1962), *Professor of Physics*
A.B., 1943, Reed College; M.A., 1948, Ph.D., 1950, Chicago
- Lorig, Arthur Nicholas, 1934 (1949), *Professor of Accounting*
B.A., 1922, Wisconsin; M.A., 1932, Stanford; Ph.D., 1936, Chicago;
C.P.A., 1927, State of California (Washington)
- Loucks, Roger Brown, 1936 (1948), *Professor of Psychology*
B.S. in C.E., 1927, Ph.D., 1930, Minnesota
- Lounsbury, Warren Carson, 1948 (1958), *Lecturer in Drama*
A.B., 1946, Western Reserve; M.A., 1953, Washington
- Lovett, Wendell Harper, 1948 (1960), *Associate Professor of Architecture*
B.Arch., 1947, Washington; M.Arch., 1948, Massachusetts Institute of Technology
- Luft, John H., 1956 (1961), *Associate Professor of Anatomy*
B.S., 1949, M.D., 1953, Washington
- Lumer, Gunter, 1961, *Assistant Professor of Mathematics*
B.S., 1948, State College of Montevideo (Uruguay); E.E., 1951, University of Montevideo (Uruguay); Ph.D., 1959, Chicago
- Lunneborg, Clifford Earl, Jr., 1962, *Assistant Professor of Psychology; Director of the Bureau of Testing*
B.S., 1954, M.S., 1957, Ph.D., 1959, Washington
- Lyden, Fremont James, 1962, *Assistant Professor of Public Affairs*
B.A., 1950, M.P.A., 1952, Ph.D., 1960, Washington
- Lytle, Dean Winton, 1958 (1962), *Associate Professor of Electrical Engineering*
B.S. in E.E., 1950, California; M.S. in E.E., 1954, Ph.D., 1957, Stanford
- Lytle, Scott Harrison, 1949 (1957), *Associate Professor of History*
A.B., 1940, Princeton; Ph.D., 1948, Cornell
- Macdonald, Catherine Joan, 1945 (1954), *Assistant Professor of Social Work*
B.A., 1936, Washington
- MacDonald, Cecilia, 1949 (1957), *Associate Professor of Elementary Education*
B.A., 1946, Central Washington College of Education; M.Ed., 1952, Washington
- Macdonald, Robert Wesley, 1961, *Assistant Professor of Social Work*
B.A., 1948, Manitoba; B.S.W., 1949, M.S.W., 1956, British Columbia; Ph.D., 1960, Minnesota
- Madsen, David Lawrence, 1961, *Assistant Professor of Education*
Ph.B., 1951, University of North Dakota; M.A., 1954, Ph.D., 1961, University of Chicago
- Magee, Donal Francis, 1951 (1962), *Professor of Pharmacology*
B.A., 1944, M.A., B.Med., B.Ch., 1948, Oxford (England); Ph.D., 1952, Illinois
- Mah, Feng-hwa, 1961, *Assistant Professor of Economics*
B.L., 1947, National Peking University (Peiping); M.A., 1956, Ph.D., 1959, Michigan
- Maier, Henry William, 1959 (1963), *Professor of Social Work*
A.B., 1947, Oberlin College; M.S., 1949, Western Reserve; Ph.D., 1959, Minnesota
- Maki, John McGilvrey, 1939 (1956), *Professor of Japanese Government and Politics*
B.A., 1932, M.A., 1936, Washington; Ph.D., 1948, Harvard

- Mallory, Virgil Standish, 1952 (1962), *Professor of Geology*
A.B., 1943, Oberlin; M.A., 1948, Ph.D., 1952, California
- Mander, Linden Alfred, 1928 (1937), *Professor of Political Science*
B.A., 1917, M.A., 1920, Adelaide (Australia)
- Manfield, Louise Wasson, 1951 (1952), *Assistant Professor of Medical-Surgical Nursing*
Diploma, 1937, Samaritan Hospital School of Nursing (Idaho); B.S., 1947, Ohio State; M.A., 1951, Columbia
- Marckworth, Gordon Dotter, 1939, *Professor of Forest Management; Dean of the College of Forestry*
B.S.F., 1916, Ohio State; M.F., 1917, Yale
- Marcus, Sumner, 1955 (1961), *Professor of General Business; Chairman of the Department of General Business*
A.B., 1931, M.B.A., 1933, LL.B., 1936, Harvard; D.B.A., 1958, Washington
- Martin, Arthur Wesley, Jr., 1937 (1950), *Professor of Physiology*
B.S., 1931, College of Puget Sound; Ph.D., 1936, Stanford
- Martin, George M., 1957 (1960), *Assistant Professor of Pathology*
B.S., 1949, M.D., 1953, Washington
- Martin, Harold Clifford, 1948 (1952), *Professor of Aeronautics and Astronautics*
B.S. in M.E., 1934, M.S., 1937, New York; Ph.D., 1950, California Institute of Technology
- Marts, Marion Ernest, 1946 (1961), *Professor of Geography; Director of Evening Classes and of Summer Quarter*
B.A., 1937, M.A., 1944, Washington; Ph.D., 1950, Northwestern
- Masek, George E., 1957 (1961), *Associate Professor of Physics*
B.S., 1950, M.S., 1951, Ph.D., 1955, Stanford
- Mason, Alden C., 1946 (1957), *Associate Professor of Art*
B.A., 1942, M.F.A., 1947, Washington
- Matchett, William H., 1954 (1961), *Associate Professor of English*
B.A., 1949, Swarthmore; M.A., 1950, Ph.D., 1957, Harvard
- McAdams, Laura Elizabeth, 1941 (1951), *Associate Professor of Home Economics*
B.S., 1923, M.S., 1932, Kansas State
- McCaffree, Kenneth Maurice, 1949 (1956), *Associate Professor of Economics*
B.A., 1940, Southwestern College (Kansas); M.A., 1942, Denver; Ph.D., 1950, Chicago
- McCarthy, Joseph Le Page, 1941 (1952), *Professor of Chemical Engineering; Dean of the Graduate School*
B.S. in Ch.E., 1934, Washington; M.S., 1936, Idaho; Ph.D., 1938, McGill
- McCarthy, Walter Charles, 1949 (1957), *Associate Professor of Pharmaceutical Chemistry*
B.S., 1943, Massachusetts Institute of Technology; Ph.D., 1949, Indiana
- McDermott, Mark Nordman, 1962, *Assistant Professor of Physics*
B.A., 1952, Whitman; M.A., 1956, Ph.D., 1959, Columbia
- McDiarmid, John Brodie, 1949 (1956), *Professor of Classics; Chairman of the Department of Classics*
B.A., 1936, Toronto; Ph.D., 1940, Johns Hopkins
- McFarlan, Lee Horace, 1927 (1946), *Professor of Mathematics*
B.S., 1917, Kansas State Teachers College; M.A., 1921, Ph.D., 1924, Missouri
- McFeron, Dean Earl, 1958, *Professor of Mechanical Engineering; Associate Dean of the College of Engineering; Director of Office of Engineering Research*
B.S. in M.E., 1943, M.S. in M.E., 1948, Colorado; Ph.D., 1956, Illinois
- McKay, George Frederick, 1927 (1943), *Professor of Music*
B.Mus., 1923, Rochester
- McKee, Bates, 1958, *Assistant Professor of Geology*
B.S., 1955, Yale; Ph.D., 1958, Stanford
- McKeever, Benjamin Butler, 1949, *Associate Professor of Psychology*
A.B., 1930, M.A., 1931, Harvard; Ph.D., 1940, Iowa

