CORRESPONDENCE DIRECTORY

Office of the Chancellor
Mrak Hall
752-2983

College of Agricultural and Environmental Sciences
228 Mrak Hall
752-0107

College of Engineering
2132 Bainer Hall
752-0553

College of Letters and Science
150 Mrak Hall
752-0392

Graduate School of Administration
111 Vocheys Hall
752-7362

School of Law
1011 King Hall
752-0243

School of Medicine
Medical Sciences 1C
752-0331

School of Veterinary Medicine
1024 Hering Hall
752-1360

Graduate Division
252 Mrak Hall
752-6650

Division of Extended Learning
376 Mrak Hall
752-2420

Admissions
Undergraduate: Office of Admissions
175 Mrak Hall
752-2971
EOAC Office of Admissions
175 Mrak Hall
752-2992

Graduate: Graduate Division Admissions
252 Mrak Hall
752-0655

Administration: Graduate School of Administration
111 Vocheys Hall
752-7362

Law: School of Law Admissions
1011 King Hall
752-0243

Medicine: School of Medicine Admissions
Medical Sciences 1C
752-0331

Veterinary Medicine: School of Veterinary Medicine Admissions
1024 Hering Hall
752-1360

Registrar’s Office
124 Mrak Hall
752-2973
(for registration information, transcripts, the General Catalog)

Financial Aid Office
North Hall
752-2390
(undergraduate and graduate loans, grants, work-study)

Scholarship Office
University House Annex
752-2397
(undergraduate scholarships)

Fellowships and Graduate Scholarships
Graduate Division
252 Mrak Hall
752-0650

Teaching and Research Assistantships
Write to department or group concerned. Addresses given in the Announcement of the Graduate Division.

Housing
Community: Housing Office
752-2483

Residence Halls: Housing Office
752-2033

Student Family Housing: Orchard Park
752-4000

ASUCD (Associated Students UCD)
3rd floor, Memorial Union
752-1990

Memorial Union Information Desk
752-2222

Office of Public Affairs
334 Mrak Hall
752-1930

Relations with Schools
175 Mrak Hall
752-1099

Residency Matters, Attorney in
690 University Hall
University of California
Berkeley, CA 94720

Student Health Service
54A Cowell Hospital and Student Health Center
752-2300

Visitors Services and Ceremonies
129 Mrak Hall
752-0639
(campus tours, maps, and information)

The cover illustration shows the Main Theatre in the UCD Fine Arts Complex.

The quotes interspersed throughout the text have been collected over the years from students, faculty, staff, and alumni at UCD.
COMPLIANCE STATEMENT
The University of California, in compliance with Titles VI and VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972 (45 CFR 86), and Sections 503 and 504 of the Rehabilitation Act of 1973, does not discriminate on the basis of race, color, national origin, religion, sex, or handicap in any of its policies, procedures, or practices; nor does the University, in compliance with the Age Discrimination in Employment Act of 1967 and Section 402 of the Vietnam Era Veterans Readjustment Act of 1974, discriminate against any employees or applicants for employment on the basis of their age or because they are disabled veterans or veterans of the Vietnam era. This nondiscrimination policy covers admission, access, and treatment in University programs and activities, and application for and treatment in University employment.
In conformance with University policy and pursuant to Executive Orders 11246 and 11375, Section 503 of the Rehabilitation Act of 1973, and Section 402 of the Vietnam Era Veterans Readjustment Act of 1974, the University of California is an affirmative action/equal opportunity employer.
Inquiries regarding the University’s equal opportunity policies may be directed to the Vice Chancellor of Academic Affairs and Affirmative Action Officer, 515 Mrak Hall, 752-2070. Speech and hearing impaired persons may dial 752-6TTY.
HOW TO USE THIS CATALOG

We intend the UC Davis General Catalog as a source of information about the Davis campus course offerings, academic programs, campus facilities, services, fees, requirements, and campus life. We know that it is used for a variety of ends and purposes by both current and prospective students and their advisers. While we attempt to provide information for all of these uses, you may find that some information you need is not given. Therefore, throughout the book, we refer to other publications available from individual offices or departments in the Correspondence Directory on the inside front cover you will find a list of the most frequently questioned offices and their addresses. (Please refer to the index for locations of other offices or department addresses.) On page 317 there is a list of major publications and where you can request them.

The Catalog is divided into four major sections:

- Information about the University and the campus, student services, fees, admissions, and scholastic requirements
- Information about individual schools and colleges
- Descriptions of specific courses of study, undergraduate major requirements and courses offered, and lists of the faculty in departments and programs
- Appendix and Index

Prospective students may wonder “What is the Davis campus like?” The first section is intended to give you a general impression of the campus. You should supplement this impression by reading, in the second section, the description of the college or school which interests you. Section three is intended to answer the question, “What does UCD offer to help me reach my goals?” If you are a prospective freshman or international student, you may find it helpful to look over the Glossary of unfamiliar terms on page 318. The names of some majors may not convey to you what academic areas courses cover, so please check the lists of courses offered to satisfy the requirements of any unfamiliar major. Department chairpersons, program directors, major advisers, or any faculty member listed with these major offerings would be happy to answer any further questions you might have. Prospective graduate students might also wish to send for the Announcement of the Graduate Division (Graduate Division Office, 252 Mrak Hall) which provides descriptions of graduate programs and requirements, although not descriptions of courses.

Current students should refer to the Catalog throughout their years here to answer specific questions on regulations, requirements, and course offerings. Although every effort is made to keep the Catalog correct and current, inevitably there will be some changes in courses offered or instructors assigned. You should, therefore, check the quarterly Class Schedule and Room Directory for the up-to-date list of courses offered.

Advisers of prospective students may wish to send for the Planning Guide to Majors, distributed by the Office of Relations with Schools (175 Mrak Hall), for more comprehensive information on programs and their requirements.

We are always trying to make the Catalog more helpful, so please let us know of difficulties you encounter in using it or send us your suggestions for improvement (Publications Office, Reprographics Building or Registrar’s Office, 124D Mrak Hall).
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Davis Campus Map ............................................................................................ inside back cover
### CALENDAR

**Academic Calendar**

- **FALL 1980**
  - June 4-Aug. 29
  - June 6-6
  - June 6-6
  - June 16-Aug. 29

- **WINTER 1981**
  - Nov. 12-14 (1980)
  - Nov. 13-14
  - Nov. 17-18
  - Nov. 17-18
  - Aug. 30-Oct. 15
  - Nov. 19-Jan. 20
  - Feb. 25-Apr. 17

- **SPRING 1981**
  - Mon., Sept. 29
  - Mon., Jan. 5
  - Thurs., Apr. 2
  - Sept. 29-Oct. 1
  - Jan. 5-6
  - Sept. 29-30
  - Jan. 5
  - Apr. 2
  - Thurs., Oct 2
  - Wed., Jan. 7
  - Mon., Apr. 6
  - Wed., Oct. 15
  - Tues., Jan. 20
  - Oct. 15
  - Jan. 20
  - Oct. 15
  - Jan. 20
  - Oct. 15
  - Jan. 20
  - Wed., Nov. 5
  - Tues., Feb. 10
  - Fri., May 8
  - Nov. 5
  - Feb. 10
  - Aug. 15
  - Nov. 3
  - Aug. 15
  - Nov. 3
  - Aug. 15
  - Nov. 3
  - Fri., Dec. 12
  - Tues., Mar. 17
  - Thurs., June 11
  - Dec. 15-20
  - Mar. 19-25
  - June 13-19
  - Dec. 20
  - Mar. 25
  - June 19

- **FALL 1981**
  - Mid-June
  - Thurs.-Fri., Nov. 27-28
  - Thurs.-Fri., Dec. 25-26
  - Thurs.-Fri., Jan. 1-2

**Candidates for Degrees**

- **Undergraduates**
  - Weo., Oct. 15
  - Tues., Jan. 20
  - Fri., Apr. 17
  - Fri., July 3 (for Sept. '81)
  - Fri., Oct. 17
  - Fri., Nov. 21
  - Fri., Feb. 27 (1980)
  - Fri., Feb. 27 (for Sept. '81)

*Dates are subject to change and should be checked with appropriate Class Schedule and Room Directory.*
Graduate Students

- Final date for those who expect to complete work for master’s degrees to file applications for candidacy with the Dean of the Graduate Division.
- Final date for candidates for master’s degrees to file theses with the committee in charge.
- Final date for candidates for master’s degrees to file theses with the Dean of the Graduate Division.
- Final date for those who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to file applications for candidacy with the Dean of the Graduate Division.
- Final date for candidates for the degrees of Doctor of Philosophy and Doctor of Engineering to file theses with the committee in charge.
- Final date for candidates for the degrees of Doctor of Philosophy and Doctor of Engineering to file theses with the Dean of the Graduate Division.

Admission Deadlines

- Applications for admission to undergraduate standing, including applications for intercampus transfer and EOP must be filed with complete credentials with the Office of Undergraduate Admissions on or before this date.
- Applications for admission to graduate standing, with complete credentials, must be filed with the Dean of the Graduate Division on or before this date.
- Applications for admission to the School of Law for 1981-82 must be filed with the School on or before this date.
- Applications for admission to the Graduate School of Administration for 1981-82 must be filed with the School on or before this date.
- Applications for admission to the School of Medicine for 1981-82 must be filed with the School on or before this date.
- Applications for admission to the School of Veterinary Medicine for 1981-82 must be filed with the School on or before this date.
- Applications for readmission to undergraduate status must be filed with the Registrar on or before this date.
- Applications for readmission to graduate status must be filed with the Registrar on or before this date.

Financial Aid Deadlines

- Applications for grants, loans, work-study, and California Student Aid Commission awards must be filed with the Financial Aid Office on or before this date.
- Applications for UCD undergraduate scholarships for 1981-82 must be filed with the Scholarship Office on or before this date.
- Applications for President’s Undergraduate Fellowships for 1981-82 must be filed with the Scholarship Office on or before this date.
- Applications for fellowships and graduate scholarships for 1981-82 must be filed with the Graduate Division on or before this date.
Introduction

THE UNIVERSITY OF CALIFORNIA

When the first transcontinental railroad cars steamed into the western terminal in Sacramento, only 40 students—taught by 10 professors—were enrolled in the University of California. A year earlier, in 1868, Governor Henry H. Haight signed the Organic Act which provided that a "complete University" be created for the State of California. Classes began in 1869 on the campus of the College of California in Oakland. The first few buildings on the Berkeley campus were completed in 1873, and that year the University took up residence in its new home. The following June, degrees were conferred upon the University’s first 12 graduates.

Today the University has nine campuses throughout the State of California — Berkeley, Davis, Irvine, Los Angeles, Riverside, San Diego, San Francisco, Santa Barbara, and Santa Cruz. Each campus has its own distinct atmosphere, features, and character; all are recognized nationally and internationally as distinguished educational institutions. The University also maintains research and field stations, Extension centers, and instructional facilities in more than 80 locations throughout California.

The nine campuses of the University have a current enrollment of more than 127,000 students, 90 percent of them residents of California. Nearly one-third of the students are studying at the graduate level.

The University's reputation for excellence has attracted a distinguished faculty of scholars and scientists in all fields of scholarship. In a recently conducted survey, published in the Chronicle of Higher Education, 4,000 faculty at four-year colleges and universities throughout the U.S. were asked to name the departments in their disciplines which "have the most distinguished faculties." Four UC campuses, including UC Davis, were named to the top ten in at least one field and two campuses were named in more than five fields. The University has 16 Nobel Laureate winners on its faculty, and the total membership from all nine campuses in the National Academy of Sciences is the largest of any college or university system in the country. In 1979, 26 scholars from seven campuses of the University received fellowship grants from the John Simon Guggenheim Foundation. These fellowships are among the highest honors that scholars can receive.

Governance of the University is entrusted to a corporation called The Board of Regents. Of the individuals comprising the Board, 18 are prominent California citizens appointed by the Governor; and seven, including the President of the University and the Governor of California, serve ex officio. A Student Regent is selected each year from a list of names submitted to the Board by the Student Body Presidents’ Council.

Last year’s Student Regent, Hector Cruz Lozano, was from UC Davis. This was the second time since 1975, when the first Student Regent was selected, a UC Davis student has been chosen for this important post.

The Regents have delegated authority in academic matters to the Academic Senate of the faculty, which determines academic policy and supervises the instructional activities of the entire University. All of the permanent faculty, as well as key administrators, are members of the Senate.

The Regents have delegated authority for the organization of the University to the President. David S. Saxon is President and head of the Systemwide Administration. Authority for the administration of each campus has been delegated to a Chancellor.

THE DAVIS CAMPUS

James H. Meyer, Chancellor of UC Davis, administers this campus of 17,400 students, 1,400 teaching faculty and 6,000 staff.

The Davis campus has undergraduate colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science. The Graduate Division administers graduate study and research at all schools and colleges. Professional studies are carried on at the schools of Law, Medicine, and Veterinary Medicine.
and a graduate School of Administration will open its doors to students in the fall of 1981. Approximately 5,000 students are engaged in graduate or professional study. The Division of Extended Learning extends University knowledge, expertise, and cultural activities to individuals in surrounding communities.

The University of California, Davis is accredited by the Western Association of Schools and Colleges, Association of American Law Schools, Association of American Medical Colleges, Council on Education of the American Veterinary Medical Association, Engineers' Council for Professional Development of the American Society of Engineering Education, American Chemical Society, and the Commission for Teaching Preparation and Licensing.

**UCD’s History**

In 1906 the University of California acquired 768 acres surrounding the town of Davisville for a University farm. The Farm (as UCD was originally known) was established to serve the rural population of California, offering three years of instruction in the principles and practices of managing soils, crops, and animals. The need for such training was recognized and plans for the farm encouraged by Sacramento Superior Court Judge Peter J. Shields, the “Father of the Davis Campus.”

The demand for greater educational opportunities in the state increased rapidly and in 1922, in conjunction with the UC Berkeley College of Agriculture, the degree of Bachelor of Science in Agriculture was granted to those who completed the Davis program. A few years later, the Davis campus had its own College of Agriculture and, in 1946, the School of Veterinary Medicine (still the only one in the state) was established.

The campus’s most rapid expansion began in 1951 when the College of Letters and Science was founded and more varied degree programs became available. In 1959, The Regents declared Davis a general campus of the University. By 1961, graduate programs were so numerous that a Graduate Division was established as a separate administrative unit. The College of Engineering came into existence the following year, owing much to the foundation already provided by the curriculum in Agricultural Engineering. The School of Law held its first classes in the fall of 1966, and the School of Medicine admitted its first students in the fall of 1968. The graduate School of Administration will begin holding classes in the fall of 1981.

UCD has long been known for teaching and research in agricultural sciences. This year its faculty in agriculture was named as one of the top five in the country by peers throughout the nation. The reputation of the Davis campus in many other fields has advanced as Davis has moved into the ranks of the top 25 general research universities in the United States.

The quality of undergraduate instruction is a prime concern of the faculty, students, and administration at Davis. Creative teaching and academic innovation are encouraged by several programs, including the Distinguished Teaching Awards (for which students can nominate outstanding faculty members), instructional improvement funds (for improving the quality of undergraduate teaching), the Teaching Resources Center programs which aid faculty members and teaching assistants in sharpening their teaching skills, and the Learning Resources Center programs which assist in the preparation of materials for use in classrooms and in self-paced learning activities. *Student Viewpoint*, a student-written and published evaluation of classes and instructors, is compiled each year from course questionnaires completed by students.

**Campus Life**

The Davis campus has always been especially noted for its friendliness and informality. To many people, Davis brings to mind Picnic Day (the annual campus open-house in April) and the almost universal use of bicycles within the community. Since the Davis campus is a residential community and was originally small and isolated, a tradition of close relations between students and faculty has developed. Even though the campus has now grown to 17,400 students, its style remains friendly, informal, and personal.
Beneath the casual and informal outlook of Davis students, however, there is an underlying seriousness and an emphasis on academic excellence. Davis students do study hard. However, those who think of Davis as just a place to study, will be surprised by the variety of activities happening every day on campus. There is rarely a night without at least one movie, a day without a long list of public lectures, or a weekend without a play, concert, or special event.

The Davis Campus Today

Looking around the campus you can see modern concrete and glass buildings contrasting with the older, original wooden structures from the University Farm days. But the newest building on the main campus—set between Sproul Hall, a nine-story concrete office tower, and University House, one of the oldest buildings on campus—is a harmonious blend of redwood, glass, and concrete.

The planned expansion of the Davis campus is nearing completion, and, although some of the buildings are less than a decade old, the spirit of its past as the University Farm gives UCD a sense of tradition. A University is never static, always changing to meet new needs and new conditions. Looking back, we can see that the campus has developed in ways which the founders of the University Farm could never have envisioned. But looking ahead, out of an era in which the role of the University in society is being reexamined, we can predict that the Davis campus will retain its fundamental assumption that academic programs at all levels of the University—undergraduate, graduate, professional, and research—must reinforce and strengthen each other.

The root word of University, the Latin universitas—entirety—reflects UCD's aim to bring together learning and life, scholarship and teaching, theory and practice, and general and professional education.

The Setting

The Davis campus lies adjacent to the city of Davis (population 36,400), 15 miles west of Sacramento and 72 miles northeast of San Francisco. Sacramento, with all its resources as the state capital, is only twenty minutes away, yet Davis is surrounded on all sides by open space—including some of the most valuable agricultural land in the state. The total campus comprises approximately 3,800 acres. About 980 acres are devoted to the central campus, the remainder being used for agricultural research and for such special facilities as the Veterinary Medical Teaching Hospital, the California Primate Research Center, and the University Airport. (The University of California Davis Medical Center is located in Sacramento.)

Its location makes Davis ideal for access to outdoor recreation. Within a 70-mile radius are Lake Berryessa, Folsom Lake, Clear Lake, the famed Napa Valley, and the historic Mother Lode country. San Francisco is a little more than an hour's drive from Davis along Interstate Highway 80. The coastal areas of Mendocino and Santa Cruz are about 150 miles from Davis, as are Lake Tahoe and the ski areas of the Sierra Nevada.

Winters in Davis are mild, with the temperatures rarely below freezing. It hardly ever snows in the winter, but you should get good use from your raingear. Average winter temperatures range from 36° to 54°. Summers are sunny, hot, and dry. Although some days the thermometer may exceed 100°, the overnight temperatures can drop into the 50°s. Davis weather in the spring and fall is among the most pleasant in the state.

Davis is very much a bicycling town. More than 30 miles of bike paths and 30,000 bicycles have given Davis the title, "City of Bicycles." One study found that bicycles are used for 25 percent of all travel in Davis.

The central UCD campus is closed to motor vehicles and automobile parking lots are located on its perimeter. Special parking places are reserved for handicapped drivers (those with special disability license plates) and ramps at most buildings provide easy access for wheelchairs. Sidewalks have inclines to street level at intersections.

The Regional Transit System linking Davis with the nearby cities of Woodland and Sacramento is supplemented by Unitrans, seven bus lines operated by the Associated Students. A Greyhound bus terminal and Amtrak station are also located in town, and the Sacramento Metropolitan Airport is a 20-minute drive from Davis.

The City of Davis

The year 1868 marked not only the Act of the Legislature chartering the University of California but also the completion of the California Pacific Rail Road line from Vallejo to a junction located on the former Jerome C. Davis farm and the founding of the city of "Davisville."

The community is closely tied to the University (more than half of the people in Davis are University students, faculty members, or staff) yet the city has developed its own recreational, cultural, and community outlets to supplement the University's offerings. The Davis Art Center, adult education programs, community theater, local galleries, recreation and parks programs, and civic organizations have strong local support. The Veterans Memorial Center complex is a focus of community events and has facilities for concerts and theatre performances, exhibits, meetings, and special events.

Since its early days, Davis has recognized the importance of open space. It now operates thirteen large and grassy city parks, many with tennis courts, playgrounds, swimming pools, and playing fields as well as a municipal golf course.

The city of Davis is changing. It still retains many characteristics of the small college town it once was, but the growth of the University has brought a corresponding development within the community. From fewer than 22,000 people only a decade ago, the population of Davis stands today at 36,400.
Despite the pressures of rapid growth, people in Davis are actively concerned with maintaining the quality of life here. The small-town flavor is being preserved in the downtown core area — the city's central business district — and action by the citizens and City Council have emphasized that concern with the quality of life means a commitment to planned, environmentally sound development and limited growth.

Davis is possibly the most energy-conscious city in the U.S. Since 1973, average residential electrical consumption has dropped by 18 percent, compared with an 8 percent rise nationally during that same period. A series of energy-savings ordinances passed since 1968 regulates such things as new home insulation and window area and requires all new housing developments to have bicycle paths. The annual "Sun Day" both celebrates and encourages exploration of alternative energy sources.

THE UNIVERSITY LIBRARY

Information:
Peter J. Shields Library Office
108 Shields Library
752-2110

The library on the Davis campus contains more than 1,607,000 volumes and receives more than 41,400 periodicals, serials, and government publications annually. Its holdings in the natural sciences and agriculture are outstanding. There are strong collections in the humanities, social sciences, fine arts, and engineering. Materials in law and medicine are already substantial and are still growing. According to a recent survey by the Association of Research Libraries, the UCD Library ranks twenty-sixth among the ninety-four academic libraries surveyed on its "overall library index."

In addition to the main stack collection in the Peter J. Shields Library, there are 1,402,500 items on microcopy, 62,700 maps, 472,500 pamphlets, 18,700 rare books, 13,350 sound recordings, and a center containing a bibliographic collection of worldwide scope. The use of most Library materials has been made easier by a computerized control system.

The Library provides orientation and assistance in using the various library collections, which operate on an open-stack basis to permit users direct access to the shelved volumes. Audiotape walking tours and lectures on the uses and resources of the library are part of the Educational Services Program. A 3-credit course, "Introduction to Library Research and Bibliography" (English 28), is given most quarters. A non-credit class called "Library Survival" is also offered.

Researchers, faculty members, and students have a valuable research tool in the Automated Information Retrieval Services (AIRS) located in the Humanities-Social Sciences Reference Department and the Biological and Agricultural Sciences Department (of Shields Library), in the Physical Sciences Library, and in the Health Sciences Library. Through computers located at two off-campus locations, bibliographies and reference lists on a wide range of topics are available from the periodical literature of the last three to eight years. AIRS can provide bibliographies and conduct searches on subjects in agriculture, biology, chemistry, education, engineering, geology, the humanities, the medical sciences, nutrition, physics, and psychology.

The Shields Library is an official depository for Federal and State publications, and the Government Documents Department provides services that make it easier to use these publications.

The Reserve Book Service lends, on a short-term basis, material which is heavily used because of assigned class readings.

Unbound periodical titles — some 6,300 — are housed in the Periodicals Room in a closed-stack area. They are for use in the Shields Library only.

The Department of Special Collections provides assistance in the use of rare books, the Hinman collator, University archives, The Performing Arts Collection, and the 350,000-item F. Hal Higgins Library of Agricultural Technology.

Other facilities at the Shields Library include a browsing collection for recreational reading, headphones for music listening, audio-visual equipment, a typing room, an outdoor reading area, a graphic arts loan collection, and copying machines at various locations.

In addition to the collections and facilities of the Shields Library, there are branch libraries for the health sciences, the physical sciences and engineering, and agricultural economics. The Health Sciences Library's approximately 166,750 volumes support programs in both human and veterinary medicine. The Physical Sciences Library contains 148,250 volumes and also houses a collection of more than 576,500 Research Reports of the U.S. Department of Energy, the National Aeronautics and Space Administration, the Nuclear Regulatory Commission, and other governmental agencies. An independent Law Library housing about 169,600 volumes supports the instructional and research programs of the School of Law. There are also a number of specialized departmental libraries located on the campus.

RESEARCH AND SERVICE ACTIVITIES

The following facilities are connected with the Davis campus. Some are designed for the purpose of research, some for research and teaching, others to provide services to Davis students, faculty, or the surrounding community.

University Arboretum

Arboretum Headquarters
Temporary Building 32
752-2498

The Arboretum occupies an area of about 111 acres, providing materials for teaching and research. Most of
the plants are attractive but drought-tolerant trees and shrubs. The acreage also includes paths and picnic tables for recreation.

Outstanding plant collections are represented by the oaks in the Shields Grove, the California native trees and shrubs, and the T. Elliott Weier Redwood Grove. Other collections of great horticultural and botanical interest include plantings of acacia, ceanothus, eucalyptus, hakea, and exotic conifers, as well as various groups in the Heath family (Ericaceae), Legume family (Leguminosae), and Myrtle family (Myrtaceae).

The Arboretum program of seed exchange, initiated in 1961, has provided the University with numerous exotic plant specimens and also serves to distribute California native plants throughout the world.

Work-learn internships for Davis students are available in botany, horticulture, and environmental education.

Center on Administration of Criminal Justice

101 King Hall
752-2883

The Center is a joint law-social science program which works to bring about greater understanding and meaningful reform in the criminal justice system. Current research projects include studies in the area of juvenile delinquency, bail reform, and police practices. In addition to conducting research, staff of the Center also assist students, faculty, and citizens who are interested in studying or researching the criminal justice system.

Agricultural History Center

378 Voorhies Hall
752-1827

The Center coordinates and administers several research and publication programs designed to further the study of agricultural history. The primary research activity is a study of the causes and consequences of agricultural mechanization in the nineteenth and twentieth centuries.

The Center was founded in 1964 and assumed the responsibility of editing Agricultural History, the journal of the Agricultural History Society. The Center also oversees a continuing program that publishes bibliographies on American agricultural history.

California Primate Research Center

Primate Center
752-0447

The research staff of the California Primate Research Center investigates selected human health problems for which the nonhuman primate is the animal model of choice. Major research programs are in behavioral biology, perinatal biology and reproduction, and respiratory diseases. Primate medicine and primate pathology teams are responsible for the maintenance of the health of the colony and for research on spontaneous diseases. Increased emphasis is being given to breeding primates needed for the research grants.
The Center, established in 1962, is supported by an operating grant from the National Institutes of Health. Much of the research is supported by 27 extramural grants and contracts awarded by a variety of national and international agencies.

The facilities and training programs of the Center are currently being used by 64 core and affiliate faculty members, over 50 collaborating scientists, over 100 undergraduate and graduate students, 5 visiting scientists, and approximately 53 technical and supporting core staff members.

Computer Center
501 Hutchison Hall
752-0233

The Computer Center, located in the basement of Hutchison Hall, has a dual processor Burroughs 6700 Computing System. This system services the campus for batch, remote job entry, and interactive timesharing computing. In addition, three Digital Equipment Corporation PDP 11/70 Systems are installed to support more than 100 on-line terminals for student computing. The Center’s top priority is service to students and, therefore, instructional usage has priority over research and administrative usage.

Davis has developed an innovative Easy Access System of Computing for student use. Every student on the Davis campus, upon presentation of a valid registration card at the Computer Center office, may open an Easy Access Account. A specified sum is allotted to each student from instructional funds, and, within general confines, the student may use the funds to purchase computer time for any project.

The Center operates Remote Computing Stations at various locations on campus. Services at these stations include keypunches, limited programming consulting, reference manuals, and a limited number of interactive terminals.

There is a classroom computing facility in Room 208 Storer Hall where the Center maintains 16 Tektronix Graphic Terminals for classes and student use. The facility is open to students any time it is not scheduled for classroom instruction.

Center for Consumer Research
148 Everson Hall
752-2647

The Center is a small and comparatively new research unit devoted to consumer issues. Major areas of interest include product and service quality, consumer information and education, consumer decision behavior, and institutions and public policy as they relate to consumer issues. Activities of the Center include support of consumer projects undertaken by faculty, graduate students, and Extension specialists; a colloquium series; and a newsletter, in addition to a core research program.

The Consumer Research Center began operation in 1977 and has been supported since that time by the College of Agricultural and Environmental Sciences.

Early Childhood Education Center
Temporary Building 117
752-2888

The Center was established in 1963 by the Department of Applied Behavioral Sciences and serves as a laboratory facility for students majoring in Human Development and for other students interested in young children. There are four programs at the Center: one for infants, ages four to eighteen months, one for toddlers, ages eighteen to thirty months, and two for preschoolers ages 2½ to 5 years. Students from several classes use the facilities, some doing observational studies and others gaining experience working with the children. The students learn to relate theory and practice, developing their abilities as they explore the profession of early childhood education. Enrollment information may be obtained by calling or writing the Center.

Food Protection and Toxicology Center
109 Environmental Toxicology Building
752-1142

The Center sponsors and coordinates research into the nature, transport, and biologic effects of pesticides and other toxic agents. It develops analytical methods for detecting and measuring trace amounts of toxic materials, and studies their accumulation, storage, and breakdown in the environment.

Studies serve medicine, agriculture, the food-processing industry, and the public, through the examination of chemical and microbial hazards in agricultural production and in the processing and preservation of food.

Water Resources Center
2102 Wickson Hall
752-1544

The Water Resources Center is a Systemwide organized research unit charged with coordinating water resources research on the UC campuses. Through University research funds and funds from the Office of Water Research and Technology, U.S. Department of the Interior, the Center supports selected research in such areas as agricultural sciences, biological sciences, economics, engineering, history, geography, law, meteorology, physical sciences, and political science.

Research interests include water resource systems engineering, economic evaluation of water development and conservation, political strategy in water resource development, environmental and energy relationships in water resource management, watershed hydrology,
ground water use, soil and land use management in relation to water resource use, and maintenance and improvement of water quality.

**Facility for Advanced Instrumentation**

9 Hutchison Hall  
752-0264

The Facility provides and maintains sophisticated equipment for campus investigators. Equipment includes transmission electron microscopes, scanning electron microscopes, electron microprobe, mass spectrometers, a programmable spectrophotometer, an image analyzing computer, amino acid analyzers and sequencer, and a variety of instruments for biochemical analysis. The staff trains those members of research groups who have not had experience in preparatory techniques and are also available as consultants for research projects.

**Institute of Ecology**

2132 Wickson Hall  
752-3026

Established in 1966 as an organized research unit, the Institute fosters ecological and environmental research, provides intellectual leadership in ecology, administers resources and facilities, provides information on extramural support of ecological research, and maintains liaison with governmental and private organizations interested in funding ecological and environmental research.

The Institute has three publications series and sponsors national and international activities, including organizing symposia and conferences. It provides grants to support collaborative research in ecology among faculty members at UCD, and through these grants provides financial assistance to undergraduate students and graduate research assistants. The Institute's Cooperative Resources Studies Unit, supported by an agreement with the National Park Service, sponsors and administers research in the national parks of California.

Cooperating in the Institute's investigations are more than one hundred faculty members from all the schools and colleges on the Davis campus.

**Institute of Governmental Affairs**

Shields Library  
752-2042

The Institute was established in 1962 to foster research in public affairs and government. The proximity of the Institute to Sacramento has led to a research orientation toward the problems and processes of state and local government in California. The staff works closely with social science faculty and students on this campus in conducting and supporting research on such topics as
the California Legislature, environmental regulation and growth control, policy and government in small communities, and political leadership.

IGA activities include an active publication program; the preparation and administration of grant proposals for extramural funding of social science research; a specialized library of published and fugitive materials which is open to faculty, students, and other users; the Social Science Data Service; the training of graduate and undergraduate students in research methods through participation in faculty-led projects; and the conduct of policy workshops and conferences.

Institute of Marine Resources
Temporary Building 186
752-2506

This statewide institute was organized in 1955 with headquarters at La Jolla. The marine food science component of the organization was located on the Berkeley campus, but in July 1970 it was transferred and became part of the Department of Food Science and Technology at Davis. The staff studies factors affecting the chemical, biochemical, microbiological, and nutritional properties of fish and other seafoods. Current studies include those dealing with comparative biochemistry of hemoproteins, the use of modified atmospheres for storage of seafood products, crustacea nutrition, improvement of a chitinase-producing microorganism as part of a project dealing with shellfish waste, and extracellular enzyme production by a hydrocarbon-utilizing yeast.

Bodega Marine Laboratory
Box 247
Bodega Bay, California 94923
(707) 875-3511

The Bodega Marine Laboratory is designed to support research and teaching in the marine sciences. Located on Bodega Head, adjacent to the town of Bodega Bay in Sonoma County, the property consists of 327 acres fronting on both the ocean and Bodega Harbor. The property is treated as a biological refuge and is part of the UC Natural Land and Water Reserve System. Its mile-long ocean frontage is protected as a California Marine Life Refuge.

Comparative Oncology Laboratory
Armstrong Tract
752-2597

The Comparative Oncology Laboratory is a virus research facility funded primarily by the National Cancer Institute. The program was initiated in 1969 to study the relationship between viruses and cancer in animals. Currently, major emphasis is on the study of viruses from tumors in higher primates. The program includes in vivo and in vitro studies to define the role of viruses in the induction of cancer.

Crocker Nuclear Laboratory
Crocker Nuclear Laboratory
752-1460

This facility was established by the University in 1965 as an interdepartmental laboratory for the application of nuclear science to a variety of disciplines. The Laboratory has research programs in nuclear physics and chemistry, air pollution analysis, activation analysis, and neutron structural damage studies. Isotopes produced by the variable-energy 76-inch cyclotron are used in clinical and research applications. Teaching activities at the undergraduate, graduate, and post-doctoral levels are in biology, medicine, radiochemistry, and physics.

Laboratory for Energy-Related Health Research (LEHR)
Laboratory for Energy-Related Health Research
752-1340

The Laboratory performs research on biomedical/health effects of exposure to effluents and emissions related to fossil fuel and nuclear energy production. Emphasis is on developing models for evaluating and understanding such effects on biological systems and
on determining the relationships between doses and effects. Funded primarily by the U.S. Department of Energy, the Laboratory has a staff of about 100 professional, technical, and support personnel.

**Serology Laboratory**

2116 Medical Sciences 1-A
752-2211

The Serology Laboratory was established in 1955 to acquire blood specimens for research and teaching programs in immunogenetics and to provide largely unique animal blood-typing services on request from registry organizations and private breeders. Its main objective is to pioneer in research on animal blood groups and biochemical polymorphisms, particularly those genetic markers which are effective and efficient in solving problems of questionable parentage arising in the breeding of registered animals.

The Serology Laboratory is a self-supporting activity funded by income generated primarily through agreements with various cattle and horse breeding organizations in the U.S. and Canada. The Laboratory is affiliated with the Department of Reproduction in the School of Veterinary Medicine. Its facilities are available for graduate and postdoctoral trainees.

**Adult Fitness Program**

Department of Physical Education
752-0637

The Adult Fitness Program is open to people from the University, the city of Davis, and surrounding communities. It provides members with a comprehensive physical fitness evaluation and an individualized exercise program for improving cardiovascular endurance fitness. The program is sponsored by the Department of Physical Education with considerable support from the Section of Cardiovascular Medicine, School of Medicine. Membership is unrestricted and participants may begin the program at any time during the year. Emphasis is placed on the evaluation of cardiovascular fitness and health and on the assessment of body fat proportion by underwater weighing. Participants receive individual counseling for exercise training, weight control, and preventive medicine in general. Supervised exercise sessions include walking, jogging, swimming, and cycling. A cardiac rehabilitation program is offered to patients with coronary heart disease and to individuals who have a high risk for developing heart disease.

Special activities of the Adult Fitness Program are offered to University students and employees. These low-cost activities give participants an opportunity to have their body type and fitness determined, with personal counseling on how to achieve a desired body weight through proper nutrition and exercise. A "Shape-Up" program for students is open at the beginning of each quarter and includes supervised exercise sessions.

**Agricultural Alternative Development Program (Student Experimental Farm)**

Information:
College of Agricultural and Environmental Sciences
752-7645

This program was initiated in the summer of 1977 following several years of courses, discussions, and analysis of "alternative agriculture" and its importance to the College of Agricultural and Environmental Sciences. The Student Experimental Farm is an innovative research facility run by the students on 18 acres of University land. Students participate as volunteers, work-study interns, and Research Associates. Its purpose is threefold, as (1) an educational adjunct to the curriculum providing graduate and undergraduate students with the opportunity to design, conduct, and analyze their own field experiments; (2) a research and development program for conducting valid scientific research in small-scale and alternative technologies; and (3) a small farm and urban garden extension service.

**Carnegie Institution of Washington, Department of Embryology, Davis Division**

Temporary Building 160
752-0210

The world-renowned embryological collection founded in Baltimore in 1914 by Franklin P. Mall, and the later collections of Hertig, Rock, Hartman, and Bluntschli, are now housed at UCD. In addition to the microscope slides, photographs, and reconstructions showing human development, the collection includes insectivore, prosimian, platyrhine, and catarrhine embryos.

The resources of this department are available to qualified investigators studying normal and abnormal primate development, on application to the Director.

**UC Natural Land and Water Reserves System (NLWRS): Cold Canyon Reserve**

Information:
Natural Land and Water Reserves System
Room 544
2111 Bancroft Way
Berkeley, CA 94720

Professor Peter B. Moyle
Department of Wildlife and Fisheries Biology
67 Briggs Hall
UC Davis
752-2739

The University of California administers some 25 natural reserves throughout the state. These reserves comprise a representative cross-section of California's diverse ecosystems and include deserts, offshore islands, mountains, and even submarine canyons. Unlike parks or wilderness areas, the reserves are devoted entirely to teaching and research purposes and are not available for recreation. Since 1965, when the program was initiated, the University, using non-state resources...
Introduction

funds, has been protecting these carefully selected sites which might otherwise have become unavailable for scientific study.

In 1979, the University purchased the Cold Canyon property, 277 acres of wildland near Lake Berryessa (about 14 miles west of campus), as part of its Natural Land and Water Reserves System. The Davis campus has administrative and management responsibility for the reserve, which will be maintained in its present natural state and be available for teaching and field research by scientists and students at UC Davis and other universities.

Terrain and rainfall patterns of the Cold Canyon area support examples of several different plant communities found in both the inner and outer coast ranges, and the property is now being used by botany students studying California plant life and by ornithology students studying birds in the area.

ADDITIONAL ACADEMIC RESOURCES
DIVISION OF EXTENDED LEARNING

Information:
376 Mrak Hall
752-2820

The Division of Extended Learning extends the knowledge, teaching, research, and cultural resources of the University to the citizens of northern California through University Extension, Summer Sessions, Committee for Arts and Lectures, Conferences and Campus Services and the Kellogg Program.

University Extension

Information and catalog:
4485 Chemistry
752-2680

The free quarterly University Extension catalog, Venture, contains the current list of continuing education programs offered to individuals in 29 northern California counties. Enrollment is open to the general public. No formal admission to student status is required to take advantage of the wide variety of stimulating programs.

Fields covered by Extension courses, both credit and non-credit, include public administration, business management, environmental studies, data processing, wilderness recreation, alternative technology, engineering, labor relations, liberal arts, education, nursing and allied health sciences, veterinary medicine, and agricultural sciences.

Programs vary in length and format, from one-day conferences and short lecture series to certificate programs requiring attendance for several quarters. Classes are held both on and off campus. Instructors are drawn from the University, nearby college faculties and professionals, and internationally known experts.

Tuition fees and charges enable University Extension to function as a financially self-supporting enterprise.

Summer Sessions

Information:
376 Mrak Hall
752-1647

Summertime means vacation time. But it can also mean a time for students to accelerate progress toward a degree (attending both sessions can result in completion of a quarter’s work) — or work on a teaching credential — or take advanced special study, research, or group study courses.

Summer Sessions at Davis offer a variety of lower division, upper division, and graduate courses that provide full University credit. Admission is open to all University students, high school graduates, and qualified applicants. Please note, however, that admission to a Summer Session does not constitute admission to the University’s regular sessions. For the Summer Sessions bulletin and application materials, write to the address above.

In 1981 there will be two six-week Summer Sessions at UC Davis: June 22 through July 31, and August 3 through September 11. UCD Summer Sessions also offers two special six-week programs: one at the University of Edinburgh, Scotland, from July 13 to August 22, and the other in Washington, D.C., from June 22 to August 1.

Committee for Arts and Lectures (CAL)

Information:
104 Freeborn Hall
752-2523

The Committee for Arts and Lectures presents cultural events to enrich and supplement the educational experiences of campus and community members.

In 1980-81 CAL will be presenting music and dance concerts, films, plays, poetry readings, lectures, solo recitals, orchestral performances, and free noontime entertainment on the Quad.

Student tickets are available at reduced prices for events for which there is a charge.

The Committee, which is composed of students, faculty, and staff members, welcomes program suggestions and interested volunteers.

Conferences and Campus Services

Information:
Conferences and Campus Services Office
4475 Chemistry Annex
752-2813

Off-campus and non-student campus groups desiring to use campus facilities to sponsor meetings, workshops, conferences, or similar activities should contact Conferences and Campus Services. A one-stop res-
ervation service, this office provides a single location for assistance with arranging all the various components of meetings and conferences.

**Kellogg Public Service Research Program**

**Information:**
376 Mrak Hall
752-3224

"The University and Public Policy: New Models for Communication, Action and Change" was developed on a grant to UCD from the W.K. Kellogg Foundation. The program provides the opportunity for faculty members to undertake collaborative research projects with public agencies on issues of public policy. It also encourages the dissemination of research information on public policy issues through publications, policy conferences, and workshops.

One result of Kellogg Program activities is a network of resources which helps to improve access to University research and contributes to a better understanding of public policy issues.

**WORK-LEARN INTERNSHIPS**

**Information:**
Work-Learn and Career Planning and Placement Center
2nd floor, South Hall
752-2855

Where are you going?

That is sometimes hard to answer in today's complex world. You may need to clarify your personal or educational goals. Or expand your awareness of the "working world." Or find out if you are really interested in a career in business, research, teaching, or agriculture.

One way to help yourself make these and other important decisions is to participate in a work-learn internship. Work-learn expands your learning beyond the classroom and enables you to make better decisions about your future by helping you to assess your skills, explore career opportunities, and secure on-the-job experience.

Here is how it works: participation may be full-time or part-time, credit or non-credit, voluntary or with a salary — depending on your needs and interests and the availability of opportunities. The work-learn experiences must emphasize learning rather than routine activities, include field supervision by a qualified professional, and, where appropriate, the faculty member responsible for giving credit. Academic credit is awarded only for experiences planned and approved in advance.

You can initiate an internship on your own, or take advantage of the organized programs at Davis which include internships in:

- agricultural and environmental sciences
- engineering and physical sciences
- health and biological sciences
- liberal arts and education

In either case, a notation describing the internship can be made on your transcript by obtaining prior approval from the Work-Learn Office.
EDUCATION ABROAD

Information:
Education Abroad Program Office
323 South Hall
752-3014

Academic Advice:
H.J. Ketellapper, Campus Coordinator
Dean's Office, College of Letters and Science
752-0362

The United Kingdom, Japan, Sweden, Norway, Mexico, Brazil, Hong Kong, Ireland, Egypt, France, Austria, Germany, Italy, Israel, Spain, Kenya, Peru, the USSR, and West Africa.

An around-the-world itinerary for madcap travelers? No. These are the places where you can study as a participant in the University's Education Abroad Program (EAP).

Most EAP experiences are for undergraduates for an academic year. An exception is the one-semester program in Leningrad (USSR).

Graduate students who have completed at least one year of graduate work at the University and have the support of their department and the Graduate Division are also eligible for some EAP programs.

The primary purpose of EAP is to provide an academic experience in a different educational system. For the most part, UC students abroad live as do students at the host university, attend the same classes, take courses from the same professors, and take part in local social and cultural activities. Full UC unit credit is given for courses satisfactorily completed.

Eligibility requirements include:

- At least 84 quarter units completed by the time of participation
- At least a 3.0 GPA for coursework completed in the University of California at the time of application and departure
- 2 years of University-level foreign language, or equivalent, with a 3.0 GPA (not applicable where classes are in English)
- An academic plan approved by your major adviser and the campus coordinator
- Endorsement of the Academic Senate Committee on the Education Abroad Program

To help overcome "culture shock" and prepare you for your academic schedule, University of California professors administer intensive language and orientation programs at many overseas campus locations. Moreover, should any personal or scholastic problems arise during your study abroad, the faculty members will be there to assist you.

Estimated minimum costs for the nine-month program range from $4,300 to $7,250.

For study abroad during the 1981-82 academic year, the application deadlines are November 7, 1980 for the United Kingdom and Ireland and January 23, 1981 for all other study centers. If you intend to participate during your senior year, careful advance planning is necessary to make sure that all degree requirements will be met. (See also page 60.) Consult with your major adviser, the Dean's Office of your college, and the Campus EAP Coordinator. See page 178 for information on EAP centers and study programs.

You can obtain informational brochures on other opportunities for study, travel, and employment abroad from the Education Abroad Program Office.
UNIVERSITY PROFESSORS

One of the University's valuable and unique resources is its small roster of University Professors appointed by the Regents upon the recommendation of the President of the University. The title is reserved for certain distinguished faculty members, recognized nationally and internationally as scholars and teachers of exceptional ability. Each University Professor has a home campus but may hold a joint appointment on another campus. All are available to other UC campuses for limited or extended visits, primarily for teaching and lecturing. A University Professor may visit a number of UC campuses during the academic year, holding conferences with students and staff and speaking before general public audiences. Arrangements for a visit by a University Professor are made directly by deans and department chairpersons with the University Professor concerned. A small fund, part of the Intercampus Exchange Program budget, helps defray the University Professor's travel expenses.

At present, the roster includes:

University Professor, Emeritus, Melvin Calvin
Lawrence Berkeley Laboratory
UC Berkeley

University Professor Murray Krieger
Department of English and Comparative Literature
UC Irvine and UC Los Angeles

University Professor, Emeritus, Josephine Miles
Department of English
UC Berkeley

University Professor, Emeritus, Glenn Seaborg
Department of Chemistry
UC Berkeley and Lawrence Livermore Laboratory

University Professor Neil Smelser
Department of Sociology
UC Berkeley

University Professor, Emeritus, Edward Teller
Lawrence Livermore Laboratory
Livermore, California

University Professor Charles Townes
Department of Physics
UC Berkeley

University Professor, Emeritus, Harold Urey
Department of Chemistry
UC San Diego

University Professor, Emeritus, Sherwood Washburn
Department of Anthropology
UC Berkeley

University Professor, Emeritus, Lynn White, Jr.
Department of History
UC Los Angeles
LIVING ACCOMMODATIONS

Residence Halls

Information: 
Student Housing Office 
752-2003

You can expand your UC Davis experience and add a measure of convenience to your life by living on campus; some 2,900 undergraduates and 160 graduate students do just that. Each of the residence hall complexes is staffed with students and professionals who help create and maintain an environment conducive to personal growth and educational achievement.

The total room-and-board rate for 1980-81 is $1,990 for a double-occupancy room and $2,155 for a single room (of which there are very few available to new residents). These rates include local telephone service and 19 meals per week. Rooms come complete with furniture, study lamps, and private telephone. Students must provide their own linens and towels.

If you check "University Operated Housing" and request the Davis campus as your first choice when filling out your University Admissions Application, the necessary information and applications are mailed to you by the UCD Undergraduate Admissions Office. Students redirected to UC Davis from another UC campus should immediately contact the UCD Housing Contracts Office to obtain a housing application.

Student Family Housing

Information: 
Student Family Housing Office 
Orchard Park 
752-4000

There are 476 apartments on campus for married students and single parents. Both furnished and unfurnished apartments are available. Sorry, pets are not permitted.

Considering that apartments in the Davis community generally cost $70 to $160 more per month than student family housing, you can see why on-campus apartments are assigned only from a waiting list. Since a wait of 6-8 months for a Fall Quarter assignment is common, your application may be submitted prior to admission to UCD.

Rents for 1980-81 (including all utilities except telephone) are:
- 1-bedroom unfurnished, $144/month
- 2-bedroom unfurnished, $163/month
- 2-bedroom furnished, $195/month
  (air conditioned)

Community Housing

Information: 
Student Housing Office 
752-2483

If you choose to live off campus — about 75 percent of UC Davis students do — the Community Housing Office will probably turn out to be a very valuable resource. Many special programs, including grievance counseling and roommate selection services are provided. Useful publications, such as A Delicate Balance — Your Rights and Responsibilities, leasing information, and the Davis Model Lease, are also available here.

In addition, the Office maintains listings of private rooms, apartments, mobile homes, and houses for rent in the Davis area, as well as "roommates wanted" and "roommates available." Because the listings change from day to day, however, prepared lists are not furnished by mail.
Independent living groups — fraternities and sororities — are among your other housing options. Such groups offer an opportunity to participate in a self-governing residential environment where maintenance, food preparation, social planning, and educational activities are shared by the members.

THE ARTS AT DAVIS

Whether you want to participate, be entertained, or be inspired, an abundance of creative, musical, dramatic, dance, and art offerings are happening on campus all year long.

The Department of Music sponsors the University Symphony, Chorus, Early Music Ensemble, Concert Band, and small ensemble groups. Music majors and other interested students can receive credit for participation in these groups, which perform at concerts and recitals open to the University community. The Music Department also sponsors an artist-in-residence for one quarter each year who gives concerts, recitals, and lectures, and who works with music classes and individual students. Free noon concerts featuring individual performers and ensembles — both professional musicians and music students — are a favorite weekly event during the school year.