- McKinnon, Richard Nichols, 1951 (1957), *Associate Professor of Japanese Language and Literature*
A.B., 1947, A.M., 1949, Ph.D., 1951, Harvard
- McMinn, Bryan Towne, 1920 (1939), *Professor of Mechanical Engineering*
B.S. in M.E., 1918, Oregon State; M.S. in M.E., 1926, M.E., 1931, Washington
- McMinn, Trevor James, 1956, *Assistant Professor of Mathematics*
B.A., 1942, Utah; Ph.D., 1955, California
- McNeilly, Clyde Emerson, 1959, *Assistant Professor of Ceramic Engineering*
B.S. Cer. E., 1954, Ph.D., 1959, Alfred
- Meeuse, Bastiaan Jacob Dirk, 1952 (1960), *Professor of Botany*
B.Sc., 1936, Doctoraal Examen, 1939, Leiden (Holland); Doctor, 1943, Delft (Holland)
- Meier, Robert C., 1957 (1962), *Associate Professor of Production*
B.S., 1952, Indiana; M.A., 1955; Ph.D., 1961, Minnesota
- Melden, Abraham Irving, 1946 (1956), *Professor of Philosophy*
A.B., 1931, California (Los Angeles); A.M., 1932, Brown; Ph.D., 1938, California
- Merendino, K. Alvin, 1948 (1955), *Professor of Surgery*
B.A., 1936, Ohio; M.D., 1940, Yale; Ph.D., 1946, Minnesota
- Metzger, Lore, 1960 (1961), *Assistant Professor of English*
B.A., 1946, Hunter College; M.A., 1947, Ph.D., 1956, Columbia
- Meyer, Herman Carl Henry, 1934 (1942), *Associate Professor of Germanic Languages; Executive Secretary of the Department of Germanics*
B.A., 1924, Capital (Ohio); Ph.D., 1936, Chicago
- Michael, Ernest A., 1953 (1960), *Professor of Mathematics*
B.A., 1947, Cornell; M.A., 1948, Harvard; Ph.D., 1951, Chicago
- Michael, Franz H., 1942 (1948), *Professor of Far Eastern History and Government*
Dr.Jur., 1933, Freiburg (Germany)
- Miller, Alfred Lawrence, 1923 (1937), *Professor of Mechanics and Structures*
B.S. in C.E., 1920, C.E., 1926, Washington
- Miller, Charles John, 1927 (1945), *Professor of Marketing; Chairman of the Department of Marketing, Transportation, and International Business*
B.B.A., 1922, M.B.A., 1927, Washington
- Mills, Blake David, Jr., 1946 (1947), *Professor of Mechanical Engineering*
B.S. in M.E., B.S. in E.E., 1934, Washington; M.S. in M.E., 1935, Massachusetts Institute of Technology; M.E., 1947, Washington
- Mills, Caswell Albert, 1942 (1961), *Associate Professor of Physical Education; Lecturer in Public Health*
B.A., 1935, North Dakota State Teachers College; M.A., 1943, Ph.D., 1960, Washington
- Misch, Peter H., 1947 (1950), *Professor of Geology*
D.Sc., 1932, Göttingen (Germany)
- Mittet, Holger Peder, 1946 (1955), *Associate Professor of Civil Engineering*
B.S. in C.E., 1937, Washington; M.S. in C.E., 1938, Massachusetts Institute of Technology
- Miyamoto, Shotaro Frank, 1945 (1956), *Associate Professor of Sociology*
B.A., 1936, M.A., 1938, Washington; Ph.D., 1950, Chicago
- Moore, Alton Wallace, 1948 (1951), *Professor of Orthodontics; Chairman of the Department of Orthodontics*
D.D.S., 1941, California; M.S., 1948, Illinois
- Morel, Anne C., 1960 (1961), *Associate Professor of Mathematics*
B.A., 1941, California (Los Angeles); Ph.D., 1953, California
- Moritz, Harold Kennedy, 1928 (1949), *Professor of Hydraulics*
B.S. in M.E., 1921, Massachusetts Institute of Technology
- Morrill, Richard L., 1960, *Assistant Professor of Geography*
B.A., 1955, Dartmouth; M.A., 1957, Ph.D., 1959, Washington
- Morris, Morris David, 1949 (1961), *Professor of Economics*
A.B., 1941, Ph.D., 1954, California
- Morrison, James Bryan, 1946 (1960), *Professor of Mechanical Engineering*
B.S. in M.E., 1943, Virginia Polytechnic Institute; M.S. in M.E., 1954, Washington

- Morrison, Kenneth N., 1948 (1957), *Associate Professor of Fixed Partial Dentures; Chairman of the Department of Fixed Partial Dentures*
D.D.S., 1943, Toronto (Canada); M.S., 1952, Washington
- Moseley, Spencer Altemont, 1948 (1959), *Associate Professor of Art*
B.A., 1948, M.F.A., 1951, Washington
- Mottet, N. Karle, 1959 (1961), *Associate Professor of Pathology*
B.S., 1947, Washington State University; M.D., 1952, Yale
- Motulsky, Arno Gunther, 1953 (1961), *Professor of Medicine and Genetics*
B.S., 1945, M.D., 1947, Illinois
- Moulton, Ralph Wells, 1941 (1950), *Professor of Chemical Engineering; Chairman of the Department of Chemical Engineering*
B.S. in Ch.E., 1932, M.S. in Ch.E., 1934, Ph.D., 1938, Washington
- Mueller, Fred J., 1956 (1959), *Associate Professor of Accounting and Finance*
B.A., 1953, M.A., 1954, Washington; Ph.D., 1956, Ohio State; C.P.A., 1960, State of Washington
- Mueller, Gerhard Gottlob, 1960 (1963), *Associate Professor of Accounting*
B.S., 1956, M.B.A., 1957, Ph.D., 1961, California
- Mueller, James Irving, 1949 (1955), *Professor of Ceramic Engineering*
B.Cer.E., 1939, Ohio State; Ph.D., 1949, Missouri
- Mund, Vernon Arthur, 1932 (1937), *Professor of Economics*
B.B.A., 1928, M.B.A., 1929, Washington; Ph.D., 1932, Princeton
- Murphey, W. Rhoads, III, 1952 (1962), *Professor of Geography*
A.B., 1941, A.M., 1942, A.M., 1948, Ph.D., 1950, Harvard University
- Murray, B. Louise, 1957 (1962), *Associate Professor of Maternal Child Nursing*
B.S., 1938, Portland; M.N., 1950, Washington; Ed.D., 1962, Columbia
- Myers, Harold William, Jr., 1960 (1962), *Assistant Professor of Art*
A.B., 1952, San Jose State College; M.F.A., 1959, Mills College
- Nash, Shirley Istas, 1952 (1957), *Assistant Professor of Nursing*
Diploma, 1941, Virginia Mason Hospital School of Nursing; B.S., C.N.S., 1949, M.N., 1956, Washington
- Nece, Ronald Elliott, 1959 (1961), *Associate Professor of Civil Engineering*
B.S. in C.E., 1949, Washington; M.S. in C.E., 1951, Lehigh; Sc.D., 1958, Massachusetts Institute of Technology
- Neddermeyer, Seth Henry, 1946 (1952), *Professor of Physics*
A.B., 1929, Stanford; Ph.D., 1935, California Institute of Technology
- Nelson, Oliver Wendell, 1945 (1952), *Associate Professor of Speech; Acting Chairman of the Department of Speech*
B.A., 1933, M.A., 1939, Ph.D., 1949, Washington
- Nelson, Robert A., 1955 (1962), *Professor of Transportation*
A.B., 1941, Clark; M.B.A., 1947, Boston; Ph.D., 1954, Clark
- Neurath, Hans, 1950, *Professor of Biochemistry; Chairman of the Department of Biochemistry*
Ph.D., 1933, Vienna
- Newell, William Thrift, 1960 (1963), *Associate Professor of Production*
B.S., 1952, Colorado; M.B.A., 1955, University of Denver; Ph.D., 1962, Texas
- Newman, David Stanley, 1961 (1962), *Assistant Professor of Mathematics*
B.S., 1956, New Mexico; Ph.D., 1961, Cornell
- Nielsen, Mabel, 1957 (1959), *Assistant Professor of Home Economics*
B.S., 1935, Idaho; M.S., 1941, Iowa State College
- Nilsen, Thomas Robert, 1946 (1963), *Associate Professor of Speech*
B.A., 1940, M.A., 1948, Washington; Ph.D., 1953, Northwestern
- Niven, Harold Franklin, Jr., 1958, *Assistant Professor of Communications*
B.A., 1948, Denver; M.A., 1949, Stanford; Ph.D., 1958, Ohio State
- Niwa, Tamako, 1962, *Assistant Professor of Japanese Language and Literature*
B.S., 1944, M.A., 1946, Ph.D., 1956, Radcliffe
- Noges, Endrik, 1958 (1962), *Associate Professor of Electrical Engineering*
B.S., 1954, M.S., 1956, Ph.D., 1958, Northwestern