The Dramatic Art Department has one of the best theatre facilities in California. The excellent faculty and special guest artists, the presence of graduate students working on Master of Fine Arts (MFA) degrees in acting, directing, writing, and technical theatre, and an unusually good stock of scenery, props, costumes, and lighting equipment all contribute to the professional quality of Davis productions. Each year's dramatic schedule includes the University Theatre Season (five major productions of established plays); one major production of an experimental piece; the Premiere Season (five smaller productions of plays written by students); Studio Season (three smaller productions of established plays); and dozens of class-related projects. These productions are part of the academic program of the Department and serve an important purpose in the study of dramatic art. Participation is open to all students.

A tour of all the UCD art galleries will take you from one corner of the campus to the other. The Memorial Union Gallery (725-2885) has two exhibit spaces and features eighteen exhibits a year. The Gallery shows are organized by part-time student managers and include works by professional artists in solo and group shows.

The Richard L. Nelson Gallery (752-0105), named in honor of the first chairperson of the Department of Art, was dedicated in 1976. Located on the first floor of the Art Building, the Gallery organizes regularly changing exhibitions of historical and contemporary works of art. The Gallery's program of high quality and rich variety reflects and complements the teaching program of the Department of Art and provides aesthetic enrichment to the University community and the Northern California
area at large. The Nelson Gallery space includes the Main Gallery, which features sculpture and painting, and the Small Gallery, which features photographs and prints. The Basement Gallery (752-0105) in the Art Building shows work by undergraduate UCD art students.

The Carl N. Gorman Museum (752-6567), established in 1973 in honor of Carl Gorman, an advocate of Native American Studies at UCD, features professional Native American artists. The museum has a permanent collection as well as exhibits that change throughout the year. The Design Galleries on the first floor of Walker Hall, and exhibit spaces in the College of Agricultural and Environmental Sciences Office (228 Mrak Hall), the Faculty Club, and AOB-IV, feature the work of students and faculty members in the Design program. Exhibits in the Anthropology Museum (138 Young Hall), are oriented toward areas of graduate and faculty research interest. Various collections include artifacts from North America, the South Pacific, and Africa. Exhibits are mainly Department collections, with some works on loan from other galleries.

The Committee for Arts and Lectures (CAL) brings a wide variety of performing groups to campus, in addition to sponsoring lectures, film series, and free noon-time events on the Quad. Various departments, such as English, the foreign languages, and History, sponsor lectures, poetry readings, and exhibits open to the University community. The Campus Record, a weekly information sheet published by the Office of Public Affairs (334 Mrak Hall, 752-1930) lists most of the week's activities, but bulletin boards, kiosks, the student radio station KDVS, and the California Aggie also advertise upcoming events.

On the lighter side, the Cal Aggie Marching Band entertains spectators at UCD football and basketball games, and sometimes even shows up at tennis matches. A special group which defies all categorization, the Band is noted for its colorful performances and is one of the last remaining student-funded and student-run marching bands in the country.

RECREATIONAL FACILITIES AND PROGRAMS

No matter what your recreational bent — horseback riding, dancing, music listening, chess, crafts, bowling, woodworking, swimming, or sports — Davis has a place where you can enjoy it.

How about intramural sports? The Intramural Recreation Program is one of the most popular programs on the Davis campus, a great way to relax and have fun. More than 50 different activities, from coed inner-tube water polo (created on the Davis campus in 1969) to lacrosse, are available year-round. Whether the action takes place in one of several gymnasiums, the Rec Hall, the track at Toomey field, Memorial Union Games Area, the tennis courts, or the swimming pool, participation is always lively and informal.

Memorial Union

Information:
Coordinator, MU Business Services and Facilities
462 Memorial Union
752-2524

Coordinator, MU Programs and Campus Recreation
462 Memorial Union
752-1730

The Memorial Union (MU), at the north end of the Quad, is the hub of campus activities. Bring yourself up to date on local events by stopping at the Information Desk in the main lounge, or by calling 752-2222. In the
MU you'll find the Games Area (with 16 bowling lanes, a billiards room, a card and TV room, and game machines), the Campus Box Office, and Freeborn Hall. Freeborn is a 1,800-seat assembly hall used for dances, banquets, dramatic and musical events, lectures, and conferences. Located in lower Freeborn is the Student Organizations and Activities Center (SOAC), KDVS radio, the California Aggie newspaper, Rabbit Reproductions, Experimental College, Switchboard, Zapple Records, Classical Notes, and the MU Barbershop. Also housed in the MU complex are the Committee for Arts and Lectures, the UCD Bookstore and Corral, the Coffee House, MU Dining Commons, The Last Resort Restaurant and Pub, MU Listening Lounge and Library, music practice rooms, lounges, outdoor plazas, Associated Students offices (including the travel service), the Graduate Student Assembly (GSA) Office, the MU Art Gallery, MU Recreation offices, and meeting rooms. In addition to these programs and services, the MU staff coordinates the following facilities and programs outside the MU complex:

The Putah Creek Recreation Area and the Arboretum feature picnic areas, bicycle and walking paths, bridle paths, and a small lake. Surrounded by a grassy area suitable for group recreation, the Putah Creek Lodge has outdoor barbecue pits and tables as well as an indoor fireplace, kitchen, and multi-purpose room. The Arboretum along Putah Creek is planted with trees and shrubs from California and many other parts of the world for teaching and research activities, as well as for general enjoyment.

Memorial Union and Recreation Services maintains the tennis courts on La Rue Road, just north of the Recreation Pool, and the volleyball and basketball courts west of the Segundo residence hall complex. While these courts are primarily for student use, they are also available to the general community when not being used for campus programs. No reservation is required as the courts are available on a first-come, first served basis.

The Recreational Swimming Pool Complex includes a large free-form pool with separate wading pool, bath house, snack bar, and shuffleboard courts. The adjacent lodge is equipped with a kitchen, meeting rooms, and a lounge with a large fireplace.

The Silo Barn Student Center, built in 1908, was once billed "The World's Most Modern Dairy Barn." The barn was renovated in 1970 and now features a snack bar, games facilities, a large multi-purpose room, and offices for Student Special Services. The Silo Craft Center is an ideal place to channel your creative energy. Facilities are available on a drop-in basis, and workshops and classes are offered each quarter in such varied crafts as woodworking, weaving, spinning, jewelry making, batik, ceramics, photography, silk-screening, leatherworking, upholstery, and more.
The Equestrian Center, southwest of the Veterinary Medical Teaching Hospital, is active all year round. Trail rides and instruction in both English and Western riding are available for beginning through advanced riders.

The Outdoor Adventures program is located in Temporary Building 24 (across from Chemistry 194). Outdoor Adventures operates a rental outlet and resource center, and provides classes and clinics in backpacking, rock climbing techniques, white water rafting, mountaineering, cross-country skiing, and equipment construction...to name just a few.

Recreation Hall

Rec Hall Office
Entrance 1B
140 Recreation Hall
752-6071

The Recreation Hall on the Davis campus is a multi-use facility for intramural and informal recreation play, intercollegiate athletics, and special events. The three-level hall has locker rooms; an equipment room; handball, racquetball, and squash courts; a weight room; I.C.A. training and team rooms; an arena area for volleyball, basketball, and badminton courts; areas for wrestling and combative sports, table tennis, gymnastics, and dance; and informal recreational play areas.

Students can use Rec Hall facilities by showing their current Registration Card. Faculty, staff, alumni, and community members may purchase privilege cards to use Rec Hall lockers, equipment, and facilities. One-day passes may also be purchased at the door. Copies of the brochure Rec Hall Activities are available from the Rec Hall Office and at the Memorial Union Information Desk.

The Rec Hall is also available to campus affiliated organizations for special events.

ASSOCIATED STUDENTS (ASUCD)

Information:
ASUCD Office
3rd floor, Memorial Union
752-1990

The Associated Students of the University of California, Davis (or ASUCD) is the student organization to which every registered undergraduate belongs. Out of the $256.50 undergraduates pay each quarter $10 goes to ASUCD. Graduate and professional students may become members by paying the $10 fee although certain ASUCD services are available to all students from their membership in the Graduate Student Association or Law Student Association. The money is spent on activities and services that will make life as a student a little easier, less expensive or just more fun — such as the Coffee House, the campus newspaper, radio station, record store, note-taking service, the Experimental College, the Academic Grievance Center, and more.

The student government, which controls how and where the money goes, is run by the ASUCD Executive Council. The Executive Council is based on the city council form of government and consists of six elected council members and the Council President. It is the policy-making body for ASUCD and oversees every aspect of the association. The Council President is the chief administrative officer for ASUCD and is assisted by the Vice President who serves as the executive aide.

ASUCD keeps the student body in contact with other universities, the University systemwide administration, The Regents, and the Davis city government.

Four commissions deal with making recommendations to the Executive Council. Members of the commissions are appointed by a subcommittee of the Executive Council. The four commissions are as follows:

External Affairs deals with off-campus concerns (city of Davis, The Regents, social responsibility, agricultural mechanization impact, etc.).
Campus Life is concerned with nominating students to the Chancellor's Administrative Advisory Committees, as well as monitoring campus issues.

Academic Affairs acts as an advocate of student rights in the area of academics, including dealing with the Academic Senate and with issues such as grading policies, tenure, and teacher evaluations.

Business and Finance deals with the allocation of student monies to services and activities as well as to the annual ASUCD budget.

The judicial branch consists of the Student Judicial Board whose members are appointed by the President of ASUCD.

ASUCD operates more than fifty activities and services for UCD students. Information about these services can be found in a new publication which combines Student Viewpoint with the ASUCD Catalog of Services and Organizations and the Student Directory, or by visiting the ASUCD offices in the Memorial Union.

Some of the ASUCD services include the Unitrans bus system, California Aggie newspaper, Student Viewpoint evaluation of professors and classes, the Bike Barn repair services, free legal services, and the Coffee House in the Memorial Union. The ASUCD-sponsored Experimental College offers a variety of nontraditional classes each quarter for students interested in diversifying their educational experience. Other ASUCD activities include Radio KDVS stereo FM and AM, the Cal Aggie Marching Band, Student Forums, Entertainment Board, Zapple Records, and Picnic Day. ASUCD also cooperates with Associated Student groups on other University of California campuses to operate a full-time Student Lobby in Sacramento to represent student interests to State government.

STUDENT ORGANIZATIONS AND ACTIVITIES CENTER (SOAC)

Information:
SOAC Office
10 Lower Freeborn Hall
752-2027

At UC Davis there are over 300 recognized student organizations with a total of 18,000 members, representing political, religious, social, cultural, ethnic, academic, recreational, international, and service interests. The Student Organizations and Activities Center is a resource staffed by professionals in student development and higher education. The Center provides advising on activities and campus policies, support services, and leadership training to help campus organizations increase their effectiveness. SOAC also assists individual students who want to get involved in new activities or to start new organizations. Members of the campus community can pick up quarterly Film Calendars at SOAC and obtain information about campus activities by contacting the SOAC Office and attending the Fall SOAC Activities Faire. To reserve campus facilities (recreation lodges, meeting space, etc.), student groups may contact the SOAC Reservations Manager at 752-1920.

ADVISING AND COUNSELING

In many ways, good advising is as important as good teaching. Several sources of advising and counseling—both academic and personal—are available to students at Davis. You may never need some of these services, but you'll be missing out on some important opportunities if you don't give them a try.

Advising Services

Information:
109 South Hall
752-3000/2222

Advising Services coordinates the student service groups listed below. Professional staff and more than 60 student advisers are available to help you with your immediate concerns and with plans and possibilities for your future.

Academic Peer Advising places peer advisers in more than twenty departments to help students find the answers to their questions about major requirements, courses, and University regulations. The Academic Peer Adviser complements faculty advising by providing a student perspective on the department. The Academic Peer Advising staff is trained to provide information and assistance concerning graduate schools, career opportunities, and college requirements. For more information contact the main APA office in South Hall, 752-3000.

The First Resort is a place to go if you're feeling bogged down by University red-tape, registration procedures, course selection, choosing a major or other academic questions. The student advisers here can either answer your questions or put you in contact with others who can. The staff can give you advice and assistance from the point of view of someone who has "been there." The First Resort also maintains a tutor listing and referral service for use by all students. If you have a problem, remember—start with the First Resort (TB-115, corner of Peter J. Shields and California Avenues, 752-2807).

The Orientation and Summer Advising Office provides coordination for the Summer Advising and Registration Conference, "O" Week (orientation) activities, Preview Day, and many other student assistance and orientation programs for new students. The staff seeks to help students learn about the campus environment, procedures, and opportunities, and to offer programs relevant to students' changing needs. Your contribution to orientation programs, through ideas and assistance, is always welcome. The Coordinator's office is located in South Hall (752-3000).

The Pre-Business School Adviser, 359 Kerr Hall (752-6512 or 752-3000), is a student peer adviser who can assist you in seeking information about graduate
schools in business and management. This office also works with students who are in the process of applying to graduate school in business and distributes the Graduate Management Admission Test (GMAT) booklet. There is a useful library of business school catalogs and an informational handbook available.

The **Pre-Law Advising Office** is the place students interested in legal careers can come for information. The staff can advise you about admission requirements and program planning. The office maintains a reference library of law school bulletins, legal assistant information, admission test materials, and general career information. Many seminars and workshops are also held each year to provide students with more information for preparation for law school and a legal career. The Pre-Law Adviser may be contacted in South Hall, 752-3009.

The **Health Sciences Advising Office** (1st Floor South Hall, 752-2672) will be an important place for you if you are considering a career in the health sciences. The professional staff and student advisers can provide information on requirements, application procedures, professional school curricula, and career options. The office maintains an extensive library of school catalogs, statistics, and books and journals related to health care and careers.

**Counseling Center**

Information: 219 North Hall 752-0871

The Counseling Center is a place where you can receive individual support and attention with concerns about interpersonal relations or questions such as choosing an academic major or vocation. It is a place where individuals can explore their feelings, values, and concerns in an atmosphere of understanding and confidentiality.

In addition to individual counseling, the Counseling Center offers group counseling, vocational interest testing, personality testing, information about graduate school admissions tests, and counseling for EOP students. The Center also helps students wishing to participate in the Planned Educational Leave Program clarify their reasons for temporarily leaving the University.

The Counseling Center is staffed with psychologists and counselors who provide services to students directly and work as consultants, trainers, and advisers to other groups and agencies within the campus community.

Students can see counselors immediately through the walk-in service or can make an appointment to fit their schedules.

**The House**

Temporary Building-16 (next door to Housing Office) 24-hour hotline: 752-2790 Information: 752-5665

The House is a 24-hour peer counseling center which offers a comfortable, supportive, non-judgmental environment for UCD students who wish to explore personal issues and interpersonal problems. Student volunteers are trained to provide counseling, support, clarification, information, and appropriate referrals. Through supportive intervention we hope to help students improve their problem-solving, coping, and personal growth abilities.

The House also offers a variety of workshops and groups, training in basic counseling and communication skills, and free tea and coffee.

Counseling services are available on a drop-in or phone basis. The Center is open seven days a week and is accessible by ramp. Counseling is provided for on-going problems as well as crisis situations, and all services are confidential. The House is a student-funded student service. Use us!

The most important thing to remember about studying is that to do it well you have to practice. It's a skill, like anything else, and it takes some time to get good at it.

--- Senior, Mathematics
Educational Opportunity Program (EOP)

Information:
EOP Information Office
311 North Hall
752-3472

The EOP Information Office is an important unit of the Counseling Center and its primary goals are to assist students with their academic, social, and personal adjustments to the University environment; to collect and disseminate information about students' needs; to serve as a liaison between students, staff, faculty, and administration; to coordinate EOP orientations; and to provide training and experiences for students who are pursuing the "helping" professions.

The peer staff of this office is an invaluable academic resource for students and is particularly sensitive to the social, cultural, and ethnic background and concerns of EOP students.

The Information Office is very concerned about making counseling and advising more open to the immediate needs of students and the staff is involved in "outreach" activities throughout the campus. So feel free to stop by the main office (address above) or telephone to find out more about the available services.

We are here to serve you!

EOP Tutoring (Learning Skills Center, Temporary Building-10, 752-2013) is a free service for EOP students. If you are having difficulty with your course work, the Learning Skills Center offers tutoring in several course areas. Tutoring is provided on a one-to-one basis, with primary emphasis on the assignments in classes you are taking. However, tutorial services may also be used to improve study habits and learning skills. The tutoring program is staffed by EOP and non-EOP students, most of whom are undergraduates who have taken the classes in which they tutor.

Special Transitional Enrichment Program (STEP) (Learning Skills Center, Temporary Building-10, 752-2013). New EOP students (freshmen and transfers) admitted by special action are expected to participate in the Special Transitional Enrichment Program (STEP). The program begins in summer and continues through the first academic year, providing preparatory course work and developing academic skills. By supplementing regular academic courses, the program helps students adjust academically and socially to the campus by strengthening their learning skills and study habits, and by providing an extensive orientation to campus life.

Learning Skills Center (LSC)

Information:
Temporary Building-10
752-2013

At the Learning Skills Center you can receive assistance in a wide variety of areas, including:

- General study skills
- Math/science study skills
- Writing essays and term papers
- Reading efficiency and speed
- English as a second language
- Time-management
- Test-taking
• Test anxiety reduction
• and many more . . .

In addition to the above assistance, the Center provides tutoring sessions, individual and group, to various segments of the student population: members of the underrepresented ethnic groups, handicapped students, veterans, and students on academic probation or subject to dismissal.

Learning specialists can assist you individually, or you may participate in workshops covering specific areas of study. The Learning Laboratory has self-help tapes and films which enable you to work at your own pace. The LSC Library contains a variety of programmed instructional materials, reference books, and preparation materials for the GRE and LSAT exams, many of which may be checked out.

The Learning Skills Center is open Monday through Friday, from 8 a.m. to 5 p.m. Come in and inquire about our services, which are free to all UC Davis students.

**Academic Reentry Program**

Information:
175 Mrak Hall
752-2971

If you are a nontraditional student, you can find help through the Academic Reentry Program. Preadmission and reentry advising are offered. The Office's resource area contains information on major programs, and staff is available to discuss ways of combining past study with future academic and career goals. Referrals to major advisers and campus services are included.

Once admitted, the campus provides additional assistance with an orientation to campus life through Advising Services and study skills workshops offered by the Learning Skills Center.

The Counseling Center provides continuing support with noon-group sessions for discussions and information sharing. *Continuum* is the reentry student newsletter.

**STUDENT SERVICES**

**Student Health**

Information:
Cowell Hospital and Student Health Center
752-2300

Your health is important to you and to the University. Consequently, every new full-time student and every full-time student who returns after an absence must file, in person, a medical history form and the results of a tuberculin skin test at the Health Center as part of
registration. A medical evaluation of the information on the form is then made in order to safeguard your health and the health of the University community.

Since it is not intended that the Health Center supplant the medical care of your family physician, you are advised to have a physical examination by your own doctor before coming to UC Davis. Any problems capable of remedial treatment, such as diseased tonsils or imperfect eyesight, should be corrected to prevent loss of study time. Applicants with contagious diseases will be excluded from the classroom.

The services of the Health Center are made possible, for the most part, by your registration fees. As a regularly enrolled student paying full registration fees, you are entitled to such outpatient and inpatient medical care as the Health Center is staffed and equipped to provide from the first day of the quarter through the last day of the quarter or to the date of official withdrawal.

Some of the Health Center services and facilities are:
- General outpatient and hospital care
- 24-hour emergency service
- Regularly scheduled clinics
- Major and minor surgery facilities
- An intensive-care unit
- X-ray, laboratory, and pharmacy services
- Physical therapy facilities
- Contraceptive information

The Health Center does not assume the responsibility for treating chronic physical defects, illnesses present at the time you enter the University, dental problems, or non-emergency remediable disorders.

When, in the opinion of the Health Center’s Director, a serious illness or injury obviously prevents you from continuing class work during the current quarter, you will be returned to your community or home for definitive treatment.

If you are not enrolled during a quarter, or if you spend the summer in the Davis area, you can maintain your Health Center eligibility by paying an appropriate fee. Enrollment in this program can be initiated only during the registration period for each quarter or summer session.

The facilities of the Health Center are open to your dependents on a fee-for-service basis. A Dependents’ Health Insurance Plan for your spouse and children can be purchased at the beginning of each quarter in the Health Center.

**International Student Services**

Information:
Services for International Students and Scholars
3rd floor, South Hall
752-0664

The UC Davis campus currently has a community of international students and scholars from 96 different countries studying, teaching, and researching in a wide variety of fields. Assistance for international persons on campus is provided by the staff of Services for International Students and Scholars (SISS).

The primary function of the SSIS Office is to assist incoming international persons in obtaining proper visas and then maintaining their status after arrival. The Office also provides financial information, advising and counseling services, orientation, and intercultural activities.

Prior to Fall Quarter registration, a special orientation is held for new international students. All new and transfer international students are urged to attend this annual program which provides assistance with registration, class enrollment, housing, banking, cultural adjustments, and immigration regulations. Introductions to campus services and community resources are also provided.

Careful budgeting is essential for international students. A minimum allowance of $380 per month for a single student and $500 per month for a married student is recommended for living expenses. In addition, international students will require funding for tuition and
fees as nonresidents (see page 37) for the duration of
their stay at UC Davis.
Additional funding will be required for books, labo-
rary equipment, instruments, dental and eye care, sum-
mer health insurance, health care of dependents, and
Summer Session fees, as needed.
The international student should be cautioned that
there will be numerous additional expenses during the
first few months for deposits and cleaning fees for
housing, telephone installation costs, and purchase of
bedding and cooking utensils.
No financial aid (loans, grants, or scholarships) is
awarded by the University to international students
during their first year of study and no aid can be
guaranteed in subsequent years. Prospective
graduate students who have been corresponding
with an academic department about a research or
teaching assistantship should receive a clearly de-
defined offer in writing before departing for Davis.
Students are encouraged to visit Services for Inter-
national Students and Scholars as soon after their arrival
as possible. If contacted in advance, the SISS Office
can make arrangements to provide transportation for
new students from the Sacramento airport to Davis.
This office can help with immediate needs and assist in
providing friendship by helping to locate fellow coun-
trymen and introducing new students and scholars to
Davis’s international community.

Services to Handicapped Students

Information:
Services to Handicapped Students (SHS)
101 Silo
752-3184 or MCM 752-6TTY

If you are physically disabled or blind, you can draw
upon the advice, assistance, resources, and experi-
ence available from Services to Handicapped Stud-
ents. This resource program is designed to reduce
the barriers that students with disabilities face at UCD.
The staff of SHS are committed to working with you to
accommodate your individual circumstances and
know the needs and problems you face from their own
experience on campus.

Most architectural barriers to participation in campus
activities have been removed. There is now accessible
on-campus housing, and a campus map showing special
facilities is available. The campus is almost com-
pletely flat and has a good curb ramp system. This ease
of mobility, plus special class scheduling methods, can
better ensure that you’ll make it from one class to
another on time.

Advising is available to assist with such problems as
living options, attendant recruitment and management,
and adaptations for maximum independent living. Coun-
selor and student peer support can help you on
disability management issues, career choices, and
personal development. You can also find assistance in
obtaining financial aid to meet special needs.

Educational support includes specialized academic
advising, emergency educational equipment loans,
tutoring services, a library resource center with speci-
lized equipment, and arrangements for locating and
funding readers, interpreters, and clerical or research
assistants. Other resources include:

- Priority registration and enrollment in classes
- Educational support equipment, including a read-
ing machine, television aids for visually impaired,
  amplification equipment, speech compressor, etc.
- Orientation tours and mobility advising for max-
  imum independence
- Repair services for wheelchairs and mobility
equipment
- Emergency loan of electric carts and wheelchairs
- Transportation services in adapted vans.

Preadmission counseling is available to individuals
with disabilities. You are encouraged to contact the
SHS Office if the circumstances of a permanent physi-
cal disability seem to prevent you from demonstrating
your ability to do University work or completing the
subject or examination requirements for admission.

Veterans Affairs

Information:
Veterans Affairs Office
200 Silo
752-2020

As a veteran or veteran’s dependent, you may be enti-
tied to various benefits under state and federal laws. If
so, the Veterans Affairs Office can assist you.
To initiate a benefit claim, write the Veterans Affairs
Office or drop by 200 Silo with your letter of admission,
preferably before registration. The office can give you
forms, information, and advice, and will also certify your
attendance to the Veterans Administration. Remember
to visit the office each quarter (bring your validated
registration card for recertification) in order to avoid any delay in receiving benefits. If other delays occur, the office will help resolve the problem.