- Nordquist, William Bertil, 1947 (1955), *Associate Professor of Mechanical Engineering*
B.M.E., 1941, Rensselaer Polytechnic Institute; M.S., 1946, Massachusetts Institute of Technology
- Normann, Theodore Frederick, 1940 (1958), *Professor of Music*
B.A., 1925, Macalester College; M.A., 1928, Columbia
- Norris, Charles Head, 1962, *Professor of Civil Engineering; Chairman of the Department of Civil Engineering*
B.S. in C.E., 1931, Washington; S.M. in C.E., 1932, Sc.D. in Structural Engineering, 1942, Massachusetts Institute of Technology
- North, Douglass Cecil, 1950 (1960), *Professor of Economics; Director of the Institute of Economic Research*
B.A., 1942, Ph.D., 1952, California
- Northwood, Lawrence K., 1959 (1960), *Associate Professor of Social Work*
B.A., 1947, Wayne; Ph.D., 1953, Michigan
- Norton, Thomas John, 1961, *Assistant Professor of Architecture*
B.A., 1949, M.U.P., 1960, Washington
- Nostrand, Howard Lee, 1939, *Professor of Romance Languages and Literature; Chairman of the Department of Romance Languages and Literature;*
B.A., 1932, Amherst College; A.M., 1933, Harvard; Docteur, 1934, Université de Paris (France)
- Nunke, Ronald John, 1958 (1963), *Associate Professor of Mathematics*
B.S., 1950, M.S., 1951, Ph.D., 1955, Chicago
- Nyhus, Lloyd M., 1952 (1959), *Associate Professor of Surgery*
B.A., 1945, Pacific Lutheran; M.D., 1947, Alabama
- O'Brien, Timothy Frederick, 1956 (1958), *Associate Professor of Aeronautics and Astronautics*
B.S. in A.E., 1947, M.S. in A.E., 1951, Sc.D., 1958, Massachusetts Institute of Technology
- Ogilvie, Alfred Livingston, 1951 (1957), *Associate Professor of Periodontics and Endodontics*
D.D.S., 1944, Toronto; M.S., 1948, California
- Oi, Walter Iasue, 1962 (1963), *Associate Professor of Economics*
B.S., 1952, M.A., 1954, California at Los Angeles; Ph.D., 1961, Chicago
- O'Keefe, Kathleen Baxter, 1959 (1960), *Assistant Professor of Mathematics*
A.B., 1946, M.S., 1948, Ph.D., 1959, California
- Olcott, Virginia, 1931 (1945), *Associate Professor of Medical-Surgical Nursing*
Diploma, 1926, Peter Bent Brigham Hospital School of Nursing (Massachusetts); B.S., 1927, M.S., 1931, C.P.H.N., 1949, Washington
- Olson, Bruce Harry, 1961 (1962), *Assistant Professor of Finance*
B.A., 1957, Wabash; M.B.A., 1959, D.B.A., 1961, Indiana
- Ordal, Erling Josef, 1937 (1957), *Professor of Microbiology*
B.A., 1927, Luther College; Ph.D., 1936, Minnesota
- Orians, Gordon Howell, 1960, *Assistant Professor of Zoology*
B.S., 1954, Wisconsin; Ph.D., 1960, California
- Orr, Jack E., 1956, *Professor of Pharmacy; Dean of the College of Pharmacy; State Chemist*
B.S., 1940, Purdue; Ph.D., 1943, Wisconsin
- Osterud, Kenneth Leland, 1949, *Assistant Professor of Zoology*
B.A., 1935, Randolph-Macon College; Ph.D., 1941, New York
- Ottenberg, Simon, 1955 (1961), *Associate Professor of Anthropology*
B.A., 1948, Wisconsin; Ph.D., 1957, Northwestern
- Paine, Robert Treat, Jr., 1962, *Assistant Professor of Zoology*
A.B., 1954, Harvard; M.S., 1958, Ph.D., 1961, Michigan
- Palmer, John Milton, 1952 (1963), *Associate Professor of Speech*
B.A., 1946, M.A., 1950, Washington; Ph.D., 1952, Michigan
- Parsons, Jack R., 1955 (1963), *Professor of Social Work*
B.A., 1935, M.A., 1940, College of the Pacific; M.S., 1943, Columbia; Ph.D., 1958, Chicago

- Pascal, Paul, 1953 (1963), *Associate Professor of Classics*
B.A., 1948, Vermont; Ph.D., 1953, North Carolina
- Patrick, Maxine Lambrecht, 1955, *Assistant Professor of Nursing*
B.S., 1948, Colorado; M.S., 1953, Washington
- Patterson, Viola Hansen, 1947 (1958), *Associate Professor of Art*
B.S. in L.S., 1921, B.F.A., 1925, M.F.A., 1947, Washington
- Patton, Harry Dickson, 1947 (1956), *Professor of Physiology and Biophysics*
B.A., 1939, Arkansas; Ph.D., 1943, M.D., 1946, Yale
- Paulik, Gerald John, 1961, *Assistant Professor of Fisheries*
B.S., 1953, Ph.D., 1959, Washington
- Payne, Blanche, 1927 (1942), *Professor of Home Economics*
B.S., 1916, Kansas State Teachers College; M.A., 1924, Columbia
- Pearce, John Kenneth, 1934 (1943), *Professor of Logging Engineering*
B.S.F., 1921, Washington
- Peck, Charles Elwin, 1951 (1963), *Professor of Business Communications*
B.A., 1935, Wichita; M.A., 1947, Ph.D., 1950, Iowa
- Peden, Mary Irene Carswell, 1961 (1962), *Assistant Professor of Electrical Engineering*
B.S. in E.E., 1947, Colorado; M.S., 1958, Ph.D., 1962, Stanford
- Pedersen, Roma M. Kittelsby, 1953 (1961), *Associate Professor of Medical-Surgical Nursing*
B.S.N., 1943, Minnesota; M.N., 1955, Washington
- Peck, Clifford L., 1938 (1962), *Associate Professor of Physical Education*
B.S., 1929, Washington; M.A., 1931, Columbia
- Pence, Orville Leon, 1941 (1954), *Associate Professor of Speech*
B.A., 1935, M.A., 1939, Washington; Ph.D., 1946, Iowa
- Penington, Ruth Esther, 1928 (1951), *Professor of Art*
B.F.A., 1927, M.F.A., 1929, Washington
- Person, Henry Axel, 1937 (1961), *Associate Professor of English*
A.B., 1927, Ph.D., 1942, Washington
- Peterson, Marion Elizabeth, 1951 (1958), *Associate Professor of Librarianship*
B.A., 1930, B.A., in Librarianship, 1941, M.A., 1957, Washington
- Phelps, Robert Ralph, 1962, *Assistant Professor of Mathematics*
A.A., 1952, Los Angeles City College; B.A., 1954, California; Ph.D., 1958, Washington
- Phillips, William Louis, 1949 (1961), *Associate Professor of English; Associate Dean of the College of Arts and Sciences*
B.A., 1942, Iowa State Teachers College; M.A., 1947, Ph.D., 1949, Chicago
- Pierce, Richard Scott, 1955 (1960), *Professor of Mathematics; Chairman of the Department of Mathematics*
B.S., 1950, Ph.D., 1952, California Institute of Technology
- Pifer, Drury Augustus, 1945 (1948), *Professor of Mining Engineering; Director of the School of Mineral Engineering*
B.S. in Min.E., 1930, M.S. in Min.E., 1931, Washington
- Pigott, William, III, 1957 (1960), *Associate Professor of Finance*
B.S.S., 1949, Seattle; M.A., 1955, Ph.D., 1957, Washington
- Pizzuto, Eugene Carmine, 1957 (1960), *Assistant Professor of Art*
B.S., 1950, Wisconsin; M.F.A., 1951, Cranbrook Academy of Art
- Plein, Elmer Michael, 1938 (1951), *Professor of Pharmacy; Coordinator of Pharmaceutical Services*
PhC., B.S., 1929; M.S., 1931, Ph.D., 1936, Colorado
- Pocker, Yeshayau, 1961, *Professor of Chemistry*
M.Sc., 1949, Hebrew University (Jerusalem); Ph.D., 1953, D.Sc., 1960, University College (London)
- Polonis, Douglas Hugh, 1955 (1962), *Professor of Metallurgical Engineering*
B.A.Sc., 1951, British Columbia; M.A.Sc., 1953, Toronto; Ph.D., 1955, British Columbia