Other special services veterans and veterans' dependents may be eligible for are coordinated by this office. These include employment, financial aid, VA Work-Study, correcting military records, and tutorial assistance.

Selective Service Information

Information:
Student Special Services
200 Silo
752-2007/2020

The Office for Selective Service Information assists students who have inquiries and problems regarding their Selective Service status.

Students will find it to their advantage to continually keep themselves aware of Selective Service laws and procedures. Even during periods when induction is not in effect, draft-eligible students may still have legal responsibilities for registration and status changes. This Office provides individual advising and consultation on legal obligations and classification options and conducts group workshops in all areas relating to the draft.

If you are confused or unsure of your current selective service status, the Office can help by offering information, assistance, alternatives, and support.

Women's Resources and Research Center (WRRC)

Information:
Temporary Buildings — 116 and 124
752-3372

The Women's Resources and Research Center is a supportive place for women in all roles, with all kinds of needs and interests. WRRC's services are wide-ranging and include:

- Forums and workshops on subjects related to the status of women and the effects of changing sex roles on both women and men
- Academic advising and assistance in locating faculty supervision for 198, 199, 298, and 299 courses
- Internships in research, writing, legislative work, publicity, program planning, graphic arts, and other areas
- Limited career advising
- Resource files and referrals for birth control, marital problems, legal rights, legislation, child care, sexuality, mental health, health care, employment
- Consultation with other units
- Research on issues of concern to women
- Special interest discussion groups and consciousness-raising groups for both women and men
- Speakers Bureau

A library containing books and research materials on subjects related to women and changing sex roles, and a monthly newsletter, Women's Writes, are also services of WRRC.

The Center is staffed by professionals, student interns, and volunteers. People are encouraged to drop by and talk with the staff, and volunteers are needed to work with the Women's Center on public forums, resource updating, legislative research, publicity, and on the newsletter.

Student Employment

Information:
Student Employment Center
1st floor South Hall
752-0520

Need a part-time job to get yourself through school? Do you occasionally run short of funds or need a few extra
dollars for the special weekend event? Or are you looking for experience in a job that is related to your major? If so, the Student Employment Center can probably assist you.

The Center assists regularly enrolled students (including Part-Time Degree students), students on Planned Educational Leave, students’ spouses, and students who have received a letter of acceptance for the following quarter but have not yet registered. The Center also coordinates the College Work-Study Program for eligible financial aid recipients.

A wide variety of positions on the campus and in Davis and adjacent communities are available. New listings are posted twice daily. Extensive listings of summer opportunities in government agencies, camps and resorts throughout California are located at the Center and students are encouraged to begin in January looking for summer employment.

The Center is open from 9 a.m. to 12 noon and 1 to 4 p.m.

- Part-time, full-time, school-year jobs
- Vacation employment

Career Planning and Placement

Information:
Work-Learn and Career Planning and Placement Center
2nd Floor, South Hall
752-2864

Worried about your career plans? Do you know what kind of a job you want when you graduate? Or are you one of the many students unsure about the career you want after graduation? If so, the advisers in the Work-Learn and Career Planning and Placement Center may be able to help you.

The Center assists undergraduates, graduates, and alumni in skill assessment, development of career or employment goals and experience, and placement into full-time employment. If you are considering dropping out of the University for a term or longer, an adviser can also give you information about internships and employment opportunities.

Some of the resources you can find at the Center include:

- Individual career advising and group seminars
- Workshops on communication, interviewing, and job-seeking skills
- Seminars to explore career fields and employment trends
- A Career Resources Library
- A manual for job-seekers
- Listings of current job vacancies

The Career Resources Library has material that can aid you in learning how your major field of study can be translated into job opportunities, as well as data concerning types of employment graduated students have obtained (summarized by academic major). Useful to job-seekers — and available free of charge — is the Placement Manual, prepared by the Center, which provides guidelines for preparing a resume, tips on being interviewed, and information on employment in government, business, and education.

To assist students in finding jobs after graduation, the Center solicits and maintains files of vacancy listings, arranges employment interviews, and schedules on-campus recruiting by employers.

Don’t wait until you are a senior — about to be thrust into the job market — before thinking about your career interests. Visit the Work-Learn and Career Planning and Placement Center early — you’ll be way ahead later.

Advisers are available on a drop-in basis or by appointment.

Educational Placement Service

Any student enrolled in the teaching credential program should establish a placement file with the Educational Placement Service. By using the information you provide about your background, training, and professional experience, advisers can match your qualifications with available positions. The University reserves the right to refer only those persons who are considered to be fully qualified. Advisers counsel candidates, communicate with employers, receive job listings, and arrange interviews. Students not pursuing a credential are encouraged to talk with an adviser to explore education as a potential career field or internship opportunity. Contact the Office in person or by telephone, 752-0724.

CAL AGGIE ALUMNI ASSOCIATION

Information:
The Alumni Center
University House
752-9286

In choosing the University of California, Davis as your University, you are making a life-long commitment... you will be identified with the Davis campus for the rest of your life. After graduation many people choose to continue their association with UCD through participation in the Cal Aggie Alumni Association.

The Association and its alumni members have aided the Davis campus through support and sponsorship of many activities and programs including the Alumni Scholarship Program, Alumni Day, Picnic Day, the Recreation Hall Campaign, legislative relations programs, and a student loan fund. In addition, the Association maintains a professional staff dedicated to meeting the needs of UCD’s more than 50,000 alumni.

Each graduate of UC Davis is considered important as an alumnus and is given the opportunity to become a sustaining member of the Cal Aggie Alumni Association. For those who become sustaining members, the Association offers special programs and benefits.
FEES AND EXPENSES

It is extremely important to consider carefully the total financing of your University education. If you will need funds beyond those that you and your family can provide, you should apply for aid well in advance of enrollment. The deadlines for financial aid (grants, loans, work-study, and scholarships) can be found in the following pages.

While the needs and resources of each student are different, the following information will give you an idea of the basic expenses students at UCD will incur. Legal residents of California are not required to pay tuition at the University. Students classified as nonresidents must pay tuition of $800 per quarter. (See page 313 for the nonresident tuition fee statement.)

At the time of registration each quarter, every student must pay the following fees:

<table>
<thead>
<tr>
<th>Undergraduate students</th>
<th>Graduate students (excluding Law*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>University registration fee</td>
<td>$143.00</td>
</tr>
<tr>
<td>Memorial Union fee</td>
<td>3.50</td>
</tr>
<tr>
<td>Associated Students membership fee</td>
<td>10.00</td>
</tr>
<tr>
<td>Graduate Student</td>
<td></td>
</tr>
<tr>
<td>Assembly fee</td>
<td>3.00</td>
</tr>
<tr>
<td>Educational fee</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Total for California residents</strong></td>
<td><strong>$256.50</strong></td>
</tr>
<tr>
<td>Tuition for nonresidents</td>
<td>800.00</td>
</tr>
<tr>
<td><strong>Total for nonresidents</strong></td>
<td><strong>$1,056.50</strong></td>
</tr>
</tbody>
</table>

Additional Fees and Expenses

Students may be subject to the following fees for optional services:

- **Parking** (per year: $24 to $36 for cars, depending on the type of permit; $12 for motorcycles)
- **Bicycles** (annual fee for the required California State License, $1.50)
- **Late payment registration fee** ($10)
- **Changes in class schedule after announced deadline** ($3)
- **Transcripts** ($2 for the first and $1 for each additional copy requested at the same time)
- **Applications for readmission, Planned Educational Leave, or Intercampus transfer** ($20; effective Fall Quarter 1981, $25)

For details concerning fees and deposits, consult the publication *Student Fees and Deposits 1980-81*, available from the Registrar’s Office. Current fees are also published in the Class Schedule and Room Directory. (These fees are for the 1980-81 academic year and are subject to change without notice.)

Explanation of Fees and Expenses

**University Registration Fee:** $143 per quarter; $214.50 per semester for law students. Revenue from this fee is used to support a portion of the cost of student services programs including recreational services (MU and Rec Hall), counseling and advising services, career planning and placement services, student organization and activities services, learning skills center services, and health services. The health services portion of the fee can be treated as a medical expense deduction from income tax.

*Students in the School of Law should refer to the School announcement for explanation of fees.*
Education Fee: $100 per quarter for undergraduates; $120 per quarter for graduate students; $180 per semester for law students. Revenue from this fee is used to support a portion of the cost of the educational program. Undergraduate students enrolling for less than 9 units in any quarter may petition the Registrar's Office to pay the reduced Educational Fee of $50.

Nonresident Tuition: $800 per quarter; $1,200 per semester for law students (see the nonresident tuition fee statement on page 313).

Memorial Union Fee: $3.50 per quarter; $5.25 per semester for law students. Paid by all full-time students.

Associated Students Membership Fee: $10 per quarter. All full-time undergraduate students are members of the Associated Students, University of California, Davis (ASUCD). Graduate and professional students may become members by paying the fee (see also Graduate Student Assembly fee following).

Graduate Student Assembly Fee: $3 per quarter. Paid by all graduate students but not mandatory for professional students in the schools of law, medicine, and veterinary medicine. Professional students may become members by paying the fee.

Law Student Association Fee: $2.50 per semester.

Living Expenses

The Financial Aid Office estimates that the average 1980-81 expenses of a UCD undergraduate who is single will total $4,700 including $770 for fees, $280 for books and supplies, $1,098 for housing, $1,485 for food, $852 for personal expenses and $215 for transportation. Estimated expenses for other single students are: graduate students, $5,075; law, $5,150; veterinary medicine, $5,675; first-year medicine, $5,550; second-through fourth-year medicine, $6,250. For married students these categories range from an undergraduate low of $7,050 to a high of $9,500 for students in their last years of medical school.

These costs are average costs, and your own living expenses may differ somewhat from these. More information on living expenses can be found in the section on housing or obtained from the Financial Aid Office.

Transportation

Transportation is included in the cost of living estimates given above. See pages 10 and 37 for an idea of what types of transportation are available. Information on parking and bicycle regulations can be obtained through the Parking Operations Office located in the Police Department on campus (752-0699). Car pools are encouraged and the Car Pool Information Office (752-MILE) can help you find a ride or riders.

FEE REFUNDS

If you have to withdraw before the first day of instruction, you must fill out and return a "Cancellation of Registration" form to the Registrar's Office, along with your validated Registration Card. After the first day of instruction, fill out a "Petition for Withdrawal" and follow the same procedures.

Refund Procedures

New Undergraduate Students:

Prior to Day 1, Registration Fees paid are refunded except for the $50 Acceptance of Admission Fee, and other fees paid are refunded in full.

Day 1 and After, the $50 Acceptance of Admission Fee is withheld from the Registration Fee and the Schedule of Refunds is applied to the balance of fees assessed.

All Continuing and Re-Admitted Students and New Graduate Students:

There is a service charge of $10 for cancellation of registration or withdrawal before the first day of instruction. After the first day of instruction the Schedule of Refunds is applied to the total of fees assessed.

Schedule of Refunds

The Schedule of Refunds refers to calendar days beginning with the first day of instruction. Percentages listed (days 1-35) should be applied respectively to Tuition, Educational Fee, University Registration Fee, and other student fees. The effective date for determining a refund of fees is the date the student files an official notice of withdrawal with the University, and it is presumed that no University services will be provided to the student after that date.

University Registration Fee, Educational Fee, Nonresident Tuition and other student fees:

<table>
<thead>
<tr>
<th>Days</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-14 days</td>
<td>80%</td>
</tr>
<tr>
<td>15-21 days</td>
<td>60%</td>
</tr>
<tr>
<td>22-28 days</td>
<td>40%</td>
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<tr>
<td>29-35 days</td>
<td>20%</td>
</tr>
<tr>
<td>36 days and over</td>
<td>0%</td>
</tr>
</tbody>
</table>

FINANCIAL AID

Information:
Financial Aid Office
1st floor, North Hall
752-2390

The Financial Aid Office provides financial assistance in the form of scholarships, loans, grants, and work-study employment. Budgetary counseling is also available.

Financial need is the major criterion for most sources of aid other than scholarships. Eligibility is determined from a careful assessment of your financial situation which takes into account your family's income, assets, debts, number of children, and the estimated cost of attending the University. If you are eligible, you will be offered a combination of the funds from various sources.
Applications for loans, grants, and work-study employment are accepted throughout the academic year as long as funds are available. However, to be assured of priority consideration you should file your application for the 1981-82 academic year no later than February 12, 1981. Complete application instructions for prospective undergraduate students are contained in the UC Undergraduate Admissions and Financial Aid Packet. Continuing UCD students and prospective graduate students should obtain application forms and instructions from the Financial Aid Office in December 1980.

Undergraduates with outstanding academic records are encouraged to apply for scholarships. Scholarship applications for the 1981-82 academic year are available in October and must be filed by January 15, 1981. (See the Scholarship section beginning on page 41.)

Graduate students are eligible for most of the same types of financial aid as undergraduates. In addition, graduate scholarships, fellowships, and teaching and research assistantships are administered through the Graduate Division (see page 105).

For more information about awarding of financial aid, contact the Financial Aid Office.

## TYPES OF FINANCIAL AID

### Grants

A grant is a gift that does not have to be repaid. Whenever criteria and funding levels permit, a student's financial aid award includes grants.

**Basic Educational Opportunity Grants (BEOG)** are federally funded awards. All undergraduate financial aid applicants are required to apply for a BEOG each year by following the instructions on the financial aid application packet. Recipients must be enrolled for at least a half-time course load and must maintain good academic standing and make satisfactory academic progress.

- $1,400 maximum per year
- Amount depends on financial need

**Supplemental Educational Opportunity Grants** are awarded to U.S. citizens or permanent U.S. residents who are at least half-time students in good academic standing and have exceptional financial need.

- $200 to $1,500 per year
- $4,000 maximum for 4-year program
- $5,000 maximum for 5-year program
- Grant cannot exceed 50 percent of total financial aid award

**Cal Grants** are awarded by the California Student Aid Commission and may be renewed each year. All undergraduate financial aid applicants who are California residents are required to apply for one of these awards by following the instructions on the financial aid application packet.

**Cal Grant A** awards are based on financial need and academic achievement. Recipients must complete at least 36 units per academic year.

**Cal Grant B** awards are based on financial need and are made to entering undergraduate students, primarily from low-income backgrounds. Recipients are required to complete at least 12 units each quarter, unless the student receives permission to enroll for fewer units.

- $300 to $700 per year for Cal Grant A
- $1,800 maximum per year for Cal Grant B
- Undergraduate California residents only

**Educational Fee Grants** provide qualified California residents with a grant to pay their Educational Fee for the first three quarters of attendance at a UC campus.

- $300 maximum

**University Grants** including Educational Opportunity Grants are available to both graduate and undergraduate students.

- Maximum varies each year depending on funds available

**Bureau of Indian Affairs (BIA) Grants** are awarded to students who are at least one-fourth American Indian, Eskimo, or Aleut, as recognized by a tribal group served by the Bureau of Indian Affairs. Students must submit a regular Financial Aid Application and provide supportive documents by the filing deadlines before making an appointment with a Financial Aid counselor to complete the BIA application.

- Amount depends on need and availability of funds

### Loans

A loan is an award which permits you to postpone paying part of the costs of your education until you have completed school. A financial aid offer almost always includes an offer of a long-term, low interest loan. Repayment of these loans begins after you graduate or withdraw from school.

**Educational Fee Deferral Loans** enable California residents to delay payment of all or some of the Educational Fee. Repayment may be deferred for Armed Forces, Peace Corps, and VISTA members.

- $300 maximum per year
- 3 percent interest
- Repayment begins 9 months after graduation or withdrawal

**University Student Loans** of up to $10,000 per student are available. If graduate studies are undertaken, payment may be deferred until completion or termination of studies. (Cosigner is required.)

- $2,500 undergraduate maximum for first 2 years
- $5,000 undergraduate maximum during 4 years
• $10,000 maximum for graduate students, including loans taken out as undergraduates
• 3 percent interest
• Repayment begins 9 months after graduation or withdrawal

**Health Profession Student Loans (HPSL)** are awarded to students in the Schools of Medicine and Veterinary Medicine who can demonstrate exceptional financial need. Parental income information is required for all applicants.

• $2,500 maximum
• 7 percent interest
• Repayment begins 12 months after receipt of the degree or withdrawal

**Health Education Assistance Loan (HEAL) Program** provides federally insured loans to graduate students attending the Schools of Medicine and Veterinary Medicine. The loans are made by participating lenders, including banks, credit unions, and savings and loan associations.

• $10,000 maximum per academic year
• $50,000 total maximum
• Interest may not exceed 12 percent per year

**Guaranteed Student Loans** are available through banks and other lending institutions; financial need is no longer a criterion. Interest accrued while in school may be paid by the government if you qualify for federal interest benefits. Applications and information are available at the Financial Aid Office.

• $2,500 maximum per year for undergraduate students, $5,000 for graduate students
• 7 percent interest
• Repayment begins 9 months after graduation or withdrawal

**Short-Term and Emergency Loans**, provided by UCD alumni, ASUCD, and private donors, are designed to meet temporary, emergency financial needs of registered students. Apply at the University House Annex any time during the academic year.

• $200 maximum
• Interest-free if repaid on time

**National Direct Student Loans** are for U.S. citizens or permanent U.S. residents. Students may be limited to a percentage of their need because of heavy demands and limited funds. Repayment starts nine months after graduation or withdrawal from school, and may be extended over 10 years. Deferment is possible for Armed Forces, Peace Corps, and VISTA members, and students who transfer to other schools. A portion of the loan may be cancelled for certain veterans. Some
teachers of students from low-income families, and full-time teachers of handicapped children, may also qualify for partial loan cancellation.

- $2,500 undergraduate maximum for first 2 years
- $5,000 undergraduate maximum during 4 years
- $10,000 maximum for graduate students, including loans taken out as undergraduates
- 3 percent interest

Work-Study Employment

The Work-Study Program refers eligible financial aid recipients to employment with the University and nonprofit organizations. Opportunities range from entry-level jobs to jobs requiring a high degree of technical skill. College work-study employment is coordinated by the Student Employment Center. (For information about this service and other student employment opportunities, see page 34.)

- 19 hours maximum per week during school, full time during vacation

SCHOLARSHIPS AND AWARDS

Information:
Scholarship Office
University House Annex
752-2397

At UC Davis a special effort is made to recognize exceptional students. Approximately 150 different undergraduate scholarships are administered by the Scholarship Office, and many more scholarships are handled through outside agencies.

Scholarships are awarded on the basis of academic excellence and exceptional promise. Recipients are chosen by committees made up of both students and faculty. In addition to academic records (a minimum grade-point average of 3.25 is required), selection is based on letters of recommendation and a personal essay in which your University goals and objectives are stated. Some awards may be limited to students in specific majors or colleges, residents of certain geographical areas, students of a particular class standing, or students with demonstrated financial need. Most scholarships are not renewable and you must re-apply each year for scholarship aid.

Applications for scholarships are available at the start of each Fall Quarter for the following academic year. Deadline for submission of application materials is January 15. Announcement of winners is usually made beginning in mid-April. The Scholarship Office publication, New Horizons, provides more detailed information on specific scholarships.

Graduate students are also eligible for various scholarships and fellowships. (See also page 105)

Regents Scholarships, among the highest honors that undergraduates at the University can receive, are granted to exceptionally promising freshmen or juniors enrolling in the Fall Quarter. Awards may be honorary (a $100 one-time award) or may be accompanied by a stipend generally covering the difference between family resources and yearly educational costs (see page 38). The Regents Scholarship Administrative Committee conducts personal interviews during the final selection process. These scholarships are renewable as long as you maintain a 3.0 grade-point average.

- Dollar amounts vary — up to full financial need
- 2-year and 4-year renewable scholarships

Alumni Scholarships, provided by the Cal Aggie Alumni Association in cooperation with the University, are based primarily upon leadership and scholastic achievement. Your financial need and extracurricular activities may also be considered.

- $500 maximum
- New undergraduates only
- Selection by local Alumni Association chapters

Military Scholarships are awarded to outstanding high school seniors without regard to financial need, as well as to UC Davis students who have demonstrated exceptional leadership and scholastic achievement during their freshman and/or sophomore years. Eligible high school seniors apply for the full 4-year scholarship and must file applications by November. UCD scholarship students participate in the Military Science (ROTC) program. Information and applications are available from the Department of Military Science, 125 Hickey Gymnasium, 752-0543.

- Full fees, books and supplies
- $1,000 per year for miscellaneous expenses
- 2-, 3- or 4-year scholarships

Other Scholarships are made possible by individual donors, private corporations, and various agencies. Many organizations and groups conduct their own scholarship programs. In most cases you apply directly to these sponsoring groups.

- Generally $200 to $500

Special Prizes at UC Davis recognize outstanding performance, achievement, and promise in special programs or majors. The most prestigious prize is the University Medal, presented to the most outstanding graduating senior.

- Plaques or certificates and cash awards
- College and school medals to outstanding graduates

Fees, Expenses and Financial Aid
APPLYING TO UC DAVIS

With careful reading you should find most of the answers to your admissions questions in the following sections. The key to preparing a successful application is supplying us with accurate, complete, and timely information.

The first step in applying for admission is to select a major or area of interest within a college that best suits your academic goals. To assist you in this choice you will find an overview of undergraduate studies listed within each College section. (See also Undergraduate Studies entry on page 45 and "How to Use this Catalog," page 4.) The second step is to determine the admission category to which you belong. (Admission categories are defined on page 44.) This is a very important step because entrance requirements and filing dates may vary depending on your category of admission. The third step is to obtain and complete the Undergraduate Admissions Packet and return it during the appropriate filing period. (On the application form there is a question that allows you to request information on financial aid and housing. Once your admissions application has been submitted you should keep in contact with the Financial Aid and Housing Offices since admission to the University does not guarantee the awarding of financial aid or housing.) The final step is to arrange to have all supporting documents (official test scores and transcripts) forwarded to the Undergraduate Admissions Office as early as possible.

Application and admission procedures are outlined beginning on this page. A summary of the steps in the application procedure appears on page 51. Use this checklist to follow your application through the admissions process.

The Services to Handicapped Students Office encourages applicants with a physical impairment to contact that office (see page 33) for further information concerning admission or assistance if needed.

VISITING THE CAMPUS

You may wish to arrange a visit to UC Davis sometime before you apply. If you have specific questions about application procedures or entrance requirements, it is a good idea to write ahead and make an appointment with the Undergraduate Admissions Office. For scheduled or individual tours of the campus, contact the Visitors Services and Ceremonies Office (129 Mrak Hall, 752-0539). If you would like to visit classes, the Visitors Services and Ceremonies Office can make the appropriate arrangements.

APPLICATION PROCEDURES

Undergraduate application packets may be obtained from any California high school, community college, or University of California Admissions Office. Completed application materials and communications concerning admission to UC Davis should be sent to the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis 95616.

A nonrefundable application fee of $25 (effective Fall Quarter 1981; $20 for prior quarters) must accompany your application. Please make your check payable to The Regents of the University of California. If you have applied previously and were ineligible, or if you were admitted previously and did not register, you are required to file a new application for the quarter for which you seek admission and submit a new application fee.

Opening filing dates are the same for all UC campuses and are listed below. All applications filed during the first month of the filing period will be accepted for consideration. In addition, this campus will continue to accept applications for most majors until approximately two months prior to the start of a quarter. However, after the first month, some departments, colleges, or campuses may close to new applicants as enrollment quotas are filled. Once a department, college, or campus has closed, any additional applications which are
received will be forwarded to the next open campus preferred by the applicant. Therefore, it is important to give careful consideration to alternative campus preferences when completing the application.

**Opening dates of the initial filing periods for new applicants are as follows:**

<table>
<thead>
<tr>
<th>Quarter to be Admitted</th>
<th>Opening Date of Filing Period</th>
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<tr>
<td>Spring 1981</td>
<td>October 1, 1980</td>
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<tr>
<td>Fall 1981</td>
<td>November 1, 1980</td>
</tr>
<tr>
<td>Winter 1982</td>
<td>July 1, 1981</td>
</tr>
<tr>
<td>Spring 1982</td>
<td>October 1, 1981</td>
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Delays in notification can be avoided if you complete the application accurately, include your essay and filing fee, and arrange for transcripts (including course work in progress) and official test scores to be sent to the Undergraduate Admissions Office as soon as they are available. Because advanced standing eligibility depends upon the final outcome of quarter or semester course work in progress, this office must receive a final transcript of all work completed before you may register.