- Poppe, Nicholas Nikolaevich, 1949 (1951), *Professor of Slavic and Altaic Studies, of Anthropology and of Linguistics*
Master, 1923, Petrograd (Russia); Ph.D., 1934, Petersburg (Russia)
- Powers, Francis Fountain, 1928 (1939), *Professor of Educational Psychology; Director of Educational Research*
B.A., 1923, Washington; M.A., 1927, Oregon; Ph.D., 1928, Washington
- Prehn, Richmond T., 1958 (1960), *Associate Professor of Pathology*
M.D., 1947, Long Island College of Medicine
- Pressly, Thomas James, 1949 (1960), *Professor of History*
A.B., 1940, A.M., 1941, Ph.D., 1950, Harvard
- Pritsak, Omeljan, 1961 (1963), *Professor of Far Eastern and Slavic Languages and Literature*
M.A., 1940, University of Lemberg; Ph.D., 1948, University of Gottingen
- Proctor, Richard Macfarlane, 1962, *Instructor of Art*
B.A., 1958, M.A., 1962, Michigan State
- Puff, Robert David, 1954, *Assistant Professor of Physics*
A.B., 1954, Washington University; Ph.D., 1960, Harvard
- Pyke, Ronald, 1960 (1962), *Associate Professor of Mathematics*
B.A., 1953, McMaster; M.S., 1955, Ph.D., 1956, Washington
- Rabinovitch, Benton Seymour, 1948 (1957), *Professor of Chemistry*
B.S., 1939, Ph.D., 1942, McGill
- Rader, Melvin Miller, 1930 (1948), *Professor of Philosophy*
A.B., 1925, M.A., 1927, Ph.D., 1929, Washington
- Rahskopf, Horace G., 1928 (1944), *Professor of Speech*
A.B., 1920, Willamette; M.A., 1927, Ph.D., 1935, Iowa
- Rattray, Maurice, Jr., 1950 (1962), *Professor of Oceanography*
B.S., 1944, M.S., 1947, Ph.D., 1951, California Institute of Technology
- Ray, Dixy Lee, 1945 (1957), *Associate Professor of Zoology*
B.A., 1937, M.A., 1938, Mills College; Ph.D., 1945, Stanford
- Ray, Verne Frederick, 1933 (1947), *Professor of Anthropology*
B.A., 1931, M.A., 1933, Washington; Ph.D., 1937, Yale
- Read, Kenneth E., 1957 (1958), *Associate Professor of Anthropology; Chairman of the Department of Anthropology*
B.A., 1940, M.A., 1946, Sydney (Australia); Ph.D., 1948, London (England)
- Read, William Merritt, 1927 (1945), *Professor of Classics*
A.B., 1923, DePauw; M.A., 1924, Ph.D., 1927, Michigan
- Redford, Grant H., 1945 (1956), *Associate Professor of English*
B.S., 1937, Utah State; M.A., 1940, Iowa
- Reed, Carroll Edward, 1946 (1959), *Professor of Germanic Languages and of Linguistics*
B.A., 1936, M.A., 1937, Washington; Ph.D., 1941, Brown
- Reed, Richard John, 1954 (1963), *Professor of Atmospheric Sciences*
B.S., 1945, California Institute of Technology; Sc.D., 1949, Massachusetts Institute of Technology
- Reeves, George Spencer, 1935 (1948), *Associate Professor of Physical Education*
B.S., 1933, Oregon State; M.S., 1937, Oregon; M.P.H., 1951, California
- Reifler, Erwin, 1947 (1955), *Professor of Chinese Language*
Dr.Rer.Pol., 1931, Vienna (Austria)
- Reiss, Grace Dewey, 1947 (1960), *Associate Professor of Social Work*
B.A., 1932, Iowa; M.A., 1940, Minnesota
- Reshetar, John Stephen, Jr., 1957 (1962), *Professor of Political Science*
B.A., 1945, Williams; M.A., 1946, Ph.D., 1950, Harvard
- Rey, William Henry, 1950 (1959), *Professor of Germanic Literature; Chairman of the Department of Germanic Languages and Literature*
Ph.D., 1937, Frankfurt (Germany)

- Reynolds, Donald Kelly, 1959 (1960), *Professor of Electrical Engineering*
B.A., 1941, M.A., 1942, Stanford; Ph.D., 1948, Harvard
- Rhodes, Fred Harold, Jr., 1927 (1951), *Professor of Civil Engineering*
B.S. in C.E., 1926, B.S. in M.E., 1926, C.E., 1935, Washington
- Richards, Francis Asbury, 1959, *Associate Professor of Oceanography*
B.S., 1939, Illinois; M.S., 1942, Nevada; Ph.D., 1950, Washington
- Richardson, Frank, 1956 (1959), *Associate Professor of Zoology; Curator in Zoology, Washington State Museum*
B.A., 1934, Pomona; Ph.D., 1939, California
- Richardson, Roger Wolcott, Jr., 1960 (1963), *Associate Professor of Mathematics*
B.S., 1951, Louisiana State; Ph.D., 1958, Michigan
- Richey, Eugene Porter, 1954 (1956), *Associate Professor of Civil Engineering*
B.S. in C.E., 1941, Alaska; M.S., 1947, M.S. in C.E., 1948, California Institute of Technology; Ph.D., 1955, Stanford
- Richman, Robert June, 1961, *Associate Professor of Philosophy*
A.M., 1950, Ph.D., 1953, Harvard
- Riedel, Richard Anthony, 1949 (1950), *Assistant Professor of Orthodontics*
D.D.S., 1945, Marquette; M.D.S., 1948, Northwestern
- Rieke, William O., 1958 (1961), *Assistant Professor of Anatomy*
M.D., 1958, Washington
- Rising, L. Wait, 1934 (1936), *Professor of Pharmacy; Chairman of the Department of Pharmacy and Pharmacy Administration*
Ph.G., B.S., 1924, Oregon State; M.S., 1926, Ph.C., 1928, Ph.D., 1929, Washington
- Ritchie, Robert Wells, 1962, *Assistant Professor of Mathematics*
B.A., 1957, Reed; M.A., 1959, Ph.D., 1961, Princeton
- Ritter, David Moore, 1944 (1959), *Professor of Chemistry*
S.B., 1933, Ph.D., 1937, Chicago
- Robertson, James Campbell H., 1945 (1956), *Professor of Forest Management*
B.S.F., 1927, Washington; M.S.F., 1933, California; D.F., 1947, Duke
- Robinson, Dwight E., 1950 (1956), *Professor of General Business*
B.A., 1936, Yale; M.A., 1938, Oxford (England); Ph.D., 1948, Columbia
- Robinson, Rex Julian, 1929 (1945), *Professor of Chemistry*
B.A., 1925, DePauw; M.A., 1927, Ph.D., 1929, Wisconsin
- Roethke, Theodore Huebener, 1947 (1948), *Professor of English and Poet in Residence*
A.B., 1929, A.M., 1936, Michigan
- Rogers, Walter Edwin, 1946 (1956), *Professor of Electrical Engineering*
B.S. in E.E., 1934, California; M.S. in E.E., 1948, Washington
- Rohn, Peter Hans, 1962, *Assistant Professor of Political Science*
B.A., 1952, Wien, Vienna; M.A., 1953, Ph.D., 1958, Washington
- Roller, Julius Abraham, 1945 (1960), *Professor of Accounting; Chairman of the Department of Accounting, Finance and Statistics*
B.B.A., 1934, Washington
- Roman, Herschel Lewis, 1942 (1952), *Professor of Genetics; Chairman of the Department of Genetics*
A.B., 1936, Ph.D., 1942, Missouri
- Roosen-Runge, Edward C., 1952 (1959), *Professor of Anatomy*
M.D., 1936, Hamburg (Germany)
- Rose, Patricia Ann, 1961, *Assistant Professor of Nursing*
B.S.N., 1949, M.N., 1958, Washington
- Rosenmeyer, Thomas Gustav, 1955 (1960), *Professor of Classics*
B.A., 1944, McMaster (Hamilton, Ontario); M.A., 1945, Toronto; Ph.D., 1949, Harvard
- Rosenzweig, Jim, 1956 (1963), *Professor of Policy, Administration and Operations Research*
B.A., 1951, M.B.A., 1954, Washington; Ph.D., 1956, Illinois
- Rosinbum, Ralph Rambo, 1948 (1963), *Associate Professor of Music*
B.A., 1947, M.A., 1948, Washington