**Duplicate Applications**

Students should file an application with one campus only, listing alternate campus preferences in the space provided on the application. If you file simultaneously for admission to more than one campus, admissions processing will be suspended until you notify the Student Academic Services (570 University Hall, University of California, Berkeley 94720) which campus is your first choice. Fees submitted with duplicate applications cannot be refunded.

**Transcripts and Test Scores**

Transcripts and other documents submitted during the application process become the property of the University and cannot be returned or forwarded to another institution. Please note that it is your responsibility to arrange for transcripts and to insure that they arrive promptly.

If you are in high school when you apply, please request that your high school send an official transcript of all work completed through your junior year directly to the Undergraduate Admissions Office. This preliminary transcript should also include a list of work in progress (senior-year courses in which you are currently enrolled or plan to complete before graduation). In addition, you must also submit a final transcript including a statement of graduation or a Certificate of Proficiency (see page 50). Freshman applicants (see "Explanation of Application Categories") are also required to submit results of their SAT or ACT tests and three achievement tests. (See page 47.)

If you have attended or are attending another college when you apply, you must have final transcripts of all college-level work, as well as your high school transcript, sent directly to the Undergraduate Admissions Office.

**Change of Campus**

If, after you have applied to the Davis campus, your plans change and you prefer to be considered for admission on another UC campus, you are required to write Student Academic Services (570 University Hall, University of California, Berkeley 94720) stating your new preference and the reason for your change. Your records will be transferred to the campus of your choice, provided that campus still has openings for admission at the time of your letter. Processing a change of campus preference takes several weeks; however, your admissions priority will be assigned based on the date your request for a change was made.

**Notification**

After returning your application materials you may be wondering,

- Has the University received my application forms?
- Will I be considered for admission at my preferred campus?
- Will I be admitted to the University?

Our notification procedures answer these questions in order. First, you will be mailed a notice acknowledging receipt of your application; later, you will receive a letter confirming your admission status.

As to your chances of being admitted, during the last academic year well over 90 percent of the eligible applicants who applied on time to UC Davis were admitted.

The length of time before admission notification varies, depending upon the completeness of your application. For example, most applicants for Fall Quarter will receive final notification by early spring, provided records have been received promptly.

**Acceptance of Admission**

When you receive your notification of admission status you will receive an important form with it, if you are admitted. Filling this form, called the "Statement of Intent to Register," is a necessary step to complete the admissions process. Please complete this form and return it with the required nonrefundable $50 deposit. This deposit is applied to your University Registration Fee as long as you register in the quarter to which you are admitted. Inter and intracampus transfer, EOP, and readmit applicants (see Explanation of Application Categories below) are not required to submit the $50 deposit.

**EXPLANATION OF APPLICATION CATEGORIES**

An undergraduate applicant is a student who wishes to complete a program of studies leading to a Bachelor of Arts (A.B.) or Bachelor of Science (B.S.) degree. A freshman applicant (page 45) is a student who has graduated from high school or who has earned a "Certificate of Proficiency," but has not enrolled since high
school attendance in a regular session of any collegiate-level institution (with the exception of summer session attendance immediately following high school graduation).

An **advanced standing (transfer)** applicant (page 48) is a student who has been registered in a regular or extension session of a college or university other than the University of California since high school graduation.

An **intercampus transfer** applicant (page 49) is an undergraduate student who is currently, or was previously, registered in a regular session at another campus of the University of California and has not since been registered in another collegiate institution.

An **Educational Opportunity Program** applicant (page 48) is a low-income/minority student who may or may not meet the standard admission requirements for freshman or advanced standing status.

A **readmit** applicant (applicant for readmission) (page 54) is a student who was formerly registered on the Davis campus, who has interrupted the completion of consecutive quarters of enrollment and who is not currently participating in the Planned Educational Leave Program. (See page 49 for re-entry for the non-traditional student.)

A **reentry** applicant is an undergraduate student age 25 or over or a graduate student age 30 or over (see page 49).

A **limited status** applicant (page 49) is a college graduate (or near-graduate) who is not a candidate for an advanced degree, but who has the limited objective of enrolling in certain courses on the Davis campus.

A **special status** applicant (page 49) is any person 21 years of age or older who is prepared, by reason of special attainment or background, to undertake limited course work toward a specific objective.

A **second baccalaureate** applicant (page 49) is a college graduate who seeks an additional bachelor's degree. Approval is granted only to students who have completely changed their educational objectives.

An **international** applicant (page 49) is a student who is not a U.S. citizen, immigrant, or refugee.

A **concurrent enrollment** applicant (page 50) is a community member who wishes to fulfill an academic interest or to test academic ability by enrolling in a limited number of regular University courses on a space-available basis. This program is offered through University Extension and does not require the applicant to meet regular admission requirements.

A **part-time status** applicant is a person who wishes to complete the bachelor's degree at UC Davis on a part-time enrollment basis. See Page 54 for details.

A **graduate** applicant is a college graduate who wishes to complete a program of studies leading to an advanced degree, i.e., the master's or doctorate. See the section beginning on page 99 for details.

A **professional school** applicant is a student who has completed the requirements necessary for admission to one of the professional schools on the Davis campus (Administration, Law, Medicine, Veterinary Medicine). Please see the appropriate sections in this catalog for specific information.

**UNDERGRADUATE STUDIES**

Undergraduate studies at the University of California, Davis, are divided into three colleges: Letters and Science, Agricultural and Environmental Sciences, and Engineering. When you apply for admission to Davis, you must make an application to one of these Colleges. The three Colleges differ in their educational focuses and in the major programs they offer.

The **College of Agricultural and Environmental Sciences** focuses on six areas of concentration: animal sciences; plant sciences and pest and disease management; food, nutrition, and consumer sciences; applied economic and behavioral sciences; resource sciences and agricultural engineering; and biological sciences (majors are listed on pages 68-69). The **College of Engineering** focuses its curriculum on the engineering sciences (majors are listed on page 75.) The **College of Letters and Science** curricula encompass the humanities, including the arts, and the social, physical, and biological sciences. They enable the student to pursue fundamental knowledge and to learn those basic intellectual disciplines which lead to a liberal education (majors are noted on page 91).

**ENTRANCE REQUIREMENTS**

The University's undergraduate admission requirements are based on two principles:

- The best predictor of success in the University is high scholarship in previous academic work, and
- The study of certain subjects in high school gives you a good preparation for University work and reasonable freedom in choosing a specialized area of study.

Undergraduate entrance requirements are based upon these general principles but may vary in specific details, depending upon the type of admission you are seeking. If you are planning to apply as an advanced standing student it is important to remember that your high school record will form part of the basis for our evaluation of your qualifications and therefore an official copy of it must be submitted. Listed below are the requirements for all undergraduate admission categories.

**ADMISSION AS A FRESHMAN**

To be eligible for admission to the University of California as a freshman, you must meet specific **Subject, Scholarship, and Examination Requirements.** If you have any questions or need assistance in determining your eligibility, please contact your school counselor,
Subject Requirement

You must complete certain high school courses in the subject areas listed below with a B average and earn a grade of at least C in each semester of each course. (If your school gives only year-end grades, you must complete each year course with a grade of C or better.) The required course sequence is often referred to as the “A to F” pattern.

Courses taken in the ninth grade and completed with a grade of C or better can satisfy a subject requirement, but will not be used in computing your grade-point average. If you receive a grade of D or lower in a ninth-grade course, you have not satisfactorily completed the subject requirement until you repeat the course (or a more advanced course) with a grade of C or better.

(Note: A year course in high school constitutes one unit.)

A. History — 1 year
   One year of United States history, or one-half year of United States history and one-half year of civics or American government.

B. English — 3 years (4 years beginning Fall 1981)
   Three years of English — composition and literature (university preparatory in nature). Not more than one year will be accepted from the ninth grade. (See “English proficiency” below.)

C. Mathematics — 2 years
   Two years of mathematics — elementary algebra, geometry, intermediate and advanced algebra, trigonometry, calculus, elementary functions, matrix algebra, probability, statistics, or courses combining these subjects. Nonacademic courses such as arithmetic and business mathematics may not be used.

D. Laboratory Science — 1 year
   A year course in one laboratory science, taken in the tenth, eleventh, or twelfth grade.

E. Foreign Language — 2 years
   Two years of one foreign language. Any foreign language with a written literature may be used.

F. Advanced Course — 1 or 2 years
   This requirement must be satisfied by one of the following:

   • Mathematics: One year of advanced mathematics — intermediate algebra, trigonometry, or other comparable mathematics courses.

   • Foreign language: Either an additional year in the same language used for “E” above or two years of a second foreign language.

   • Science: A year course in any laboratory science completed subsequent to the laboratory science used for “D” above.

The required courses listed above constitute only 10 or 11 of the total (15) units required for admission to the University. The remaining units provide an opportunity for you to strengthen your preparation for University work. Additional courses in mathematics, especially second-year algebra and trigonometry, are essential for many major programs. A fourth year of English, including composition skills, is also highly recommended for all students, and will be required of applicants beginning Fall Quarter 1981.

If you are a California high school graduate, the courses used to satisfy the Subject Requirement must appear on a list that your high school principal has certified meets the course descriptions above, and has placed on file with the University’s Office of Student Academic Services. If you submit courses from an out-of-state school, the Undergraduate Admissions Office will determine if your courses are acceptable in fulfillment of the Subject Requirement.

English Proficiency

Instead of a fourth year of high school English, you may satisfy the English Proficiency Requirement by achieving a specified level in one of the following examinations:

   • University Proficiency Examination in English Composition (level 4);

   • College Board Achievement Test in English Composition (a score of 600 or above); or

   • Advanced Placement Examination in English Composition and Literature or English Language and Composition (a score of 5, 4, 3).

Scholarship Requirement

You must earn a B average in the “A to F” courses required for admission with no grade less than a C. The overall grade-point average required for those subjects taken after the ninth year is dependent upon your score on the ACT or SAT test (see the eligibility index). If you are a nonresident applicant, your grade-point average in the required subjects must be 3.4 or higher.

In determining the required grade-point average, the University will use a semester grade of A in one course to balance a semester grade of C in another. Grades you received in courses taken in the ninth grade or earlier are not used in determining your grade-point average. (However, these courses may be used to satisfy subject requirements.) The grades that appear on your official high school transcript, including those earned in accelerated and advanced courses, are the grades the University will use in evaluating your record. Grades are counted on a semester basis unless your school gives only year grades.

To meet the Subject and Scholarship Requirements you may repeat up to a total of two semester courses in which you received a grade of D or lower. The grades you earn in repeated courses, however, will not be counted higher than a C in determining your scholarship average. If the courses you repeat were taken
before the ninth grade, they will be treated as if you were taking them for the first time; if courses you repeat were taken in the ninth grade, the grade will not be used in computing your grade-point average, but the courses may be used to satisfy subject requirements.

Examination Requirement

All freshman applicants must submit scores from the College Entrance Examination Board (CEEB) or the American College Testing (ACT) Program. If you are applying for admission to the Fall Quarter, you should take the tests no later than January of your senior year (earlier testing is recommended for prospective engineering students). The following tests are required:

- Scholastic Aptitude Test (CEEB) — The verbal and mathematics tests scores you submit must be from the same siting

or

- American College Test

and

- Three Achievement Tests (CEEB), which must include (a) English Composition, (b) one from among the social studies or one from among the foreign languages, and (c) mathematics (level I or II)

If you are a California resident and your grade-point average in the required high school subjects is over 3.3, the tests are required but your scores will not be used to determine your eligibility.

The accompanying table is an eligibility index. If your grade-point average in the "A to F" requirement is less than 3.3 you should refer to this table to see what examination scores you must earn to be eligible for University admission.

Admission by Examination Alone

If you do not meet the scholarship and subject requirements for admission and have completed fewer than 12 quarter or semester units since high school graduation, you can qualify for admission as a freshman by examination alone. (If you have completed transferable college courses, CEEB tests cannot be taken in academic subjects covered in those courses.) You must take the same CEEB tests discussed above and receive a total score of at least 1100 on the Scholastic Aptitude Test. Your total score on the three Achievement Tests must be 1650 or higher with no score less than 500 on an individual Achievement Test. If you are a nonresident applicant, your score on the three Achievement Tests must be 1730 or higher. (At present, ACT scores may not be substituted for SAT scores to qualify for admission by examination alone.) High school graduation or a Certificate of Proficiency is also required for students who qualify for admission by examination alone.

Examination Arrangements: Make arrangements to take the required Scholastic Aptitude Test (SAT) and the Achievement Tests by writing to the Educational Testing Service, P.O. Box 1025, Berkeley, California 94701, or P.O. Box 592, Princeton, New Jersey 08540. For the American College Test (ACT) write to American College Testing Program, Registration Unit, P.O. Box 166, Iowa City, Iowa 52240. (Test fees should be paid to

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<th>Eligibility Index</th>
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<td>Grade-Point Averages</td>
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<td>A-F Requirement</td>
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*The American College Test (ACT) is scored in intervals of 1 point from a minimum of 1 to 36 maximum.

†The Scholastic Aptitude Test (SAT) is scored in intervals of 10 points from a minimum of 400 to 1600 maximum.
the Testing Service, not the University.) Your test scores will be regarded as official only if they are reported directly to the Undergraduate Admissions Office by a Testing Service. Your final notification of admission cannot be released until your scores from all tests have been received by the Undergraduate Admissions Office. (UC Davis's CEEB code is 4834 and the ACT code is 0454.)

ADMISSION TO ADVANCED STANDING

An advanced standing transfer applicant is a student who has been registered in a regular or extension session of a college or university other than the University of California since high school graduation. An advanced standing student may not disregard his or her previous college record and apply for admission as a freshman.

Admission Requirements

If you are an advanced standing applicant, the requirements for admission will vary according to your high school record. No examinations are required for admission purposes if you have completed more than 12 quarter or semester units of transferable college credit. If you have completed fewer than 12 units since high school graduation, the examination requirements for freshman applicants also apply. If you are a nonresident, you need to meet the additional requirements described at the end of this section.

The transcript you submit from the last college you attended must show, as a minimum, that you were in good standing and that you had earned a grade-point average of 2.0 or better. If your grade-point average fell below 2.0 at any one college you attended, you may have to meet additional requirements in order to qualify for admission.

As an advanced standing applicant you must also meet one of the following conditions:

- If you have met the Eligibility Index or your high school scholarship average in those required subjects was 3.0 or better, you may be admitted in advanced standing any time after you have established an overall grade-point average of 2.0 or better in another college or university. You must also satisfy the examination requirement for freshmen if you have completed fewer than 12 quarter or semester units of transferable college credit since high school graduation.

- If you met the Eligibility Index or your high school scholarship average in the required subjects was 3.0 or better but you have not completed one or more of the required high school subjects, you may be admitted after you have:
  
  1. Established an overall grade-point average of 2.0 or better in another college or university,
  2. Completed, with a grade of C or better, appropriate college courses in the high school subjects that you lacked,

- Completed 12 or more quarter or semester units of transferable college credit or have met the examination requirements for freshman applicants.

  - If you were ineligible at the time of high school graduation because of low scholarship or a combination of low scholarship and a lack of required subjects, you may be admitted after you have:

    1. Established an overall grade-point average of 2.4 or better in another college or university,* and
    2. Completed 84 transferable quarter (or 56 semester) units, and
    3. Completed appropriate college courses with a grade of C or better in the "A to F" subjects not completed in high school. (Up to two units of "A to F" credit may be waived if (1) and (2) above are satisfied.)

or

- Completed (1) and (2) above and one college course in mathematics, one in English, one in either U.S. history, a laboratory science, or foreign language. The courses must be passed with a grade of C or better, and, with the exception of mathematics, must be transferable to the University. The course in mathematics means completing a sequence of courses at least as advanced as the equivalent of two years of high school algebra (elementary and intermediate) or one year of algebra (elementary) and one year of high school geometry.

Nonresident Applicants

A nonresident applicant for advanced standing who meets the admission requirements for freshman admission must have a grade-point average of 2.8 or higher in college courses that are accepted by the University for transfer credit.

If you lack any of the required high school subjects, and are a nonresident, you must complete college courses in those subjects with a grade of C or higher. If you graduated from high school with less than a 3.4 grade-point average in the subjects required for freshman admission you must have completed at least 84 quarter units (56 semester units) of transferable work with a grade-point average of 2.8 or higher. Upon successful completion of that work, you may have the requirement for two units of the required high school subjects waived.

*This is a return to the original transfer requirements in effect before the experimental 2.0 admission requirement was instituted in Fall Quarter 1973. The experimental requirement allowed students to transfer to the University with the minimum grade-point average of 2.0 with 84 transferable quarter (or 56 semester) units without regard to high school records. The experiment has been evaluated by the Board of Admissions and Relations with Schools and it is their recommendation that it be discontinued and that the University return to the required 2.4, effective Fall Quarter 1978.
SPECIAL PROGRAMS AND ADMISSIONS CATEGORIES

Educational Opportunity Program (EOP)

The Educational Opportunity Program is designed to assist and provide opportunities in higher education for minority and economically disadvantaged students with academic potential who, historically, have been underrepresented at the University of California.

As an EOP applicant you may be admitted in one of two ways: as a freshman or advanced standing student who has met the standard entrance requirements, or as a special-action freshman or advanced standing student who has not met the entrance requirements but who has demonstrated academic potential.

You may obtain an application for admission to the Educational Opportunity Program at UC Davis by writing to the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis, CA 95616. The $25 application fee is waived for qualified EOP applicants. (If you do not qualify for the EOP, you must submit the nonrefundable $25 fee.) The EOP also provides special assistance in all areas of academic and student life (see page 30).

Academic Reentry Program

The Academic Reentry Program gives assistance in applying to the University to students in nontraditional age categories and reentering the University after life and work experience. Preadmission and reentry advising provides assistance in combining past study with current academic and career goals. A reentry student who has not met the entrance requirements but has demonstrated recent academic potential, has special talents, or a disadvantaged educational history may be considered for admission by special action. (See page 31 for more information.)

Second Baccalaureate Status

If you have a bachelor's degree substantially equivalent to one that is granted by the University of California, you may be allowed to enroll as an undergraduate seeking a second bachelor's degree. Admission in this category will depend upon a superior academic record and clear evidence of a change in objective.

Admission to the College of Agricultural and Environmental Sciences and the College of Letters and Science requires the approval of the Admissions Officer and the dean of the college. (Enrollment pressures have necessitated closing this category of admission for the College of Engineering.)

Limited Status

Students in limited status are those whose special attainments qualify them to take certain courses in the University toward a definite and limited objective. To apply for limited status admission you must either have a bachelor's degree or have completed a substantial amount of college work with a satisfactory grade-point average. You will not be admitted to limited status for the purpose of raising a low scholarship average.

As a limited status student you will be expected to maintain a certain scholarship average during a predetermined time of enrollment.

Admission to the College of Agricultural and Environmental Sciences and the College of Letters and Science requires the approval of the Admissions Officer and the dean of the college. You must also submit transcripts from all schools attended, including a final high school transcript. Fees and filing dates are the same as those for new applicants. (Enrollment pressures have necessitated closing this category of admission for the College of Engineering.)

Special Status

The special status classification is designed for applicants 21 years of age or older who have not had the opportunity to complete a satisfactory high school program or who have not completed a substantial amount of college work, but by reason of special attainment or background may be prepared to undertake certain courses at UC Davis toward a definite and limited objective.

You will not be admitted to special status for the purpose of fulfilling requirements for admission as a regular student. Conditions for admission are determined by the Admissions Officer and are subject to the approval of the dean of the college in which you plan to enroll. Admission is for a specified time only and a prescribed scholarship average must be maintained. Fees and filing dates are the same as those for new applicants. (Enrollment pressures have necessitated closing this category of admission for the College of Engineering.)

Intercampus Transfer Status

If you are currently registered as an undergraduate student or have been registered on another campus of the University of California, and have not subsequently registered at another institution, you may apply for an intercampus transfer to UC Davis. Intercampus transfer applications are available from and must be returned to the Registrar's Office on the UC campus you last attended. A nonrefundable filing fee of $25 (effective Fall Quarter 1981; $20 for prior quarters) must be submitted with your transfer application. Filing dates are the same as those listed for freshman applicants.

International Student Status

Applicants from other countries will be admitted in accordance with the general procedures governing nonresident admission. You may request an application by writing the Undergraduate Admissions Office, 175 Mrak-Hall, University of California, Davis, California 95616. If you are not a United States citizen, immigrant, or refugee, you must return this application with a finan-
cial information form and the nonrefundable application fee of $25 (effective Fall Quarter 1981; $20 for prior quarters). It is very important to file your application during the appropriate filing period for the quarter for which you wish to attend (see page 44). Applications received after the first month of the filing period will be processed as space permits.

If your schooling has not been in English, or if English is not your native tongue, you are required to submit the results of the Test of English as a Foreign Language (TOEFL). Write to the Educational Testing Service, P.O. Box 899, Princeton, New Jersey 08540, to arrange a testing date and location in your home country. The minimum TOEFL score which will be accepted is 500.

Prior to registration, international students whose native language is other than English are required to demonstrate that their command of English is sufficient to profit by instruction at the University. A proficiency examination is given at UC Davis during the week before school begins. If you do not pass this examination, you must enroll in English 25 or 26 until you have acquired the necessary language skills.

As part of the application process, you are also required to submit your secondary school and college records (English translations must accompany all records). These records should include all certificates and transcripts of grades awarded in each subject. You will receive credit for University studies outside the United States if the course work was completed in an approved university and is considered to be academically equivalent to coursework offered at the University of California. The Undergraduate Admissions Office will have the final authority for assessing the transferability of credit.

Financial aid information can be obtained from the Financial Aid Office (see page 38). There are no grants, loans, or scholarships awarded by the University of California, Davis campus to undergraduate international students during their first year of study, and at no time after the first year is financial assistance assured. Therefore, you must demonstrate adequate financial resources for your term of enrollment.

For additional information, see page 32.

**Concurrent Enrollment Status**

Concurrent courses are regular University courses open to the community on a space-available basis. The purpose of the program is to allow an individual to pursue academic interests and to test academic abilities at the University.

For information, write the University Extension Office, 4485 Chemistry, University of California, Davis 95616.

For admission to the Graduate Division, see page 102.

For admission to the Graduate School of Administration, see page 113.

For admission to the School of Law, see page 115.

**For admission to the School of Medicine, see page 119.**

**For admission to the School of Veterinary Medicine, see page 123.**

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**ADDITIONAL INFORMATION**

**High School Proficiency Examination**

The University of California will accept the Certificate of Proficiency awarded by the State Department of Education upon successful completion of the California High School Proficiency Examination in lieu of the regular high school diploma. However, you must also meet all other University entrance requirements (subject, scholarship, examination). On University records, the date of graduation will be the date of the certificate. Admission by CEEB scores alone is still an option if you were ineligible on the basis of your high school record.

**Subject A Requirement**

The University requires every undergraduate student to demonstrate college-level proficiency in English com-
position. This requirement is known as "Subject A." See page 60 for a full description of the means by which this requirement may be satisfied.

**Advanced Placement Examinations**

The Advanced Placement Examinations of the College Entrance Examination Board are taken in conjunction with courses taken in high school. You can receive 10 quarter units of University credit for each examination (except mathematics) in which you earn a score of 5, 4, or 3. These credits will apply toward the total required for graduation from the University. See the table on page 58 for course work equivalencies and limitations of credit.

**CLEP**

The University awards credit for certain examinations of the College-Level Examination Program of the College Entrance Examination Board. For general examinations in Social Science/History, Natural Science, and Humanities, ten quarter units of credit are given for scores of 500 (50th percentile) or better. Credit is also given for subject examinations which cover work appropriate to a University course. You must pass those examinations with a score of 50 (50th percentile) or better. The University will grant five quarter units for examinations which cover one semester of work and ten quarter units for examinations which cover two semesters of work. CLEP credit is not given for examinations that duplicate courses you have taken.

**Credit from Another College**

The University gives unit credit to transfer students for courses they have taken at other accredited colleges and universities, including some extension courses. To be accepted for credit, the courses must be consistent with those at the University as determined by the Admissions Office.

California community colleges offer a full program of courses approved for transfer credit. You may earn 105 quarter units (70 semester units) toward a University degree at a community college. Subject credit for transferable courses in excess of these units may also be granted to meet University graduation requirements.

Applicants to the College of Agricultural and Environmental Sciences and to the College of Letters and Science who have more than 120 quarter units of credit for transfer must have the approval of the Dean of the College and satisfy University requirements for admission. (College of Engineering applicants should refer to page 76.)

**ADMISSIONS CHECKLIST**

- 1. Obtain the undergraduate admissions packet from your high school, a community college, or a campus of the University of California. If you are not a California resident, request an application from the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis, CA 95616.
- 2. Complete the application, listing the college and major you prefer. Include your essay and a check or money order for $25 ($20 prior to Fall Quarter 1981) with your application forms and return them to the Undergraduate Admissions Office during the first month of the filing period for the quarter in which you wish to enter.
- 3. Request that transcripts, including work in progress, be sent from those schools attended. If test scores are required, please arrange to have these forwarded by the testing agency.
- 4. Retain for your records the notice received from the Undergraduate Admissions Office acknowledging receipt of your application.
- 5. Respond to Undergraduate Admissions Office requests for additional information, such as transcripts, test scores, or confirmation of work in progress. **Note:** Your eligibility for admission cannot be evaluated until all your application materials are received, i.e., application form, essay, transcript, work in progress, and test scores (if required), so it is important to make these arrangements if you want to avoid delay in the processing of your application.
- 6. Retain for your records the notification of admission received with your "Statement of Intention to Register" form.
- 7. Return your "Statement of Intention to Register," with the nonrefundable advance deposit of $50 (if required), as soon as possible so your registration materials can be ordered before the day you register.

**REDIRECTION**

If at the end of the first month of the application filing period (see page 44) there are more qualified applicants than a UC Davis college can accommodate within its enrollment quotas, all applications will be reviewed and some applicants may be redirected to another campus.
Academic Information

WHEN YOU ARRIVE

Information:
Summer Advising/Orientation Programs
Advising Services
South Hall
752-3000

Starting off on the right foot at UCD is made a little easier by various programs designed to introduce you to the University.

The Summer Advising and Registration Conference is a chance for entering students, both freshmen and transfers, to visit the campus for two or three days during the summer. If you are a freshman, your parents are also invited to attend, and a special parents' program is planned for them. During the conference you will have a chance to become familiar with the campus, learn about the services available to students such as financial aid and student advising, take required placement exams and complete your registration and enrollment in classes. You will also be able to meet students, professors, and staff members and get some advice about majors, requirements, social life, and answers to questions you or your parents may have. It's a good way to start out, and Davis won't seem like such a strange new place in the fall.

Orientation Week, held at the beginning of each Fall Quarter, offers new and continuing students a variety of activities, special events, and meetings to get the new quarter started. Some of the things that are happening include departmental open houses, tours of the campus, concerts and lectures, registration, and meetings with deans and advisers. Orientation activities are also held for students entering in Winter and Spring Quarters.

REGISTRATION PROCEDURES

Information:
Registrar's Office
124 Mrak Hall
752-2973

Registration is the means by which you become a student at the University. The registration process includes completion and filing of informational forms, payment of fees, and enrollment in classes. Every UCD student must register each quarter.

If you are a new or reentering student you must also:

- Submit a Statement of Residence (see page 313).
- Return the completed Medical History form, results of a tuberculin "skin" test, and the Insurance Information Request form. These forms are mailed to each new student from the Student Health Center.

New graduate students who have been registered previously at Davis as undergraduates are considered to be new students.

Your registration will be complete when you have presented your completed registration forms to the Registrar's Office by the announced deadline and have received your validated Registration Card. Late registration privileges extend through the tenth day of instruction, but you will be assessed a fee of $10 to defray the extra clerical costs of late registration. Registration after the tenth day of instruction, when approved, bears a late fee of $25.

Undergraduate students must carry a study load of at least 12 units each quarter in order to be certified as full-time students for social security, insurance, and financial aid purposes, or to compete in intercollegiate athletics. Graduate students must carry a study load of
at least 4 units each quarter in order to be certified as full-time students.

If you have not satisfied the Subject A requirement, you must enroll in the English A course (see page 196). Consult the current Class Schedule and Room Directory (published about seven weeks before the beginning of the quarter and available in the campus bookstore) for more detailed information.

It is the responsibility of each student to be familiar with announcements and regulations printed in official publications.

$50 Reduced Fee Program

If you are a full-time undergraduate student enrolled for less than nine units in any quarter (including non-credit courses, e.g., Mathematics B) you may petition for a $50 reduction in the Educational Fee. This reduction is for one quarter and a student is expected to maintain minimum progress. Petitions are available at the Registrar's Office and must be filed with that Office no later than the tenth day of instruction.

Part-Time Degree Program

You may be able to pursue a bachelor's or master's degree at UC Davis on a part-time basis if you qualify for the Program for Part-Time Degree Students. If you are employed, retired, or have family responsibilities which preclude full-time study, you may be able to study on this basis. Part-time students may change status between full-time and part-time as their circumstances change. To be considered a part-time student, an undergraduate must be enrolled for less than nine units per quarter. Minimum progress requirements are waived for graduate and undergraduate part-time students (see page 59). Petitions are available at the Registrar's Office and must be filed with that Office no later than the tenth day of instruction.

Employee Reduced Fee Program

Full-time University employees who are qualified for admission may work toward a degree through the Employee Reduced Fee Program. Employees pay $1/3 of the regular fees and enroll each quarter for up to six units, or for one course regardless of the number of units. Detailed information is in the UCD Staff Personnel Policy Manual (Section 380-42) available in Department Offices, at the Library Reference Center or the Employee Development Unit of the Personnel Office, 752-1772. Petitions are available at the Employee Development Unit.

Adding or Dropping Courses

You must file a Drop-Add Petition in order to add or drop courses after your initial enrollment in classes. You should file the petition with the office of the department offering the course. See the Class Schedule and Room Directory for more information and filing dates.

Changes of Major, College, or School

With the approval of the appropriate dean or deans, a student in good standing can transfer from one area of study to another. Petitions for this purpose may be obtained from the Registrar (Letters and Science major change petitions are obtained from department offices).

Petitions for a change of College must be filed in the first five weeks of the quarter. See under various college or school sections in this catalog for eligibility and major change requirements.

Change of Name

Petitions for this purpose may be obtained from the Registrar. (Students planning to graduate should file this petition during the first five weeks of the quarter in which they graduate.)

Withdrawals

Withdrawals may be granted by the University for emergency reasons or for good cause. Unauthorized withdrawals may jeopardize your registration privileges and result in failing grades. Request the forms for withdrawal and file them at the Registrar's Office. See page 38 for information on fee refunds. (See below for a planned temporary leave.)

If you have been receiving financial aid you must report your change of status immediately, in person or by mail, to the Financial Aid and Student Aid Accounting Offices; if you have been receiving veterans benefits you must also report to the Veterans Affairs Office.

Reentry after an Absence

If you are a former UCD student planning to return to the University of California on the Davis campus, you must file an Application for Reentry with the Registrar along with the nontransferable, nonrefundable fee of $20 ($25 effective Fall Quarter 1981). (You are a former student if you have interrupted the completion of consecutive terms of enrollment on the Davis campus.) Official transcripts of all work you may have attempted in the interim must be submitted.

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<td>Winter 1981</td>
<td>December 12, 1980</td>
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<td>Fall 1981</td>
<td>August 28, 1981</td>
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Planned Educational Leave Program (PELP)

A Planned Educational Leave is defined as a planned interruption or pause in your regular, full-time education during which you temporarily cease formal studies at Davis while pursuing other activities that may assist in clarifying your educational goals. The intent of the program is to make it possible for a student to suspend academic work, leave the campus, and later resume studies with a minimum of procedural difficulties.

Any registered student on the Davis campus, undergraduate or graduate, is eligible to enroll in the Planned Educational Leave Program. Freshmen and transfers who have been admitted but have not yet registered or attended classes are also eligible, providing an opportunity for beginning students to pause between high school or community college and the University.
Each applicant for enrollment in PELP is required to file an application form, including a brief explanation of the reasons for leaving the campus, and must state in writing when he or she intends to resume academic work. Applications for Planned Educational Leave should be filed with the Registrar's Office (Admissions Office for new students) no later than the tenth day of instruction.

A fee of $20 ($25 effective Fall Quarter 1981) is charged, payable when you enroll in the program. This fee is identical to that paid by a student who withdraws and is required to pay a readmission fee upon return.

The minimum Planned Educational Leave is one full quarter; the normal maximum is one full academic year. You may, however, request an extension of your leave. For purposes of this program, leave of one full quarter is defined as a leave beginning no later than the second week of instruction in a quarter.

Students enrolled in the program are expected to devote their leave period primarily to non-classroom activities. Students on Planned Educational Leave are not eligible to enroll in concurrent courses on the Davis campus and may not earn academic credit at Davis during the period of the leave.

At the end of the leave, you are guaranteed readmission as long as you resume regular academic work at the agreed-upon date. Students who do not return at the prearranged time and do not extend their leave will be considered to have withdrawn.

You will not be eligible to receive normal University services during the planned leave. Certain limited services, however, such as placement and student employment services, counseling, and faculty advising are available. Students on Planned Educational Leave may purchase a health care card from the Student Health Service and may retain library privileges by purchasing a library card. International students should consult Services for International Students and Scholars to find out what effects the Planned Educational Leave will have on their status. Grants and other financial aids will be discontinued for the period of the leave, but every effort will be made, where legally possible, to allow you to renegotiate loan payment schedules and to insure the availability of financial aid upon your return.

Applications and specific information about the Planned Educational Leave Program are available from the Counseling Center in North Hall. For those students who have been admitted but have not attended classes, applications and information are available from the Office of Admissions, Mrak Hall.

SCHOLASTIC REQUIREMENTS
The academic year consists of three ten-week quarters. Two six-week summer sessions are also offered. Students normally attend the University three quarters per school year, but you may accelerate your progress by enrolling in one or both summer sessions (see page 18).

Credit for academic work in the University is evaluated in quarter units. One quarter unit represents three hours of work per week by the student, including both class attendance and preparation. Laboratory and discussion sections may or may not be given unit value. (To convert quarter units to semester units, multiply by 2/3; from semester to quarter units, multiply by 3/2.)

GRADING
Every instructor is required to assign a grade for each student registered in a course. The following grades are used to report the quality of a student's work at UCD:

- A, excellent
- B, good
- C, fair
- D, barely passing
- F, not passing (work so poor that it must be repeated to receive recognition)
- I, incomplete (work is satisfactory but incomplete for a good cause)
- IP, in progress
- P, passed (grade C- or better)
- NP, not passed
- S, satisfactory
- U, unsatisfactory

The grades A, B, C, and D may be modified by a plus (+) or minus (−).

Grade Points
Grade points are assigned each letter grade as follows:

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<th>Grade</th>
<th>Points</th>
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<td>D</td>
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Grade-Point Average (GPA)
The grade-point average is computed on courses undertaken in the University of California, with the exception of courses undertaken in University Extension. The value of grade points over units attempted determines your grade-point average. The (grade-point) balance represents the number of grade points above or below a C average. The grades IP, P, S, NP, and U carry no grade points and are not included in grade-point computations. I grades are not included in the GPA at the end of the quarter, but are counted as F in determining if a bachelor's degree candidate has earned the minimum 2.0 GPA required for graduation.

A student at Davis is expected to maintain a C (2.0 GPA) or better in all work undertaken in the University. If you fall below a C average, you are considered "schoastically deficient" (see page 59).

Passed/Not Passed (P/NP) Grading Option
Subject to regulation by the faculties of the various colleges and schools, an undergraduate student in good standing can petition to take specific courses on a Passed/Not Passed basis. Petitions are available in deans' offices as of dates published in the Class...

It's hard to keep grades from interfering with my academic interests, but I've found that the most interesting work I've done is valuable to me regardless of how it's graded. — Senior, American Studies
Schedule and Room Directory and must be filed before the end of the fifth week of instruction.

The grade P is assigned for a grade of C— or better. Units thus earned are counted in satisfaction of degree requirements but are disregarded in determining your grade-point average.

The intent of this option is to encourage exploration in areas in which you have little or no previous experience by alleviating grading pressures. The maximum number of units graded P that will be accepted for degree credit is 1/3 of the units completed in residence on the Davis campus. Consequently, at least 2/3 of the units completed in residence at Davis and presented in satisfaction of degree requirements must be in courses taken for a letter grade. Your quarterly transcript will show the total number of units graded P you have accumulated, as well as the number of units graded P that are in courses taken on a P/NP basis at your option.

If you are planning to take courses on a P/NP basis, you should also familiarize yourself with the requirements of your particular school or college which may have introduced conditions or restrictions in addition to the University requirements.

If you elect the P/NP grading option for courses graded upon completion of a two- or three-quarter sequence (In-Progress grading), a petition submitted by the end of the fifth week of the first term applies to all terms of the course. A petition submitted during the second term but before the end of the fifth week of the second term applies to the second and any remaining terms of the course.

Courses in which a D or F are received may not be repeated with the P/NP option. Students who received an Incomplete in a course they undertook for a letter grade may not complete the course on a Passed/Not Passed basis.

Satisfactory/Unsatisfactory (S/U)

Graduate students, under certain circumstances, may be assigned grades of S or U, but units gained in this way will not be counted in calculating the grade-point average. The grade of S is awarded to graduate students for work in graduate courses which otherwise would receive a grade of B— or better, and in undergraduate courses for work which otherwise would receive a grade of C— or better.

Petitions are available from the Graduate Division and must be signed by your graduate advisor. (See page 129 for Individual Study courses.) Courses in which a D or F grade is received may not be repeated with the S/U option.

Passed/Not Passed (P/NP) Grading Only

In specific courses which have been approved by the respective departments and by the appropriate Committees on Courses of Instruction, individual instructors will assign only Passed or Not Passed grades. (See page 128 for Special Study courses.)

In-Progress (IP) Grading

For a course extending over more than one quarter (designated "deferred grading only, pending completion of sequence" in course descriptions), evaluation of student performance is deferred until the end of the final quarter. Provisional grades of IP are assigned in the intervening quarters and are replaced with the final grade at the completion of the sequence. In order to gain credit toward graduation, a student must successfully complete the entire sequence in successive quarters.

Incomplete Grades

The grade of I may be assigned when a student's work is of passing quality but is incomplete for a good cause. You may replace an I grade with a passing grade and receive unit credit (and grade points if the instructor assigns a letter grade) provided you satisfactorily complete the course work as specified by the instructor. In order to change your records, you must obtain a petition from the Registrar's Office and present it to your instructor for completion and mailing. An I grade must be replaced with a letter grade (or P or S grade) before the end of the third succeeding term of the student's academic residence, or the grade will revert to an F (or NP or U). If a student's degree is conferred before the expiration of the time limit for an I-grade conversion, the time limit for conversion for the graduated student will be the end of the third regular term succeeding the term in which the Incomplete was assigned.

Courses for which an I grade has been assigned may not be repeated except on an audit basis. An undergraduate student whose record shows more than 16 units of I grades will be subject to disqualification (see page 59). A graduate student who accumulates more than eight units of I grades will be subject to probation.

Incomplete grades will not be included in your grade-point average at the end of a quarter. At the time of graduation, however, any remaining I grades are included when your grade-point average is computed, in order to determine whether you have achieved the 2.0 average required for the bachelor's degree. An Incomplete grade, in these computations, has the same effect as a grade F or NP, depending on what option you have exercised. Therefore, it is recommended that students not delay the clearance of incomplete grades so as not to jeopardize graduation.

Changes of Grade

All grades except I and IP are final when filed by an instructor at the end of the term. No final grade except I may be revised by examination or the submission of additional work after the close of the term.

If, however, a "clerical" or "procedural" error in the reporting of a grade can be documented, you may request a change of grade with a petition available from department offices.
Repetition of Courses

An undergraduate student may repeat only those courses taken on a UC campus in which he or she has received a grade of D, F, or NP. In computing the grade-point average of an undergraduate who repeats courses in the University in which a D or F was received, only the most recently earned grades and grade points are used for the first 16 units repeated. Thereafter, you will receive the grade assigned and the corresponding grade points earned for each time you take the class. When a course is repeated, the units completed will be credited toward the degree only once, but the course will appear on your record each time it is taken. Repetition of a course more than once requires approval by the appropriate dean in all instances. Courses in which you have received a grade of D or F must be taken for a letter grade if repeated — not on a P/NP basis. (Courses in which a grade of NP was received may be repeated on a P/NP basis.)

A graduate student may repeat any course in which a grade of C, D, F, or U has been earned, up to a maximum of nine units. A course in which a C, D, or F grade has been earned may not be repeated on the S or U grading basis. In computing the grade-point average of a graduate student who repeats courses in which a grade of C, D, or F was received, only the most recently earned grade for each course and corresponding grade points shall be used.

Mid-Term Grade Standing

Students wishing to know their grade at the mid-quarter should inquire with the instructor. Those who have deficient grades (D, F, or Not Passed) are urged to confer with their advisers.

Final Grades

Grades are generally available about three weeks after a quarter has ended. If you wish to have your grades mailed to you, deposit a stamped, self-addressed envelope with the Registrar’s Office before the end of the term.

Transcripts

A record of each student’s academic work at UCD is prepared and retained permanently by the Registrar’s Office. Copies of your official transcript may be obtained from the Registrar’s Office for $2 for the first copy and $1 each for additional copies requested at the same time. Transcripts of all work done through University Extension or Concurrent Enrollment should be requested directly from the University Extension Office, 4485 Chemistry. Transcripts of work completed at another campus of the University or at another institution must be requested directly from the campus or institution concerned.

Application for a transcript of record should be made at least one week in advance of the time needed.

CLASS LEVEL

Undergraduate classification is determined by the number of quarter units you have completed:

<table>
<thead>
<tr>
<th>Class Level</th>
<th>Unit Breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>0 - 40</td>
</tr>
<tr>
<td>Sophomore</td>
<td>40½ - 83½</td>
</tr>
<tr>
<td>Junior</td>
<td>84-134½</td>
</tr>
<tr>
<td>Senior</td>
<td>135 -</td>
</tr>
</tbody>
</table>

EXAMINATIONS

Final Examinations

The Class Schedule and Room Directory lists the times that final examinations are to be held. These are set up according to the day-and-hour periods in which the classes are given during the quarter. This information is available at the beginning of the term so that you can avoid final examination conflicts.

Except under certain specified circumstances, Academic Senate Regulations require that final examinations be given in all undergraduate courses. Exceptions to the regulation would be independent study courses, courses which consist of laboratory work only, and courses in which the examination has been waived (course descriptions will include the statement, “no final examination”).

At the instructor’s option, the final examination may be completely or in part a take-home examination. The writing time of a take-home and an in-class final examination together should not exceed three hours. In each undergraduate course in which a final examination is required, the students have the right to take the final examination (and/or submit the take-home examination) at the time published in the Class Schedule and Room Directory. The scheduling of an examination at a time other than the specified time requires the mutual consent of the instructor and each student enrolled in the course. Any student who does not consent in writing to a different time must be permitted to take an examination (or submit the instructor-optional take-home examination) at the officially scheduled time. A student who consents in writing to a change in the final examination time waives the right to take the examination as originally scheduled. Departures from the published examination schedule should be carried out so as not to disadvantage students who are unable to accept the alternate schedule. A student who is improperly denied the right to take a required final examination on the published date (or submit the take-home examination as opted by the instructor) may file a petition with the Executive Council of his or her college by the end of the next regular term for appropriate action.

Midterms

In undergraduate courses for which a midterm examination is required, each student has the right to take the midterm (or submit the take-home examination as opted by the instructor) during one of the regularly
### College Entrance Examination Board (CEEB) Advanced Placement Examination Credit

You are awarded 10 quarter units of credit toward the 180-unit bachelor's degree requirement for CEEB Advanced Placement Examinations satisfactorily passed, usually during the junior or senior year in high school. (Exception: 5 units are awarded for a score of 5, 4 or 3 earned in the Mathematics AB exam and each Latin exam, and 10 units for one or both of the Physics B and C exams.)

You may not earn University credit for courses which duplicate credit already allowed for Advanced Placement Examinations (see UCD Course Equivalencies column below). Exceptions for biology and chemistry are noted below. If you have not received your exam results, carefully avoid enrolling in a UCD course for which credit may not be granted. Exam scores will be posted on the bulletin board opposite Room 175, Mrak Hall as soon as they are made available to the University.

The following information applies to undergraduate students in the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science. For further clarification consult the office of your college.

<table>
<thead>
<tr>
<th>EXAMINATION</th>
<th>UCD COURSE EQUIVALENCIES</th>
<th>CONTINUING COURSE</th>
<th>CREDIT ALLOWED TOWARD SPECIFIC DEGREE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENGLISH</strong></td>
<td>5, 4, 3 English 1 and 3</td>
<td>French 6</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>English</td>
<td></td>
<td>French 30A or any upper-division literature course.</td>
<td>4 units For each foreign language examination passed. In the College of Letters &amp; Science, these examinations also satisfy the Foreign Language requirement.</td>
</tr>
<tr>
<td><strong>FOREIGN LANGUAGES</strong></td>
<td>5, 4, 3 German 6, 6A or 6B</td>
<td>German 101 or German 102 recommended.</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>French</td>
<td>Lat (Vergil) 5, 4, 3 Latin 103</td>
<td>Determined by consultation with Classics advisor.</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>German</td>
<td>Lat (Lyric) 5, 4, 3 Latin 105</td>
<td>Determined by consultation with Classics advisor.</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>Latin</td>
<td>Spanish 5, 4, 3 Spanish 28</td>
<td>Spanish 28</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>Spanish</td>
<td>Country Studies 5, 4, 3 History 17A, 17B</td>
<td>History 17A, 17B</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td><strong>HUMANITIES</strong></td>
<td>5, 4, 3 Art 2, 5 Art 2</td>
<td>Art 3, 3 or 4</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>Art Studio</td>
<td>4 Art 1A, 1B, 1C Art 10</td>
<td>Art 10</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>Art History</td>
<td>3 Art 10</td>
<td></td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td><strong>NATURAL SCIENCES</strong></td>
<td>5, 4, 3 Biology 1 and 2 Botany 2 or Zoology 2:2L</td>
<td>Any appropriate upper-division course in the biological sciences. Botany 2 or Zoology 2:2L</td>
<td>Natural Sciences Credit/Preparatory Courses for Science Majors</td>
</tr>
<tr>
<td>Biology</td>
<td>3 Biology 1 and 2 Botany 2 or Zoology 2:2L</td>
<td>Biology 1 and 2 Botany 2 or Zoology 2:2L</td>
<td>10 units Student may choose any course from this list.</td>
</tr>
<tr>
<td>Chemistry</td>
<td>5, 4, 3 Chemistry 1A, 1B</td>
<td>Chemistry 1A, 1B</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>Physics AB</td>
<td>5, 4, 3 Mathematics 11A, 21A Mathematics 21B.</td>
<td>Mathematics 21C.</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td><strong>MATHS</strong></td>
<td>5, 4, 3 Math 11A, 21A Math 21B.</td>
<td>Math 21C.</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>Mathematics AB</td>
<td>5, 4, 3 Math 11A, 21A Math 21B.</td>
<td>Math 21C.</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>Physics B</td>
<td>5, 4, 3 Phys 1A 2B 2C 2D</td>
<td>Phys 1A 2B 2C 2D</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>B</td>
<td>4, 3 Phys 1A 2B 2C 2D</td>
<td>Phys 1A 2B 2C 2D</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>C</td>
<td>5, 4, 3 Phys 1A 2B 2C 2D</td>
<td>Phys 1A 2B 2C 2D</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>Cl</td>
<td>4, 3 Phys 1A 2B 2C 2D</td>
<td>Phys 1A 2B 2C 2D</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>Cl I</td>
<td>5, 4, 3 Phys 1A 2B 2C 2D</td>
<td>Phys 1A 2B 2C 2D</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>Cl II</td>
<td>4, 3 Phys 1A 2B 2C 2D</td>
<td>Phys 1A 2B 2C 2D</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
</tbody>
</table>
scheduled meetings of the class as published in the 
Class Schedule and Room Directory. The scheduling of 
a midterm examination at a time other than a regularly 
scheduled class meeting requires mutual consent of 
the instructor and each student enrolled in the course. 
A student who does not consent in writing to the dif-
f erent time must be permitted to take the examination 
(or submit the take-home examination) at the officially 
scheduled time. A student who consents in writing to 
the change of examination time waives the right to take 
the midterm at the officially scheduled time.

Credit by Examination

Under certain prescribed conditions, currently enrolled 
students in good standing may receive course credit 
by taking an examination without formally enrolling in a 
course. You may obtain a petition and a copy of the 
prescribed conditions from the Registrar's Office. The 
petition is subject to the approval of the instructor giv-
ing the examination and the department involved.

The completed petition, accompanied by a fee of $5, 
must be presented for final approval to the dean of your 
college or school, or if you are a graduate student, to 
the Dean of the Graduate Division.

The credit received for the examination may not duplic-
ate any credit you have already applied toward your 
degree. The final results will be reported to the Reg-
istrar who will assign you the appropriate grade and 
grade points. Since failure to pass the examination will 
be recorded as an F, you are encouraged to prepare 
fully for such an examination before attempting it.