- Ross, Duncan W., 1962 (1963), *Associate Professor of Drama*
Old Vic; Stratford Memorial Theatre; Birmingham Repertory Theatre, Bristol Old Vic
- Royce, William F., 1958, *Professor of Fisheries; Director of the Fisheries Research Institute*
B.S., 1937, Ph.D., 1943, Cornell
- Ruch, Theodore Cedric, 1946, *Professor of Physiology; Chairman of the Department of Physiology and Biophysics; Director of the Regional Primate Center at the University of Washington*
B.A., 1927, Oregon; M.A., 1928, Stanford; B.A., 1930, B.Sc., 1932, Oxford (England); Ph.D., 1933, Yale
- Rushmer, Robert Frazer, 1947 (1956), *Professor of Physiology and Biophysics*
B.S., 1936, M.D., 1939, Chicago
- Ryan, Milo, 1946 (1957), *Professor of Communications*
B.A., 1928, M.A., 1934, Michigan
- Sale, Roger Hiller, 1962, *Assistant Professor of English*
B.A., 1953, Swarthmore; M.A., 1954, Ph.D., 1957, Cornell
- Salzer, Rufus Coleman, Jr., 1953 (1962), *Associate Professor of Education*
B.A., 1930, Seattle Pacific; M.A., 1931, Ph.D., 1955, Washington
- Samuelson, Merrill Ernest, 1962, *Associate Professor of Communications*
B.S., 1948, Oklahoma City; M.S., 1955, Oregon; Ph.D., 1960, Stanford
- Sanderman, Llewellyn Arthur, 1928 (1952), *Associate Professor of Physics; Executive Secretary of the Department of Physics*
B.S., 1923, Linfield College; M.S., 1931, Ph.D., 1943, Washington
- Sandler, Laurence Marvin, 1962, *Associate Professor of Genetics*
B.S., 1952, Cornell; M.A., 1954, Ph.D., 1956, Missouri
- Saporta, Sol, 1960 (1961), *Associate Professor of Romance Linguistics; Chairman of the Department of Linguistics*
B.A., 1944, Brooklyn College; M.A., 1952, Ph.D., 1955, Illinois
- Sarason, Irwin Gerald, 1956 (1959), *Associate Professor of Psychology*
B.A., 1951, Rutgers; M.A., 1953, Iowa; Ph.D., 1955, Indiana
- Sarkanen, Kyosti Vilho, 1961, *Associate Professor of Wood Chemistry in the College of Forestry; Lecturer in Chemical Engineering; Associate Director of the Institute of Forest Products*
B.Sc., 1947, Helsinki University; M.Sc., 1952, Ph.D., 1956, State University College of Forestry (New York)
- Sather, Norman Fredrick, 1962, *Assistant Professor of Chemical Engineering*
B.S., 1958, Illinois; Ph.D., 1962, Minnesota
- Sauerlander, Annemarie, 1947 (1949), *Associate Professor of Germanic Literature*
B.A., 1928, M.A., 1930, Buffalo; Ph.D., 1936, Cornell
- Savelle, Max, 1947, *Professor of History*
A.B., 1925, M.A., 1926, Ph.D., 1932, Columbia
- Sawhill, Roy Bond, 1956 (1960), *Associate Professor of Civil Engineering*
B.S. in C.E., 1950, Washington; M. of E., 1952, California
- Saxberg, Borje O., 1957 (1960), *Associate Professor of Policy, Administration, and Production*
B. Econ., 1950, Swedish University College of Commerce (Finland); B.S., 1952, Oregon State; M.S., 1953, Ph.D., 1958, Illinois
- Schaeffer, Walter Howard, 1952 (1960), *Professor of Forestry*
B.S.F., 1936, Washington; M.S.F., 1937, Yale; Ph.D., 1952, Washington
- Schaller, Gilbert Simon, 1922 (1937), *Professor of Mechanical Engineering*
B.S. in M.E., 1916, Illinois; M.B.A., 1925, Washington
- Scher, Allen Myron, 1950 (1962), *Professor of Physiology and Biophysics*
B.A., 1942, Ph.D., 1951, Yale
- Schluger, Saul, 1958, *Professor of Periodontics; Director of Graduate Dental Education*
D.D.S., 1931, Louisville

- Schmid, Calvin Fisher, 1937 (1941), *Professor of Sociology; Director of the Office of Population Research*
A.B., 1925, Washington; Ph.D., 1930, Pittsburgh
- Schmidt, Fred Henry, 1946 (1956), *Professor of Physics*
B.S.E., 1937, Michigan; M.A., 1940, Buffalo; Ph.D., 1945, California
- Schrag, Clarence Clyde, 1944 (1960), *Professor of Sociology*
B.A., 1939, Washington State; M.A., 1945, Ph.D., 1950, Washington
- Schrieber, Albert N., 1948 (1956), *Professor of Policy and Administration and Production*
B.S. in M.E., 1938, Illinois Institute of Technology; M.B.A., 1947, Harvard
- Schubert, Wolfgang Manfred, 1947 (1958), *Professor of Chemistry*
B.S., 1941, Illinois; Ph.D., 1947, Minnesota
- Scott, David Robert Main, 1955 (1960), *Associate Professor of Silviculture*
B.A., 1942, Virginia; M.F., 1947, Ph.D., 1950, Yale
- Scott, Robert Haney, 1961 (1963), *Associate Professor of Business Fluctuations*
A.B., 1939, M.A., 1950, Kansas; M.A., 1956, Ph.D., 1961, Harvard
- Segal, Jack, 1960 (1961), *Assistant Professor of Mathematics*
B.S., 1955, M.S., 1957, Miami; Ph.D., 1960, Georgia
- Selfridge, John Lewis, 1960 (1961), *Associate Professor of Mathematics*
B.S., 1951, Washington; Ph.D., 1958, California at Los Angeles
- Sergev, Sergius Ivan, 1923 (1946), *Professor of Engineering Mechanics*
B.S. in M.E., 1923, M.E., 1931, Washington
- Seyfried, Warren R., 1956 (1958), *Associate Professor of General Business*
B.S. (M.E.), 1943, Vanderbilt; M.B.A., 1954, D.B.A., 1956, Indiana
- Seymour, Allyn Henry, 1962, *Professor of Fisheries; Associate Director of the Radiation Biology Laboratory*
B.S., 1937, Ph.D., 1956, Washington
- Sharpe, William Forsyth, 1961 (1963), *Associate Professor of Finance and Quantitative Analysis*
A.B., 1955, California; M.A., 1956, Ph.D., 1961, California at Los Angeles
- Sherman, John Clinton, 1942 (1954), *Associate Professor of Geography; Acting Chairman of the Department of Geography*
A.B., 1937, Michigan; M.A., 1943, Clark; Ph.D., 1947, Washington
- Sherrer, Robert Eugene, 1960, *Associate Professor of Mechanical Engineering*
B.S. in M.E., 1948, Kansas; M.S. in E.M., 1953, Ph.D., 1958, Wisconsin
- Sherris, John Charles, 1959 (1963), *Professor of Microbiology; Director of the Clinical Microbiology Laboratories at the University Hospital*
M.B., B.S., 1948, M.D., 1950, London (England)
- Shevlin, Thomas S., 1961, *Associate Professor of Mineral Engineering*
B.Cer.E., 1942, M.Sc., 1947, Ph.D., 1954, Ohio State
- Shih, Vincent Yu-Chung, 1945 (1956), *Professor of Chinese Literature and Philosophy*
B.A., 1925, Fukien Christian (China); M.A., 1930, Yenching (China); Ph.D., 1939, Southern California
- Shimada, Katsunori, 1958 (1962), *Associate Professor of Electrical Engineering*
B.S., 1945, Tokyo U.; M.S., 1954, Ph.D., 1958, Minnesota
- Shipman, George Anderson, 1946, *Professor of Public Affairs and Political Science; Director of the Institute of Administrative Research of the Graduate School of Public Affairs*
B.A., 1925, M.A., 1926, Wesleyan (Connecticut); Ph.D., 1931, Cornell
- Shulman, Robert Philip, 1961 (1962), *Assistant Professor of English*
B.A., 1952, Syracuse; M.A., 1954, Ph.D., 1959, Ohio State
- Siks, Geraldine Brain, 1950 (1961), *Associate Professor of Drama*
B.A., 1935, Central Washington College of Education; M.A., 1940, Northwestern
- Simpson, Lurline Violet, 1924 (1944), *Associate Professor of Romance Languages and Literature*
B.A., 1920, M.A., 1924, Ph.D., 1928, Washington