SCHOLARSHIP DEFICIENCIES

The following provisions apply to all undergraduate 
students in the Colleges of Agricultural and Environ-
mental Sciences, Engineering, and Letters and Sci-
ce. Graduate and professional students with scholar-
ship deficiencies are subject to action at the discre-
tion of their respective deans.

A student will be placed on probation for failure to meet 
qualitative or quantitative standards of scholarship. 
The qualitative standards of scholarship require that a 
student maintain a C average (2.0) or better for all work 
undertaken within the University and for the work 
undertaken in any one term.

A student will be placed on probation for qualitative 
reasons if, at the end of any term, the student's grade-
point average (GPA):

- is less than 2.0, but not less than 1.5, for the term
- is less than 2.0 for all courses taken within the 
  University of California.

A student will be subject to disqualification for quali-
tative reasons if, at the end of any term,

- the student's grade-point average (GPA) is less 
  than 1.5 for the term
- the student has attempted more than 16 units 
  graded "I" (Incomplete)

- the student has spent two consecutive quarters on 
  academic probation without achieving a cumula-
tive grade-point average of 2.0.

The quantitative standards, referred to as minimal 
progress requirements, define scholarship in terms of 
the number of units that must be satisfactorily com-
pleted. Minimal progress requirements do not apply to 
students enrolled in the Part-Time Degree Program or 
to students who have their dean's approval to carry less 
than the minimum program load because of medical 
disability, employment, a serious personal problem, a 
death in the immediate family, or an accident.

"Below minimum progress" will be noted on the trans-
script the first time the total number of units passed at 
UCD is less than:

- 36 at the end of the third term of enrollment
- 72 at the end of the sixth term of enrollment
- 108 at the end of the ninth term of enrollment
- 144 at the end of the twelfth term of enrollment
- 180 at the end of the fifteenth term of enrollment

"Below minimum progress; subject to disqualification. 
Continued registration will be at the discretion of the 
dean of your college, and any questions should be 
directed to the dean," will be noted the second con-
secutive time the total number of units passed at UCD is 
less than those listed above.

Once a student is in good standing and has met quan-
titative standards for scholarship, the notations will be 
removed from the transcript.

It is assumed that a student will earn 180 units and 
obtain a degree prior to the fifteenth term.

The following courses may be counted toward unit 
minimums:

- Required non-credit courses, e.g. Mathematics B, 
  will be evaluated according to the "Carnegie unit" 
  rule and counted as units passed (see page 127)
- Repeated courses passed to improve D or F 
  grades
- Courses passed during Summer Session at UCD 
  or at another accredited school and transferred to 
  UCD shall be counted as units passed (applied to 
  quarter of enrollment just preceding the Summer 
  Session)
- Courses passed by examination in accordance 
  with policies established by the Divisional Com-
  mittee on Courses (applied to quarter in which 
  examination is taken)
- Courses graded IP (in progress) will be counted as 
  units passed.

The faculty of a college may grant a student a minimum 
progress variance of one or more quarters for an 
acceptable reason. A student is given a warning on the 
first instance of failing to make minimum progress but is 
not removed from scholastic good standing. The 
second consecutive time a student fails to complete the
required minimum number of units, continued registration will be at the discretion of the student's dean. Students who fail to make minimum progress may continue to take courses using their Passed/Not Passed grading option. Advising assistance should be obtained either through the student's own adviser or in the college Dean's Office.

Transfer with Scholastic Deficiencies
To transfer from one University campus to another, or from one college or school to another on the same campus, a disqualified or probational student must obtain the approval of the dean whose jurisdiction is being sought. Following the transfer, the student is subject to supervision by the faculty of the new college, school, or campus.

STUDENT RESPONSIBILITY
You are responsible for compliance with the announcements and regulations printed in this catalog and in the Class Schedule and Room Directory, published in the campus newspaper, and with all regulations of the University.

You will not receive grades, transcripts of record, teaching credentials, or diplomas until you have met all University obligations. Any past obligations which you have not satisfied or had officially extended may prevent your registration.

Student Conduct and Discipline
Students enrolling or seeking enrollment in the University assume an obligation to act in a manner compatible with the University’s function as an educational institution. Rules concerning student conduct, student organizations, use of University facilities, and related matters are set forth in both University policies and campus regulations. A standard for student conduct is outlined in the booklet University of California Policies Applying to Campus Activities, Organizations, and Students. The operation of the campus student disciplinary system is outlined in the booklet UCD Administration of Student Discipline. These policies and regulations are available from the Office of the Vice Chancellor—Student Affairs, 541 Mrak Hall, and the Coordinator of Student Judicial Affairs, 466 Memorial Union.

A one sheet summary of student conduct expectations is distributed in the registration process. Misconduct for which students are subject to discipline includes, but is not limited to, plagiarism, cheating, knowingly furnishing false information to the University, forgery, and alteration or misuse of University documents, records, keys, or identification. Disciplinary sanctions which may be involved range from a warning to dismissal and/or restitution.

Alleged violations of campus or University standards will be investigated by appropriate officials, and may be referred to a hearing before the Student Conduct Committee, Campus Judicial Board, the Coordinator of Student Judicial Affairs, or another appropriate officer.

The President of the University, through the Chancellor, has ultimate authority for the administration of student discipline.

BACHELOR'S DEGREE REQUIREMENTS
Three groups of requirements must be satisfied before a student can become eligible for candidacy for the bachelor's degree. They are:

1. University requirements, which are general and apply to all schools and colleges;
2. College or school requirements; and
3. Individual major requirements.

For information on college, school, or major requirements, see the appropriate section of this catalog, the Registrar's Office, or college and school deans' offices.

UNIVERSITY REQUIREMENTS
Subject A: English Requirement
The University requires every undergraduate student to demonstrate college-level proficiency in English composition. Satisfaction of the Subject A requirement is a prerequisite to all other undergraduate courses in English.

The requirement, as determined by Undergraduate Admissions, may be met in one of the following ways:
• By achieving a score of 600 or higher on the College Entrance Examination Board (CEEB) Achievement Test in English Composition.
• By achieving a grade of 5, 4, or 3 in the CEEB Advanced Placement Examination in English.

• By entering the University with credentials showing the completion of an acceptable 3-semester or 4-quarter unit college-level course in English composition with a grade of C or better.

• By passing with credit the California State University and Colleges English Equivalency Examination. (Note: the CSUC English Placement Test may not be used to satisfy the Subject A requirement.)

• By writing a passing essay on the Subject A Diagnostic Examination. This examination may be taken only once. It is offered during the Summer Advising sessions and the Orientation period at the beginning of each quarter. Consult the "Orientation Calendar and Registration Events" published prior to the beginning of each quarter for time and location of the Orientation Week examination.

If you have not satisfied the requirement in one of the ways described above, you must enroll in English A during your first quarter of residence at the University, or as soon thereafter as space is available in the course.

International students whose native language is not English can meet the Subject A requirement by passing a special examination in English composition and, if necessary, completing English 25 (English for Foreign Students) with a minimum grade of C.

American History and Institutions

The American History and Institutions Requirement insures that every graduating student will have at least a minimum knowledge of the background of this country's development and an understanding of the political, economic, and social interrelationships of its way of life.

You may meet this requirement in any of the following ways:

• By offering one high school unit in American history, or ½ high school unit in American history and ½ high school unit in civics or American government, with a grade of C or better in each course.

• By completing any one of the following courses:
  - Afro-American Studies 10, 100, 120, 121
  - Asian American Studies 1, 2
  - Economics 111A, 111B
  - Native American Studies 20, 116, 130A, 130B, 130C, 155
  - Political Science 1, 5, 5D, 100, 101, 102, 103, 104, 105, 106, 108, 109, 113, 127, 128, 160, 163

(Students electing to offer one of the above courses are subject to the rules that apply for prerequisites and majors.)
By presenting evidence that the requirement has been satisfied through courses in the area of American History and Institutions at another collegiate institution whose credits are acceptable for transfer to the Davis campus.

By successful completion of the Advanced Placement Examination in American History.

International students studying at the University with F class (student) or J class (exchange visitor) visas should contact the Registrar’s Office to secure exemption from this requirement. Bring your passport, visa, and registration card with you.

Further information may be obtained from the Supervisor of the American History and Institutions Requirement, 124 Mrak Hall.

Residence Requirements

The minimum residence requirement for a bachelor's degree at the University of California is one academic year (three quarters). Each summer session in which a student completes a course of at least 2 quarter units may be counted as half a quarter's residence. Thirty-five of the final 45 quarter units completed by each candidate must be earned in residence in the college or school in which the degree is to be awarded; no more than 16 of these 35 quarter units may be completed in summer session courses at UCD.

There are additional residence requirements in the College of Letters and Science (see page 93). If you are planning to study abroad during your senior year, you should consult your college dean's office.

With the approval of the dean of a student's college or school, a candidate for the bachelor's degree who was in active service in the armed forces of the United States in the year preceding the award of the degree may be recommended for the degree after only one quarter of University residence in which the candidate completes at least 16 units or passes a comprehensive examination in the major or field of concentration.

Scholarship Requirement

To receive a bachelor's degree, you must obtain twice as many grade points as units for all courses you have attempted in the University. An exception to this rule is authorized for those students undertaking certain honors courses. For specific college and school requirements consult the appropriate sections of this catalog.

Unit Requirement

A minimum of 180 quarter units is required for graduation. These must be distributed according to the mini-
minimum requirements set forth by the faculty of your college or school (see individual college and school sections of this catalog).

The acceptability of transfer courses for unit credit is determined by the Office of Admissions. The acceptability of such courses toward specific requirements is determined by the individual college or school.

Filing for Degree Candidacy
Each candidate for an undergraduate degree must file an Announcement of Candidacy with the Registrar at the beginning of the quarter in which the candidate plans to receive the degree. The dates for filing are published in the calendar on page 6.

HONORS AND PRIZES

Deans' Honors List
According to Davis campus regulations, the quarterly Dean's Honors List is comprised of names of students who have completed, for a letter grade, a minimum of 12 units in a specific term with a grade-point average equal to or higher than the minimum grade-point average attained by the upper 15 percent of those registered in the same class-level and college during the preceding term. Any additional regulations set by a particular college will be stated within that section of this catalog. Honors Lists will be posted quarterly on bulletin boards outside Dean's Offices, and a notation of these honors will be placed on each student's permanent record in the Registrar's Office.

Graduation Honors
The current program for honors at graduation is being phased out. See specific College sections for minimum grade-point averages required to qualify for honors.

Following is a description of the new honors program effective for Fall 1982:

Honors at graduation will be awarded to students who have completed units of credit in the University with a grade-point average which places them in the corresponding top percentage of the graduating class of their college or school, based on the most recent grade report available (normally winter term grades for candidates for June in each year) as shown in the following table:

<table>
<thead>
<tr>
<th>Total Quarter Units Completed</th>
<th>Honors at UC</th>
<th>Honors High Honors</th>
<th>Highest Honors Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-89</td>
<td>4%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>90-134</td>
<td>6%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>135+</td>
<td>8%</td>
<td>4%</td>
<td>4%</td>
</tr>
</tbody>
</table>

All students having the same grade-point average as that of the student who falls at each percentage cut-off point as specified in the table above will be awarded the same category of honors as that student. The grade-point averages which mark the cut-off points for each honors category for the June graduating class will be used as minimum criteria for the award of the same category of honors to students who graduate in summer sessions and fall and winter terms immediately following. Students should refer to specific College sections of this catalog for any additional requirements.

A notation of awards is made on the student's diploma and on permanent records in the Registrar's Office.

Prizes

The University Medal is the highest honor awarded to a graduating senior in recognition of superior scholarship and achievement. In addition, a College or School Medal is given to the outstanding graduating student in each of the colleges and professional schools.

Departmental citations, special awards, and prizes are also awarded to students for superior achievement and scholarship.

Honorary Societies

Election to an honorary society is one of the most prestigious awards a student can receive. At UC Davis, the following honorary societies are represented:

- Alpha Epsilon (Agricultural Engineering)
- Alpha Omega Alpha (Medicine)
- Alpha Zeta (Agriculture)
- Omicron Nu (Home Economics)
- Order of the CoI (Law)
- Phi Beta Kappa (Liberal Arts)
- Phi Kappa Phi
- Phi Zeta (Veterinary Medicine)
- Pi Mu Epsilon (Mathematics)
- Pi Sigma Alpha (Political Science)
- Prytanean Society (Women)
- Sigma Xi (Research)
- Tau Beta Pi (Engineering)
Challenges and opportunities arising from social and technological changes characterize these times. Today's challenges — protecting the environment from man's diverse activities, improving nutrition in major segments of the population, developing and utilizing human and renewable natural resources — are reflected in the programs and offerings of the College of Agricultural and Environmental Sciences.

Teaching and research in the College now extend far beyond the traditionally important mission of food and fiber production. Activities range from the soil to the home, from the farms to the cities. The best uses of land and forest areas, as well as the control of water for home, agriculture, wildlife, recreation, and industry are studied. These areas, reflected in the 42 majors and programs in the College, offer interesting and practical career opportunities.

Social problems as well as technological advances are major College considerations. The goal is to develop concern within people; a concern not only with the technology but with the human problems that such technology might create. Through the application of the biological, physical, and social sciences to resource management, farming, ranching, business, education, conservation, recreation, the family, and the community, College programs are designed to meet today's challenges and contribute significantly to effective solutions for tomorrow's problems.

**ADMINISTRATIVE STRUCTURE**

The College's administrative structure was designed by students, faculty, and administrators to insure the flexibility, responsiveness, and rigor of programs in the face of continually changing educational needs. An ongoing review and updating of teaching programs is the result of faculty and administrative concern not only with providing good teaching, but also with student receptiveness to subjects being taught.

The College is organized to help students determine what they want and need to learn — and then to assist them in learning it. Furthermore, the focus of the College's programs is on activities for which there is a societal demand, and on providing opportunities to explore the usefulness of classroom work in study-internship situations.

**STUDENT RESPONSIBILITY**

In recent years, student point of view has had a significant impact on both educational programs and College governance. Students participate in designing the College's programs and are included on College, departmental, and general faculty committees that determine a wide spectrum of educational and administrative policies. If you want to take part in the committee system, express your interest to the College Office, 228 Mrak Hall.

Teaching excellence depends on constructive help from all students. As full participants in the educational process, students are expected to provide faculty advisers, departmental chairpersons, and the deans with candid appraisals of College programs. The College also uses questionnaires to evaluate the success of its programs and to determine immediate student reactions to courses and instructors. You are encouraged to communicate with the College Office at any time, in person or by letter, concerning the impact of College programs on your education or ways in which these programs may be improved. Such information is very important in planning to meet the educational needs of future students.

**PROGRAM PLANNING**

**Your Role**

Although many services are provided to assist in program planning, in the last analysis you are the one who determines which program to pursue. The most crucial
College of
Agricultural and
Environmental
Sciences

decision you make in this process is selecting your educational objectives. These may or may not require enrollment in a university. As part of making this decision, you should investigate the educational opportunities in the College by visiting the campus before applying for admission and talking with the deans, faculty members, and students. If the University is to be a means of reaching a career decision, you should examine its potential for meeting your goals.

Once you decide to enroll in the College and have chosen an educational objective, be it specific or exploratory, the College’s advising services can be of assistance. Our advisers know the resources of the College and can help you use them to accomplish specific goals. The advisers can, in fact, be called upon long before you arrive on campus. High school students desiring information about college preparatory programs and college students contemplating transfer are encouraged to seek guidance from our deans and faculty advisers as early as one or two years before coming to the Davis campus. This is best done in person, although information can be provided by letter or phone.

It has been the experience of advisers that much of the inflexibility attributed to College programs exists only in the mind of the student. Recommendations meant to serve as guides are sometimes misunderstood to be hard and fast rules. The phrase “courses normally taken by students” often leads students to believe the courses are specifically required when they are not.

The concept of prerequisite knowledge is particularly misunderstood. Education is a building process. It is difficult or impossible to learn advanced principles without first understanding elementary ones. As a matter of convenience, most students acquire preparatory knowledge through prerequisite courses, but that is not the only route available. If you have acquired the prerequisite knowledge by other means, you need not take the specified prerequisite. Instructors will often indicate on the basis of informal discussions that you are prepared for advanced study without the need for courses. Courses may also be challenged by examination (see page 59).

Flexibility in planning has also been constrained by the belief that students in one college may not take courses in other colleges. This is not true. Within the boundaries of enrollment limitations and Academic Senate policy — and your ability to acquire useful knowledge as a result of taking a particular course — you may enroll in almost any course listed in this catalog.

Faculty Advisers

You will be assigned a faculty adviser to help you plan a program that corresponds to your individual educational interests. The assignments are made by Master Advisers, each of whom is responsible for coordinating advising within a major. If you have not decided on a specific major, you will be assigned to the Exploratory Program. In this case, you will have an adviser especially familiar with the breadth of course offerings available in this and other colleges. On the other hand, if you have well-defined educational objectives, you will be assigned an adviser with the training and experience required to facilitate your program planning.

The function of advisers is to sensitize students to the educational opportunities at Davis, to discuss the implications of one option or another, and generally, on the basis of experience, to help students achieve their educational goals. The great potential which an adviser-student relationship can have has long been recognized within the College, and you are strongly urged to consult with your adviser each quarter prior to selecting your courses.

As educational objectives evolve, you may, in consultation with the Master Adviser for your major, choose a new adviser whose area of expertise corresponds more directly to your specific objectives.

Advising Centers

General advising on academic programs is available at the College’s Academic Advising Center, 122 Hoagland Hall, where all advising activities in the College are coordinated.

Each of the Subject Matter Areas (SMA) of the College (see page 68) has an Advising Center staffed by advising associates knowledgeable in all aspects of University and College rules and regulations, courses, specific requirements of majors in that SMA, career opportunities, etc. Peer advisers for the SMA are also available at each location.

Peer Advisers

Student advisers are available in the College’s Academic Advising Center, in other advising centers, and at The First Resort (see page 28). These peer advisers keep themselves up to date on the “how’s,” and “where’s,” and “why’s,” of University operating procedures. They are prepared to answer a variety of questions about courses, requirements, and enrollment procedures, and are both a source of information and a means of referral to the right person or office for action.

Associate Deans of Resident Instruction

The College has associate deans responsible for each of the following subject areas: Animal Science; Applied Economic and Behavioral Sciences; Biological Sciences; Food, Nutrition, and Consumer Sciences; Plant Sciences and Pest and Disease Management; and Resource Sciences and Engineering. They welcome the opportunity to become acquainted with individual
students and to talk informally with them. They can also help you with academic problems if you are placed on probation or subject to dismissal.

Orientation Class
Each quarter the College offers an orientation class (see page 264) to introduce students to the University, to aid them in formulating educational objectives, and to help them identify the many educational opportunities at UCD. Although not required, this course is recommended as a useful means for discovering what the Davis campus and the College of Agricultural and Environmental Sciences are all about.

Expanded Course Descriptions
Most of the majors available in the College of Agricultural and Environmental Sciences allow for considerable freedom in selecting courses. You may find, however, that because of space limitations the descriptions in the Catalog will not include all the information you would like about a course. The faculty of the College has responded to this need by writing the "Expanded Course Descriptions" giving more detailed explanations about each of its course offerings. These descriptions are available each quarter to assist students in selecting their courses. They contain such information as course goals, texts used, preparation required of students, bases for grading, course format, detailing of special assignments (papers, field trips, etc.), and a topical outline of the material to be covered.

Copies of the "Expanded Course Descriptions" are available for on-campus use at the Shields Library Reference and Periodicals desks, the College Dean's Office, advisers' offices, advising centers, departmental offices, The First Resort, and in the dormitories at the head residents' offices.

Work-Learn Opportunities
The Work-Learn and Career Planning and Placement Office assists students in arranging supervised internships — full-time or part-time — for the summer or for any quarter of the academic year. By participating in a work-learn experience students have an opportunity to try various work situations and test their career aspirations and objectives.

Some work experiences are introductory in nature and demand a limited time commitment and have no academic credit involved. Others require more intensive work and may offer academic credit or salaries. Freshmen and sophomores who wish to secure credit for an internship may arrange for enrollment in a 92 or 192 course through the appropriate department and Work Learn and Career Planning and Placement Office. Students must complete at least 84 units in order to enroll in a 192 course. (See page 128 for details.) A maximum of 12 units of internship courses and 20 units of variable-unit courses (see College requirement on page 70) may be counted toward the 180 units required for graduation.
MAJORS AND SPECIAL PROGRAMS

Choosing a Program

There are several alternatives available to undergraduate students in the College of Agricultural and Environmental Sciences:

- A regularly established major program
- An individually designed major program
- A preprofessional program
- The exploratory program eventually leading to one of the first two alternatives above

The majors and special programs in the College are listed below according to Subject Matter Areas. Questions regarding a major should be addressed to the appropriate associate dean. Complete outlines of these majors and programs are presented in the Majors and Courses section of this catalog.

If you fulfill the requirements for more than one major in the College, that accomplishment can be noted in the memorandum section on your transcript. Requests for certification of multiple majors should be made in the College Office. Additional majors should also be indicated on the Candidacy Card when filing for graduation.

ANIMAL SCIENCE — G.A.E. Gall, Ph.D., Associate Dean
College Office, 228 Mrak Hall, 752-6970
Majors in Animal Science:
Animal Science
Avian Sciences
Wildlife and Fisheries Biology
Interdisciplinary Major:
Agricultural Science and Management

APPLIED ECONOMIC AND BEHAVIORAL SCIENCES — Warren E. Johnston, Ph.D., Acting Associate Dean
College Office, 228 Mrak Hall, 752-6360
Majors in Applied Economics:
Agricultural and Managerial Economics
Development, Resource and Consumer Economics
Majors in Behavioral Sciences:
Agricultural Education
Applied Behavioral Sciences
Design
Environmental Planning and Management
Environmental Policy Analysis and Planning
Human Development
Native American Studies

BIOLOGICAL SCIENCES (an Intercollegiate Division)
— Donald L. McLean, Ph.D., Divisional Dean
Division Office, 150 Mrak Hall, 752-0391
Majors in Biological Sciences:
Bacteriology
Biochemistry
Biological Sciences
Botany
Genetics
Physiology
Zoology
FOOD, NUTRITION AND CONSUMER SCIENCES
— J. R. Whitaker, Ph.D., Associate Dean
College Office, 228 Mrak Hall, 752-6971

Majors in Food Sciences:
Fermentation Science
Food Biochemistry
Food Science

Majors in Nutrition:
Community Nutrition
Dietetics
Nutrition Science

Majors in Consumer Sciences:
Consumer Food Science
Home Economics
Textiles and Clothing
Textile Science

Individual or Interdisciplinary Majors:
Exploratory (non-degree program)
Individual Major

PLANT SCIENCES AND PEST AND DISEASE MANAGEMENT — J. M. Lyons, Ph.D.
Associate Dean
228 Mrak Hall, 752-0319

Majors and Programs in Plant Sciences:
Plant Science
Preforestry (non-degree program)
Range and Wildlands Science

Major in Pest and Disease Management:
Entomology

Interdisciplinary Programs:
Agrarian Studies
International Agricultural Development

RESOURCE SCIENCES AND ENGINEERING
Leonard O. Myrup, Ph.D., — Associate Dean
College Office, 228 Mrak Hall, 752-0110

Majors in Resource Sciences:
Atmospheric Science
Environmental Toxicology
Renewable Natural Resources
Soil and Water Science

Major in Agricultural Engineering:
(See College of Engineering, page 80)

Exploratory Program

Sometimes you may be undecided about the major you really want to pursue. Or you may want to learn more about the alternatives available to you in the College. The Exploratory Program permits you, with the assistance of selected advisers, to choose courses in order to pinpoint your interests and aptitudes. This is not a degree program, but is an aid in finding the major that best meets your needs. You should not expect to stay in the program beyond 120 units, however, as it may delay graduation. For registration purposes, indicate Exploratory on your admissions materials and study list cards. Advising information is available from the College’s Academic Advising Center, 122 Hoagland Hall.

Individually Designed Major Programs

You may design an individual major if you have a specific academic interest not represented by an established major. Such a major requires the selection of interrelated courses totalling 45 upper-division units from two or more areas of study. After preliminary consultation about this special program with the Master Adviser for the Individual Major, you then plan your major with at least two faculty advisers. The proposed program must be submitted to a special committee for review at least four quarters before you plan to graduate.
Titles of some individually designed major programs developed recently by students are: Business Management and Human Relations, Community Health, Creative Therapeutic Recreation, Human Ecology, Hydro meteorology, Physical Therapeutic Science, Psychobiology, Recreation Planning, Environmental Design, Vocational Therapy, and Environmental Education.