- Simpson, William Tracy, 1948 (1957), *Professor of Chemistry*
 A.B., 1943, Ph.D., 1948, California
- Sivertz, Victorian, 1926 (1949), *Associate Professor of Chemistry, Executive Secretary of Department of Chemistry*
 B.S., 1922, Washington; M.S., 1924, West Virginia; Ph.D., 1926, McGill
- Skahen, Julia Goodsell, 1946 (1961), *Associate Professor of Anatomy, Physiology and Biophysics*
 B.S., 1926, M.S., 1928, Washington; Ph.D., 1940, Chicago
- Sleicher, Charles Albert, Jr., 1960 (1961), *Associate Professor of Chemical Engineering*
 Sc.B., 1944, Brown; S.M., Massachusetts Institute of Technology; Ph.D., 1955, Michigan
- Slutsky, Leon Judah, 1961, *Assistant Professor of Chemistry*
 A.B., 1953, Cornell; Ph.D., 1957, Massachusetts Institute of Technology
- Smith, Charles Wallace, 1948 (1959), *Associate Professor of Art*
 Pratt Institute; B.A., 1954, Washington; M.F.A., 1956, Cranbrook Academy of Art
- Smith, Edmund Arthur, 1957 (1962), *Associate Professor of Social Work*
 B.A., 1953, M.A., 1954, Washington; Ph.D., 1957, Harvard
- Smith, Henry Ladd, 1955, *Professor of Journalism*
 Ph.B., 1929, Yale; M.A., 1936, Ph.D., 1946, Wisconsin
- Smith, Moncrieff Hynson, Jr., 1949 (1959), *Professor of Psychology*
 A.B., 1940, M.A., 1941, Missouri; Ph.D., 1947, Stanford
- Smith, Orville A., Jr., 1958 (1963), *Associate Professor of Physiology and Biophysics; Assistant Director of the Regional Primate Research Center at the University of Washington*
 B.A., 1949, Arizona; M.A., 1950, Ph.D., 1953, Michigan State
- Smullyan, Arthur Francis, 1946 (1956), *Professor of Philosophy; Chairman of the Department of Philosophy*
 B.A., 1937, City College of New York; M.A., 1940, Ph.D., 1941, Harvard
- Snyder, Emile, 1961 (1962), *Assistant Professor of Romance Languages*
 B.A., 1949, Adelphi; M.A., 1952, Harvard; Ph.D., 1962, California at Los Angeles
- Snyder, Richard Craine, 1949 (1963), *Professor of Zoology*
 A.B., 1940, Bucknell; A.M., 1941, Ph.D., 1948, Cornell
- Sparks, Albert K., 1958 (1963), *Professor of Fisheries*
 B.S., 1947, M.S., 1949, Ph.D., 1957, Texas A. and M.
- Spector, Ivar, 1931 (1943), *Associate Professor of Russian Civilization*
 Graduate, 1919, Teacher's Seminar (Russia); M.A., 1926, Northwestern; Ph.D., 1928, Chicago
- Speier, Robert Walker, 1962, *Instructor of Art*
 B.A., 1949, Amherst; B.F.A., 1955, M.F.A., 1958, Yale
- Sperry, Robert, 1954 (1960), *Associate Professor of Art*
 B.A., 1950, Saskatchewan; M.F.A., 1955, Washington
- Spiro, Melford E., 1957, *Professor of Anthropology*
 B.A., 1941, Minnesota; Ph.D., 1950, Northwestern
- Sreebny, Leo M., 1957 (1961), *Professor of Oral Pathology; Chairman of the Department of Oral Pathology, School of Dentistry; Professor in the Department of Pathology, School of Medicine*
 A.B., 1942, D.D.S., 1945, M.S., 1950, Ph.D., 1954, Illinois
- Stadler, David R., 1956 (1962), *Associate Professor of Genetics*
 A.B., 1948, Missouri; M.A., 1950, Ph.D., 1952, Princeton
- Stanton, Robert Bruce, 1956 (1958), *Assistant Professor of English*
 B.A., 1949, M.A., 1950, Kansas City; Ph.D., 1953, Indiana
- Stein, Arnold Sidney, 1948 (1953), *Professor of English*
 A.B., 1936, Yale; A.M., 1938, Ph.D., 1942, Harvard
- Stein, Roger Breed, 1960 (1961), *Assistant Professor of English*
 B.A., 1954, M.A., 1958, Ph.D., 1960, Harvard

- Steinbrueck, Victor, 1946 (1960), *Professor of Architecture; Chairman of the Department of Architecture*
B.Arch., 1935, Washington
- Stenzel, George, 1949 (1962), *Professor of Logging Engineering*
B.S., 1938, New Hampshire; M.F., 1939, Yale
- Stern, Irving B., 1959 (1960), *Assistant Professor of Periodontics*
B.S., 1941, College of the City of N.Y.; D.D.S., 1946, N.Y.U.; Cert., 1956, Columbia
- Stern, Laurent, 1961, *Assistant Professor of Philosophy*
Ph.D., 1952, Zurich
- Stevens, Leonard Woodbury, 1937 (1961), *Associate Professor of Physical Education*
B.S., 1933, M.S., 1941, Washington
- Stevens, Walter William, 1959, *Assistant Professor of Speech*
B.A., 1951, M.A., 1953, Wayne State; Ph.D., 1959, Michigan
- Stevenson, John K., 1954 (1959), *Assistant Professor of Surgery*
M.D., 1949, University of Rochester
- Stevick, Robert David, 1962, *Assistant Professor of English*
B.A., 1949, M.A., 1951, Tulsa; Ph.D., 1956, Wisconsin
- Stibbs, Gerald Denike, 1948, *Professor of Operative Dentistry and Fixed Partial Dentures; Chairman of the Department of Operative Dentistry; Director of the Dental Operatory*
B.S., D.M.D., 1931, Oregon
- Stirling, Brents, 1932 (1949), *Professor of English*
LL.B., 1926, Ph.D., 1934, Washington
- Stotland, Ezra, 1957 (1961), *Associate Professor of Psychology*
B.S. in Social Science, 1948, City College of New York; M.A., 1949, Ph.D., 1953, Michigan
- Stout, George Hugh, 1957 (1963), *Associate Professor of Chemistry*
B.S., 1953, M.S., 1954, Ph.D., 1956, Harvard
- Strausser, Howard Samuel, Jr., 1955 (1957), *Associate Professor of Civil Engineering*
B.S. in C.E., 1942, Virginia Military Institute; M.S.E., 1950, Johns Hopkins
- Strayer, George Drayton, Jr., 1949, *Professor of Educational Administration*
B.S., 1927, Princeton; M.A., 1928, Ph.D., 1934, Columbia
- Street, Robert Elliott, 1948 (1955), *Professor of Aeronautics and Astronautics*
B.S., 1933, Rensselaer Polytechnic Institute; A.M., 1934, Ph.D., 1939, Harvard
- Streib, John Frederick, Jr., 1947 (1960), *Associate Professor of Physics*
B.S., 1936, Ph.D., 1942, California Institute of Technology
- Strother, Charles Riddell, 1947, *Professor of Psychology; Professor of Clinical Psychology in the School of Medicine; Director of the Pilot School*
B.A., 1929, M.A., 1932, Washington; Ph.D., 1935, Iowa
- Strother, David Boyd, 1958, *Assistant Professor of Speech*
A.B., 1950, Georgetown; M.A., 1951, Northwestern; Ph.D., 1958, Illinois
- Stuntz, Daniel Elliot, 1940 (1958), *Professor of Botany*
B.S., 1935, Washington; Ph.D., 1940, Yale
- Stutsman, Louise M., 1956 (1959), *Assistant Professor of Social Work*
B.A., 1940, Cornell College; M.A., 1949, Chicago
- Sugar, Peter Frigyes, 1959 (1963), *Associate Professor of History*
A.B., 1954, City College of New York; A.M., 1956, Ph.D., 1959, Princeton
- Suh, Doo Soo, 1955, *Lecturer in Korean Languages and Literature*
Graduate, 1930, Keijo Imperial University (Seoul, Korea); M.A., Ph.D., 1953, Columbia
- Sundsten, John Wallin, 1962, *Instructor of Anatomy*
A.B., 1956, Ph.D., 1961, California (Berkeley)
- Sutermeister, Robert A., 1949 (1952), *Professor of Personnel Human Relations*
A.B., 1934, Harvard; M.A., 1942, Washington
- Swarm, Howard Myron, 1947 (1959), *Professor of Electrical Engineering*
B.S. in E.E., 1940, M.S. in E.E., 1950, Washington, Ph.D., 1960, Stanford

- Sylvester, Robert Ohrum, 1947 (1957), *Professor of Sanitary Engineering*
B.S. in C.E., 1936, Washington; S.M., 1941, Harvard
- Szeftel, Marc Moise, 1961, *Professor of Russian History; Professor of History*
Matura, 1919, Stan. Staszic Gymnasium, Magister of Laws, 1925, University of Warsaw;
Docteur en droit, 1934, Lic. Slav. Phil. Hist., 1939, Universite Libre (Belgium)
- Szollosi, Daniel Gabriel, 1962, *Instructor of Anatomy*
B.A., 1956, Santa Clara; M.S., 1958, Ph.D., 1961, Wisconsin
- Taggart, Raymond, 1959 (1962), *Associate Professor of Mechanical Engineering*
B.S., 1948, London; Ph.D., 1956, Queens (Belfast, Northern Ireland)
- Takagi, Calvin Y., 1961, *Assistant Professor of Social Work*
B.A., 1950, M.S.W., 1952, Ph.D., 1958, Minnesota
- Tate, Robert F., 1953 (1961), *Associate Professor of Mathematics*
A.B., 1944, California; M.A., 1949, North Carolina; Ph.D., 1952, California
- Taylor, Donald Stewart, 1954 (1962), *Associate Professor of English*
A.B., 1947, M.A., 1948, Ph.D., 1950, California
- Taylor, George Edward, 1939 (1940), *Professor of Far Eastern History and Politics; Chairman of the Department of Far Eastern and Slavic Languages and Literature; Director of the Far Eastern and Russian Institute*
A.B., 1927, A.M., 1928, D.Litt., 1957, Birmingham (England)
- Terrell, Margaret Elma, 1928 (1944), *Professor of Home Economics*
A.B., 1923, Penn College (Iowa); M.A., 1927, Chicago
- Terry, Miriam, 1930 (1950), *Associate Professor of Music*
B.Mus., 1926, M.A., 1948, Washington
- Thomas, David Phillip, 1950 (1959), *Associate Professor of Forest Products*
B.S.F., 1941, M.F., 1948, Washington
- Thomas, Morgan David, 1959 (1960), *Associate Professor of Geography*
B.A., 1951, Ph.D., 1954, Queen's (Belfast, Northern Ireland)
- Thompson, Laurence C., Jr., 1957 (1962), *Associate Professor of Linguistics and Russian*
A.B., 1949, Middlebury; M.A., 1950, Ph.D., 1954, Yale
- Thornton, Judith Crouse, 1961 (1962), *Assistant Professor of Economics*
B.A., 1956, Vassar; M.A., 1958, Ph.D., 1960, Radcliffe
- Tiebout, Charles Mills, 1962, *Professor of Finance and Economics*
B.A., 1950, Wesleyan; M.A., 1951, Ph.D., 1957, Michigan
- Tiffany, William Robert, 1947 (1956), *Associate Professor of Speech*
B.A., 1946, M.A., 1947, Washington; Ph.D., 1951, Iowa
- Torney, John Alfred, Jr., 1930 (1948), *Associate Professor of Physical Education*
B.S., 1928, Washington; M.A., 1930, Columbia
- Torrence, Gerald Rutgers, 1954 (1961), *Associate Professor of Architectural Engineering*
B.S. in C.E., 1949, Washington; M.S. in S.E., 1950, Massachusetts Institute of Technology
- Tostberg, Robert Eugene, 1961, *Assistant Professor of Education*
B.A., 1956, Oregon; M.A., 1958, Ph.D., 1960, Wisconsin
- Towe, Arnold L., 1953 (1962), *Associate Professor of Physiology and Biophysics*
B.A., 1948, Pacific Lutheran; Ph.D., 1953, Washington
- Treadgold, Donald Warren, 1949 (1959), *Professor of Russian History*
B.A., 1943, Oregon; M.A., 1947, Harvard; D.Phil., 1950, Oxford (England)
- Troy, Alan, 1962, *Assistant Professor of Mathematics*
B.A., 1950, B.S., 1953, Chicago; M.S., 1956, Ph.D., 1961, Illinois (Urbana)
- Tschudin, Mary Stickels, 1942 (1955), *Professor of Nursing; Dean of the School of Nursing*
B.S.N., 1935, C.P.H.N., 1936, M.S., 1939, Ph.D., 1959, Washington
- Tsutakawa, George, 1946 (1963), *Professor of Art*
B.A., 1937, M.F.A., 1950, Washington
- Turner, Mabel Alexandra, 1941 (1959), *Associate Professor of Librarianship*
A.B., 1926, Oregon; B.S. in L.S., 1931, M.S. in L.S., 1959, Columbia

- Tyler, Varro E., Jr., 1957 (1961), *Professor of Pharmacognosy; Chairman of the Department of Pharmacognosy; Director, Drug Plant Gardens*
B.S., 1949, Nebraska; M.S., 1951, Ph.D., 1953, Connecticut
- Uehling, Edwin Albrecht, 1936 (1947), *Professor of Physics*
A.B., 1925, Wisconsin; M.A., 1930, Ph.D., 1932, Michigan
- Ullman, Edward L., 1951, *Professor of Geography; Associate Dean of the Graduate School*
S.B., 1934, Chicago; A.M., 1935, Harvard; Ph.D., 1942, Chicago
- Vance, Joseph Alan, 1957, *Assistant Professor of Geology*
B.S., 1951, Ph.D., 1957, Washington
- Van Cleve, Richard, 1948, *Professor of Fisheries; Dean of the College of Fisheries*
B.S., 1927, Ph.D., 1936, Washington
- Valentine, Charles Abernethy III, 1961 (1963), *Assistant Professor of Anthropology*
B.A., 1951, M.A., 1953, Ph.D., 1958, Pennsylvania
- Vargas-Barón, Anibal, 1949, *Associate Professor of Spanish*
B.A., 1926, Asbury College; M.A., 1929, Ph.D., 1943, Washington
- Vasarhelyi, Desi D., 1949 (1961), *Professor of Civil Engineering*
B.A., 1928, Ref. Collegium Kolozsvár (Romania); Dipl.Ingr., 1932, Dr.Ingr., 1944, Technical University (Budapest, Hungary)
- Verrall, John Weedon, 1948 (1959), *Professor of Music*
B.Mus., 1929, Minneapolis College of Music; Certificate of Music, 1932, Liszt Conservatory (Budapest); B.A., 1934, Minnesota
- Vincow, Gershon, 1961, *Assistant Professor of Chemistry*
A.B., 1956, M.A., 1957, Ph.D., 1959, Columbia
- Vopni, Sylvia Freda, 1952 (1961), *Associate Professor of Education*
B.A., 1931, M.A., 1938, Ph.D., 1955, Washington
- Wager, Leonard Wesley, 1954 (1959), *Assistant Professor of Sociology*
B.A., 1949, M.A., 1952, Washington; Ph.D., 1959, Chicago
- Wagner, Louis Charles, 1947 (1955), *Professor of Marketing*
B.B.A., 1938, Washington; M.A., 1940, Minnesota
- Wagoner, David R., 1954 (1961), *Associate Professor of English*
B.A., 1947, Pennsylvania State; M.A., 1949, Indiana
- Waibler, Paul John, 1954 (1961), *Professor of Mechanical Engineering*
B.S. in M.E., 1943, Kansas State; M.S. in M.E., 1944, Yale; Ph.D., 1958, Illinois
- Walker, Lauren McNeal, 1946 (1957), *Professor of Accounting*
B.A., 1939, M.B.A., 1943, Washington; C.P.A., 1943, State of Washington
- Walker, Richard Battson, 1948 (1960), *Professor of Botany; Acting Chairman of the Department of Botany*
B.S., 1938, Illinois; Ph.D., 1948, California
- Walsh, Kenneth Andrew, 1958 (1962), *Assistant Professor of Biochemistry*
B.Sc., 1951, McGill; M.S., 1953, Purdue
- Walton, Scott David, 1962, *Associate Professor of General Business*
B.S., 1947, Minnesota; M.B.A., 1949, Harvard; Ph.D., 1953, Iowa State College
- Ward, Arthur Allen, Jr., 1948 (1955), *Professor of Surgery; Head of the Division of Neurosurgery*
B.A., 1938, M.D., 1942, Yale
- Warner, Daniel S., 1954 (1962), *Professor of Communications*
B.A., 1928, Michigan; M.A., Oregon, 1958
- Warnke, Frank Joseph, 1961 (1963), *Professor of English*
A.B., 1948, Yale; M.A., 1951, Ph.D., 1954, Columbia
- Watson, James Bennett, 1955, *Professor of Anthropology*
A.B., 1941, A.M., 1945, Ph.D., 1948, Chicago
- Watson, Walter, 1958 (1959), *Assistant Professor of Sociology*
B.A., 1953, Southern Methodist; M.S., 1954, Ph.D., 1959, Wisconsin
- Watt, Lynn Alexander Keeling, 1959 (1962), *Associate Professor of Electrical Engineering*
B.S., 1947, Manitoba; S.M., 1951, Chicago; Ph.D., 1959, Minnesota

- Webster, Donald Hopkins, 1939 (1948), *Professor of Political Science; Director of the Bureau of Governmental Research and Services*
B.A., 1929, LL.B., 1931, Ph.D., 1933, Washington
- Weiser, Russell Shivley, 1934 (1949), *Professor of Microbiology*
B.S., 1930, M.S., 1931, North Dakota State; Ph.D., 1934, Washington
- Welander, Arthur Donovan, 1937 (1958), *Professor of Fisheries, Professor in the Laboratory of Radiation Biology*
B.S., 1934, M.S., 1940, Ph.D., 1946, Washington
- Welke, William Reinhardt, 1962, *Assistant Professor of Accounting*
B.B.A., 1958, M.B.A., 1959, Ph.D., 1962, Wisconsin
- Wells, Henry Herbert III, 1962, *Assistant Professor of Psychology*
A.B., 1957, Duke; M.S., 1959, Ph.D., 1962, Yale
- Welman, Valentine S., 1954 (1962), *Associate Professor of Art*
B.F.A., 1952, Denver; M.F.A., 1954, Colorado
- Wessman, Harold Everett, 1948, *Professor of Civil Engineering; Dean of the College of Engineering*
B.S., 1924, M.S., 1925, C.E., 1929, Ph.D., 1936, Illinois
- West, Theodore Clinton, 1949 (1959), *Associate Professor of Pharmacology*
B.S., 1948, M.S., 1949, Ph.D., 1952, Washington
- Wheatley, John J., 1960 (1962), *Associate Professor of Marketing*
S.B., 1947, Harvard; M.B.A., 1954, Ph.D., 1959, Buffalo
- Wheeler, Bayard O., 1948 (1953), *Professor of General Business and Real Estate*
A.B., 1928, California; M.A., 1930, Washington; Ph.D., 1942, California
- Wheeler, Harry Eugene, 1948 (1951), *Professor of Geology*
B.S., 1930, Oregon; A.M., 1932, Ph.D., 1935, Stanford
- Wheeler, Sara H., 1955 (1960), *Associate Professor of Librarianship*
B.A., 1936, Nebraska; B.S., (L.S.), 1940, Columbia; M.A., 1954, Chicago
- Whisler, Howard C., 1963, *Assistant Professor of Botany*
B.S., 1954, Ph.D., 1961, California (Berkeley)
- White, Lowell Elmond, Jr., 1954 (1960), *Assistant Professor of Surgery*
B.S., 1951, M.D., 1953, Washington
- Whiteley, Arthur Henry, 1947 (1959), *Professor of Zoology*
B.A., 1938, Kalamazoo College; M.A., 1939, Wisconsin; Ph.D., 1945, Princeton
- Wickman, James Allen, 1956 (1962), *Associate Professor of Risk and Insurance*
B.S., 1953, M.B.A., 1954, D.B.A., 1961, Washington
- Wilcox, Philip E., 1952 (1957), *Associate Professor of Biochemistry*
B.S., 1943, California Institute of Technology; Ph.D., 1949, Wisconsin
- Wilets, Lawrence, 1958 (1962), *Professor of Physics*
B.S., 1948, Wisconsin; M.A., 1950, Ph.D., 1952, Princeton
- Wilhelm, Hellmut, 1948 (1953), *Professor of Chinese History and Literature*
Ph.D., 1932, Berlin (Germany)
- Wilkie, Richard Francis, Jr., 1937 (1962), *Associate Professor of Germanic Literature*
B.A., 1934, M.A., 1936, Washington; Ph.D., 1953, California
- Williams, Robert Walter, 1959 (1960), *Professor of Physics*
A.B., 1941, Stanford; M.A., 1943, Princeton; Ph.D., 1948, M.I.T.
- Willis, Frank Roy, 1960 (1963), *Associate Professor of History*
B.A., 1952, M.A., 1956, Cambridge; B.A., 1954, London; Cert., 1955, Cambridge; Ph.D., 1959, Stanford
- Williston, Frank Goodman, 1943 (1949), *Professor of Far Eastern History*
A.B., 1922, Ohio Wesleyan; M.A., 1926, Ph.D., 1935, Chicago
- Wilsing, Weston C., 1953 (1960), *Associate Professor of Business Education*
B.Ed., 1943, Wisconsin Teachers College; M.A., 1946, Columbia; D.B.A., 1959, Washington
- Wilson, Clotilde, 1929 (1961), *Associate Professor of Romance Languages*
B.A., 1926, M.A., 1927, Ph.D., 1931, Washington

- Wilson, Ruth Marian, 1936 (1945), *Associate Professor of Physical Education; Chairman of the Department of Physical Education for Women*
B.S., 1931, Utah; M.S., 1936, Wisconsin
- Wilson, William Charles Eade, 1926 (1947), *Professor of Romance Languages*
B.A., 1922, Montana; M.A., 1925, Ph.D., 1928, Washington
- Wilson, William Ronald, 1920 (1929), *Professor of Psychology*
B.A., 1917, M.S., 1920, Ph.D., 1925, Washington
- Wingate, Marcel E., 1957, *Assistant Professor of Speech*
B.A., 1948, Grinnell; M.S., 1952; Ph.D., 1956, Washington
- Wittfogel, Karl August, 1947 (1949), *Professor of Chinese History*
Ph.D., 1938, Frankfurt (Germany)
- Wolfe, Myer Richard, 1949 (1958), *Professor of Urban Planning; Chairman of the Department of Urban Planning*
B.S., 1940, New Hampshire; M. Regional Planning, 1947, Cornell
- Woll, John William, Jr., 1961, *Assistant Professor of Mathematics*
B.S., 1952, Haverford College; Ph.D., 1956, Princeton
- Wood, Richard Lyman, 1959 (1961), *Assistant Professor of Anatomy*
B.A., 1950, Linfield College; Ph.D., 1957, Washington
- Woodburne, Lloyd Stuart, 1950, *Professor of Psychology*
A.B., 1929, M.A., 1930, Ph.D., 1932, Michigan
- Woodbury, J. Walter, 1950 (1962), *Professor of Physiology and Biophysics*
B.S., 1943, M.S., 1947, Ph.D., 1950, Utah
- Woodcock, Edith, 1930 (1945), *Associate Professor of Music*
B.M., 1925, Rochester; M.M., 1936, Washington
- Woolf, William Blauvelt, 1959 (1960), *Assistant Professor of Mathematics*
B.A., 1953, Pomona College; M.A., 1955, Claremont College; Ph.D., 1959, Michigan
- Worcester, Dean Amory, Jr., 1946 (1951), *Associate Professor of Economics*
B.A., 1939, M.A., 1940, Nebraska; Ph.D., 1943, Minnesota
- Wyatt, William Frank, Jr., 1960 (1962), *Assistant Professor of Classics*
B.A., 1953, Bowdoin; M.A., 1957, Ph.D., 1962, Harvard
- Wykhuis, Walter A., 1956, *Associate Professor of Prosthodontics*
B.A., 1932, Calvin College; D.D.S., 1936, Chicago College of Dental Surgery
- Wylie, Turrell Verl, 1958 (1959), *Assistant Professor of Tibetan Language and Civilization*
B.A., 1952, Ph.D., 1958, Washington
- Yen, Isabella Yiyun, 1960, *Associate Professor of Chinese Language*
B.A., 1938, National Peking (China); A.M., 1951, Michigan; Ph.D., 1956, Cornell
- Ylvisaker, Nils Donald, 1961, *Assistant Professor of Mathematics*
B.A., 1954, Concordia; M.A., 1956, Nebraska; Ph.D., 1960, Stanford
- Young, Allan Charles, 1949 (1960), *Professor of Physiology and Biophysics*
B.A., 1930, M.A., 1932, British Columbia; Ph.D., 1934, Toronto
- Young, Harry Allen, 1948, *Professor of Prosthodontics*
D.D.S., 1919, Indiana
- Zeldow, Bernard Joseph, 1957 (1960), *Assistant Professor of Periodontics*
B.A., 1949, Buffalo; M.S., 1951, Washington; D.D.S., 1956, Pennsylvania
- Zetlin, Emanuel Roman, 1947, *Professor of Music*
B.A., 1916, Imperial Conservatory (Petrograd); D.Mus. (Hon.), 1936, Washington College of Music, Washington, D.C.
- Zillman, Lawrence John, 1932 (1953), *Professor of English*
B.A., 1928, Ph.D., 1936, Washington
- Zuckerman, Herbert Samuel, 1939 (1952), *Professor of Mathematics*
B.S., 1932, California Institute of Technology; M.S., 1934, Chicago; Ph.D., 1936, California