Additional information may be obtained by contacting the College's Academic Advising Center, 122 Hoagland Hall. (Also see page 230.)

**Preprofessional Programs**

The preprofessional program in forestry is a two-year plan which prepares students for entering a degree program in forestry or conservation. Davis does not offer a bachelor's degree in forestry; however, advisers in the College can help you prepare a lower-division program that will provide a basis for continuing work at another school. (Also see page 108.)

Preprofessional training requirements for application to professional schools, such as schools of veterinary medicine, law, or medicine, may be satisfied through programs in the College. You should select an undergraduate major on the basis of individual interest and aptitude; no one major will give you an advantage toward admission. Advisers in the College are well-informed about professional requirements and will help you integrate them into your major program. You can obtain more information by contacting the College Office, 228 Mrak Hall; the Office of the Associate Dean — Student Services, School of Veterinary Medicine, 1024 Haring Hall; the Health Sciences Advising Office, South Hall; or the Pre-Law Advising Office, South Hall.

**Teaching Credentials**

Inquiries concerning preparation for teaching credentials in agriculture and home economics should be addressed to the Department of Applied Behavioral Sciences, University of California, Davis 95616.

For general information on obtaining the teaching credential, see page 105.

**REQUIREMENTS FOR THE BACHELOR'S DEGREE**

It is your responsibility to see that all requirements for graduation are fulfilled. In brief, these are:

**University Requirements:** See page 60.

**College Requirements:** You must fulfill the Bachelor of Science requirements in a major as prescribed by, or individually designed and approved by, the faculty. Of the required 180 units counting toward a degree:

- Not more than 6 units can be Physical Education 1
- Not more than 20 units can be courses numbered 92, 99, 192, 197, or 199
- 54 units must be upper-division work
- At least 8 units (which must be earned before you have completed 120 units) must be earned in courses in English, or English and rhetoric, or their equivalent, that emphasize written or oral expression. The following UCD courses have been approved for satisfaction of this College requirement:

1. 4 units must be selected from English 1, 2, 20, or 103 (courses with primary emphasis on writing skills).
2. 4 units from one of the unused courses above or from English 3, 104; Comparative Literature 1, 2, 3; Philosophy 5, 10; Rhetoric 1 or 3 (courses emphasizing either writing or speaking skills).

**Major Requirements:** See requirements under specific majors in the Majors and Courses section of this catalog.

**Natural Sciences, Social Sciences, and Humanities Requirements (Breadth Requirements):** Since the broadening effect of any particular course is dependent on your major and general interests, it is not possible to be specific as to what is desirable and what is not. (For example, natural science courses would add more breadth to an Agricultural and Managerial Economics major than they would to a Biochemistry major.) Your faculty adviser has guidelines for each major showing what courses you should consider.

**Filing for Graduation:** You must file a Candidacy Card with the Registrar's Office during the first two weeks of the quarter in which you plan to graduate (see page 63). You must also see your faculty adviser and complete your Major Certification; this form must be received and evaluated by the Dean's Office before your candidacy for a degree can be finalized.

**COLLEGE POLICIES AND PROCEDURES**

**Study List and Major Plan**

The study list is a record of the courses in which you enroll during a particular quarter. It should be part of a larger plan for exploration or attainment of specific long-term goals and should allow for (a) the acquisition of prerequisite knowledge for courses to be taken in subsequent quarters, (b) the fulfillment of College and major requirements, (c) a proper balance between the demands of the courses and your ability to master the subject matter, and (d) meeting the minimum progress regulations (see page 59).

In conjunction with an adviser, you must prepare a written plan that specifies your goals and shows how your graduation requirements will be met. This plan must be filed with your adviser by the end of the second quarter of your junior year (before completing 120 units, in residence or by transfer). Your adviser will then notify the Dean that you have filed your plan.

You will be denied registration for future quarters if you do not comply with this regulation. However, filing this plan does not preclude a change of major or program modifications.
Probation and Disqualification

Students are expected to make reasonable progress toward fulfilling the degree requirements. You must pass at least 36 units during each three terms of enrollment on the Davis campus in order to maintain a good standing status. Refer to page 59 for minimum requirements for subsequent quarters of enrollment and regulations on probation and disqualification.

Passed/Not Passed Option

If you are a regular student in good standing, you may elect to take certain courses on a Passed/Not Passed basis. (See page 55 for complete information.)

By using the Passed/Not Passed option, you can take courses in new areas without the pressure of competing with students who are majoring in the subject. This option should be used only for elective courses, however, not for courses taken to fulfill major requirements. When in doubt, check with your adviser before electing to take a course Passed/Not Passed.

Credit by Advanced Placement Examinations

(See page 58.)

Transfer Students

If you transfer to UCD from another institution, the Admissions Office will determine the unit credit you will be awarded for previous work. The College evaluates the credit awarded by the Admissions Office and determines how many units will be counted as upper-division work. Your faculty adviser then determines how the credit applies toward completion of the major requirements.

In order to make program planning easier for transfer students, the major requirements listed in the Majors and Courses section of this catalog have preparatory subject matter set out in a special category. These preparatory courses may be taken at the University of California or elsewhere. You can generally determine the area of knowledge covered by a specific requirement by reading the course descriptions. You need not present identical courses, only ones that have substantially similar content. If you are attending a community college, consult your counselor to determine which community college courses are appropriate and acceptable for fulfilling College of Agricultural and Environmental Sciences requirements.

If you have questions as to the best way to prepare for transfer to the Davis campus, you are encouraged to write directly to the associate dean responsible for your intended major (see pages 68-69) or plan a visit to the campus to discuss your program with a faculty adviser.

Registration Beyond the 195-Unit Limit

A minimum of 180 units is required for a bachelor's degree. You are normally expected to fulfill all degree requirements by taking 160 to 195 units.

Registration beyond 195 units requires permission from the Dean. If you must exceed 195 units before you complete four years of college study, permission is usually automatic. Beyond the fourth year of college study, permission is granted only for unusual circumstances and only for a limited time. Approval must be obtained before course enrollment materials can be made available for the quarter following completion of 195 units. You must adhere to a specific program of courses and academic performance levels agreed upon.

HONORS

Undergraduate Honors

The Dean's Honors List, published at the end of each quarter, includes the names of all students in the College of Agricultural and Environmental Sciences who have completed at least 12 units on the Davis campus during the preceding quarter (exclusive of units taken on a Passed/Not Passed basis) and who have a grade-point average equal to or higher than the minimum grade-point average attained by the upper 16 percent of students registered in the same class and college during the preceding quarter.

Honors at Graduation

Graduating students who are completing their majors with distinction may be recommended for honors, high honors, or highest honors. The names of these students are announced at commencement, and this distinction is noted on their transcripts and diplomas. (See also page 63.) The minimum grade-point averages required to qualify for honors are as follows:

<table>
<thead>
<tr>
<th>Total quarter units completed</th>
<th>Grade-Point Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Honors</td>
</tr>
<tr>
<td>150 or more</td>
<td>3.20</td>
</tr>
<tr>
<td>90-149</td>
<td>3.40</td>
</tr>
<tr>
<td>45-89</td>
<td>3.50</td>
</tr>
<tr>
<td>Less than 45</td>
<td>not eligible</td>
</tr>
</tbody>
</table>

College Medal

Each year the outstanding graduating senior in the College is awarded a silver medal, known as the "Agricultural and Environmental Sciences Medal." Scholarly excellence (in a minimum of six quarters at UC Davis) is the primary basis for choosing the recipient.

Scholarships

To encourage capable young men and women to pursue careers in the agricultural and environmental sciences, many companies and private individuals have established scholarships restricted to students in this college. You are encouraged to apply for these scholarships if you have a high scholastic standing and demonstrate exceptional performance. Certain scholarships also require proof of financial need. Information is available from the Scholarship Office, or from the College Office, 228 Mrak Hall. (See also the Scholarship section, beginning on page 41.)
Engineering is the profession in which the physical, biological, and social sciences are applied in a practical way for the benefit of mankind. As an engineering student, you will learn to observe and describe problems that deal with human needs and to seek useful solutions to these problems. Your skills upon graduation will be useful to you not only as an engineer, but also as a professional in management, sales, operations, manufacturing, and other fields.

Eighteen undergraduate engineering curricula, including six formal double-major programs, are offered at Davis. These are all four-year programs that lead to the degree of Bachelor of Science in Engineering. Within each curriculum, areas of specialization are available through the selection of suitable technical elective courses. If your specific career objectives are not compatible with the established curricula, an individual engineering major can be proposed.

With the exception of the individual major, the four-year undergraduate program is divided into two parts. The first part (the Lower Division Program) is made up of mathematics, physics, chemistry, humanities and social sciences courses, and certain introductory engineering courses. The Lower Division Program is essentially the same for all engineering curricula, with the exception of Chemical Engineering and the double major in Chemical Engineering/Materials Science and Engineering. The second part (the Upper Division Program) is made up of elective courses and a group of required technical courses pertinent to your intended major. Most of your senior year is elective, to be divided between technical and non-technical courses. The major programs are outlined on pages 180 through 183.

It takes more than four years of schooling to learn all you need to know about any profession. The objective of the undergraduate programs in engineering, therefore, is to form an appropriate foundation for a lifetime of learning. Extended learning after graduation—on-the-job experience, individual study, extension courses, or formal graduate study—is an essential part of an engineering education. And since practical experience during your undergraduate years is also useful, you are encouraged to participate in engineering internship programs.

For information on graduate programs leading to the Master of Engineering, Doctor of Engineering, Master of Science, and Doctor of Philosophy degrees, or Graduate Certificate Programs, see page 87.

E.C.P.D. Accreditation

The following Engineering curricula are accredited by the Engineers' Council for Professional Development: Agricultural Engineering, Chemical Engineering, Civil Engineering, Electrical and Computer Engineering, and Mechanical Engineering.

ADMISSION TO THE COLLEGE OF ENGINEERING

Admission to Freshman Standing

There are no special requirements for admission to the College of Engineering other than the general University requirements beginning on page 45. It is recommended, however, that you take the following subjects (or integrated courses covering substantially equivalent material) during high school:

<table>
<thead>
<tr>
<th>Subject Areas</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebra</td>
<td>2</td>
</tr>
<tr>
<td>Plane geometry</td>
<td>1</td>
</tr>
<tr>
<td>Trigonometry</td>
<td>½</td>
</tr>
<tr>
<td>Analytic geometry</td>
<td>½</td>
</tr>
<tr>
<td>Chemistry and/or physics</td>
<td>1</td>
</tr>
</tbody>
</table>

These subjects are prerequisite to certain basic courses in the freshman engineering program. You will be required to make up equivalent work if you are
admitted without this preparation. As a result, graduation could be delayed. A year of high school mechanical drawing is also recommended, but not required.

**Advanced Placement Examination**

Credit toward the total unit requirement for the degree is awarded for CEEB Advanced Placement Examinations satisfactorily passed, as indicated in the table on page 58. Except as otherwise noted in the table, these units may be used to satisfy specific graduation requirements in the College of Engineering.

**Admission to Advanced Standing**

While it is possible for community college students to transfer to UC Davis after completing only the freshman year, you are urged to take the entire Lower Division Program at the same school. After completing the basic lower-division engineering curriculum at a California community college, it is possible to complete your studies at Davis in two academic years. Questions about community college programs should be directed to your counselor, or you can contact the UC Davis College of Engineering Undergraduate Office directly. (For information on admission to the University in advanced undergraduate standing, refer to the Admission section of this catalog.)

If you are admitted with fewer than 84 quarter units of college work (56 semester units), you are classified in lower-division standing, and must complete one of the two Lower Division Programs listed on pages 180-181. You are advanced to upper-division standing after completing 84 units.

If you are admitted with 84 or more quarter units, you are classified in upper-division standing, but you are required to complete the minimum number of quarter units in the subject areas specified before your Lower Division Program is considered complete. You may, however, start your Upper Division Program while completing your Lower Division Program.

**Subject Areas**

<table>
<thead>
<tr>
<th>Subject Areas</th>
<th>Minimum Quarter Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mathematics</strong> (calculus, differential equations, vector analysis)</td>
<td>18</td>
</tr>
<tr>
<td><strong>Physical and biological sciences</strong> (at least 10 units must be in general chemistry and at least 12 units in physics for engineering and science students)</td>
<td>27</td>
</tr>
<tr>
<td><strong>Engineering</strong> (lower-division subjects such as graphics, properties of materials, surveying, computer programming, statics, and circuit theory. Chemical Engineering majors may elect to take only 12 units of engineering in their Lower Division Program)</td>
<td>15</td>
</tr>
<tr>
<td><strong>Written and oral expression</strong> (courses equivalent to English 1, and Rhetoric 1 or 3)</td>
<td>8</td>
</tr>
</tbody>
</table>

**Humanities-social sciences** (must be selected from a list of course groups approved by the Committee on Undergraduate Study) ... 8

**Unspecified subjects** (Chemical Engineering majors should take quantitative analysis and one course in organic chemistry with laboratory during their sophomore year) ... 8

**Total** ........................................ 84

Once you have completed the Lower Division Program on this basis, it is not necessary to take additional lower-division courses, except those that are prerequisite to upper-division courses in your curriculum.

The minimum number of required units in the Lower and Upper Division programs varies from 180 to 195. Engineering is closed to Limited Status, Special Status, and Second Baccalaureate applicants.

**CHANGE OF COLLEGE AND MAJOR**

Petitions for change of major and transfer into the College of Engineering from another UCD college will be considered only from students who have completed at least 60 units of work at the Davis campus but not more than 150 units overall, and have completed Mathematics 21A, 21B, 21C, and Physics 8A or the equivalent. It may be necessary to limit the number of applications that are approved, in which case selection will be based on UC grade-point averages. These limitations on transfer into the College apply only to students who first entered UCD in March of 1979 or later. See page 54 for details on filing petitions.
ACADEMIC ADVISING

In establishing the College of Engineering’s undergraduate programs, every effort has been made to provide for maximum flexibility consistent with rigorous preparation for professional practice or graduate study. The key to developing a flexible program for each student is an effective system of advising.

Every engineering undergraduate is assigned to a faculty member for academic and career advising, and every full-time engineering faculty member has 25 to 30 advisees.

Adviser assignments are made and coordinated through the College’s Undergraduate Office, which assigns you an adviser prior to your first term on campus. New students who participate in the Summer Advising Program will have individual appointments scheduled with faculty advisers during the program. Other new students are asked to meet with their faculty advisers during the orientation period that precedes the first week of classes.

Since a close relationship between you and your faculty adviser can be one of the most important factors in a successful educational experience, you are encouraged to come into the Undergraduate Office and select a new faculty adviser whenever you wish.

Faculty advising is complemented by a well-developed peer advising system. Student advisers are available at the Student Center in Bainer Hall and at other locations listed in the index under Advising.

CHOOSING A MAJOR

The majors (curricula) in the College of Engineering are:

- Aeronautical Engineering
- Agricultural Engineering
- Agricultural Engineering (Forest Engineering option)
- Chemical Engineering
- Civil Engineering
- Electrical and Computer Engineering (General)
- Electrical and Computer Engineering (Computers)
- Electrical and Computer Engineering (Electronics, Circuits and Signal Processing)
- Electrical and Computer Engineering (Solid-State, Microwave and Quantum Electronics)
- Materials Science and Engineering
- Mechanical Engineering
- Agricultural Engineering/Materials Science and Engineering
- Chemical Engineering/Materials Science and Engineering
- Civil Engineering/Materials Science and Engineering
- Electrical and Computer Engineering/Materials Science and Engineering
- Mechanical Engineering/Aeronautical Engineering
- Mechanical Engineering/Materials Science and Engineering
- Individual Engineering Major

Note that six of these are double majors. Degree requirements for each of these double majors can be completed in four academic years.

The Individual Engineering major is designed by you with the help of your adviser, and is subject to approval by the Engineering Undergraduate Study Committee.

Many students who enter the College of Engineering have well-defined career objectives. Others do not. All engineering students are formally classified as Engineering—Lower Division until 84 quarter units of college work have been completed. Your official designation of an engineering curriculum does not take place until the end of your sophomore year. If you are planning to graduate under the Chemical Engineering or the Chemical Engineering/Materials Science and Engineering curricula, however, you should make that decision during your freshman year and plan your entire program accordingly.

You are encouraged to make use of the many advising and counseling sources available to students if you are uncertain about your choice of a major. Guidance within the College is available through faculty and student advisers, instructors, and the academic deans. The Career Planning and Placement Office, Advising Services Office, Counseling Center, and other sources listed in the index under Advising are also good places to seek assistance.

Introductory Courses

A number of freshman engineering courses are designed to describe the engineer’s role in society and to show the similarities and differences among various engineering branches. Included are:

- Engineering 3 (Introduction to Engineering Systems)
- Agricultural Engineering 1 (The Agricultural Engineer in Tomorrow’s World)
- Chemical Engineering 1 (The Scope of Chemical Engineering)
- Civil Engineering 1 (The Civil Engineer in Society)
- Electrical and Computer Engineering 1 (Introduction to Electrical and Computer Engineering)
- Mechanical Engineering 1 (Mechanical Engineering)

PLANNING YOUR PROGRAM

You are held responsible for planning your program. But that does not mean you are simply on your own. Your faculty adviser, with whom you are strongly urged to consult prior to registration each quarter, is the primary source of assistance. The Undergraduate Office of the College is willing to assist, as are the many advising offices throughout the campus.

Specific degree requirements for the various engineering curricula are given beginning on page 180.
The minimum number of required units ranges from 180 to 195, depending on the curriculum. Programs normally require a minimum of 12 quarters of study averaging 15 units per quarter. Continuing students can enroll for no more than 21 units, and students in their first quarter of residence can enroll for no more than 17 units unless authorized by the Dean. See page 59 for regulations concerning the minimum rate of progress.

Sample arrangements that list the Lower Division and Upper Division Programs in a quarter-by-quarter sequence may be found in the College of Engineering Bulletin, available from the Engineering Undergraduate Office.

Program Flexibility

In the Lower Division Program for all curricula except Chemical Engineering, only mathematics, Physics 8A and 8B and the lower-division engineering courses are prerequisites to required upper-division engineering courses. These courses should be completed during your first two years. The other physics, chemistry, and humanities-social sciences courses in the Lower Division Program are requirements for graduation, and can be scheduled to suit your individual program.

In planning your four-year program, be careful to observe course prerequisites in order to avoid a delay in graduation. Course prerequisites are specified to help you avoid courses for which you are unprepared and to help the instructor establish a starting point for a given course. The prerequisites for any course may be waived by the course instructor, for good cause, for individual students.

Course Priorities for Freshmen

An extensive background in mathematics is a prerequisite to upper-division engineering courses. Therefore, if you are enrolled in engineering or are considering future enrollment, you should include mathematics in your program from the outset. Course priorities for the first quarter of your freshman year are suggested below.

- Mathematics 11 (if not completed in high school)
- Mathematics 21A (if not completed in high school)
- English A (if the Subject A requirement is not yet otherwise satisfied)
- Other (Engineering 3 or 4, English 1, Chemistry 1A or 4A, Rhetoric 1 or 3, or humanities-social sciences electives)

If you plan to graduate in the Chemical Engineering or the Chemical Engineering/Materials Science and Engineering major, or are considering the possibility, you should take Chemistry 4A-4B-4C in your freshman year.

Expanded Course Outlines

A file of expanded course outlines for all courses offered by the various engineering departments is available for student use at the Undergraduate Office of the College.

Special Courses

Special-Study Courses: You are limited to five Special-Study units (courses 99 and 199) per quarter. (See page 128.)

Work-Learn Programs: Internship courses, numbered 92 and 192, are designed to provide internship experience under the Work-Learn Program (see page 128). Further information is available from your adviser, the College Undergraduate Office, or the Work-Learn and Career Planning and Placement Center.

University Extension Courses: Appropriate courses taken under University Extension may be used for degree credit. Simultaneous enrollment in resident courses and Extension courses requires prior approval of the Dean of the College. Such approval will be given only for a limited number of credits. No grade points are assigned for courses completed in University Extension.

DEGREE REQUIREMENTS

YOU ARE RESPONSIBLE FOR PLANNING YOUR PROGRAM AND FOR SATISFACTORY COMPLETION OF DEGREE REQUIREMENTS.

Degree Requirement Check Sheets for each of the curricula are made available to students and advisers. The Undergraduate Office will prepare only one unofficial degree check for you (preferably at the beginning of your senior year) if you submit a signed Degree Check Request. Further information and forms concerning this service are available in the Engineering Undergraduate Office.

General University Requirements

University requirements for the bachelor's degree are explained beginning on page 60.

College Requirements

Each candidate for the degree of Bachelor of Science in Engineering must satisfactorily complete an approved curriculum in engineering. Each curriculum consists of a specified Lower Division Program (or an approved equivalent program for students who transfer into the College with 84 or more quarter units), and a specified Upper Division Program. Detailed requirements for the approved curricula are given beginning on page 180.

You may, for good cause, request a modification of particular degree requirements by submitting a student petition. These petitions, available in the Undergraduate Office, can be a valuable aid in solving individual program conflicts or other special problems. Such petitions are subject to approval by the Undergraduate Study Committee, a body of five professors and five (non-voting) students. A negative decision by the Committee may be appealed to the College faculty for action at a regular meeting.
English Composition Requirement

The English Composition requirement may be satisfied in one of two ways:

1. By passing the English Composition Examination administered by the College of Letters and Science. (This examination is taken after completion of 84 quarter units of college work. It should be taken early in the junior year and must be taken prior to the last quarter before graduation.)

2. By completing any section of English 103 with a grade of C− or the equivalent, taken after completion of 84 units of college work.

This requirement is in addition to the expository writing course (English 1 or Comparative Literature 1, 2, or 3) specified in the Lower Division Programs.

During the 1980-81 academic year, the English Composition Examination will be offered on November 1, January 31, and April 25. Sign-up rosters will be available in 2132 Bainer Hall, Monday through Thursday of the week prior to each examination.

Degree Requirement Changes

Degree requirements in the various curricula in Engineering can change every year. Any student is free to choose to graduate under the requirements printed in the General Catalog in effect at the time of graduation, or under any of the three preceding catalogs.

Electives

There are four kinds of elective courses in the engineering curricula: basic science and mathematics, humanities-social sciences, technical, and unrestricted.

Basic Science and Mathematics electives: An engineering education is built on a solid foundation in the basic sciences and mathematics. That foundation provides a strong support for continuing academic and professional growth.

The purpose of the basic science and mathematics electives differs from the purpose of the technical electives. The former develop a fundamental base in the sciences, whereas the technical electives provide a direct opportunity for specialization.

The basic science and mathematics electives allow some selectivity in the choice of fundamental courses. For example, if you are interested in agricultural, biomedical, or environmental engineering, you may wish to select fundamental courses in the life sciences; or if you are planning a career related to the earth sciences, you can elect courses in geology. Most other career objectives are best served by courses in chemistry or mathematics.

The following courses are acceptable as basic science and mathematics electives. They must be taken for a letter grade.

<table>
<thead>
<tr>
<th>Biological Sciences 1</th>
<th>Genetics 100A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botany 2</td>
<td>Geology 1, 1L</td>
</tr>
<tr>
<td>Chemistry 1C or 4C, 5, 8A, 8B</td>
<td>Mathematics 22A</td>
</tr>
<tr>
<td></td>
<td>Physiology 2</td>
</tr>
<tr>
<td></td>
<td>Zoology 2</td>
</tr>
</tbody>
</table>

Humanities-Social Sciences electives: When a wise decision-maker examines an engineering problem, both scientific and humanistic components need to be considered. The humanities-social sciences electives are emphasized within the engineering disciplines to better prepare you for such decision making.

Each engineering program must include at least 23 quarter units from subjects in the areas of humanities and social sciences. A wide latitude is allowed in selecting these units. Subjects that are vocationally oriented, however, such as management and accounting, or which contain a preponderance of scientific or mathematical content, are not considered to be humanities—even though they are offered by a department ordinarily classified as a humanities or social science department.

All courses in the following categories, except courses 92, 97T, 98, 99, 192, 197T, 198, 199 and additional exceptions noted in parentheses below, are suitable as humanities-social sciences electives. If you repeat a course which may be repeated for credit, not more than 4 units of that course may be counted toward your humanities-social sciences requirement.

<table>
<thead>
<tr>
<th>Afro-American Studies</th>
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</thead>
<tbody>
<tr>
<td>Agrarian Studies</td>
</tr>
<tr>
<td>American Studies</td>
</tr>
<tr>
<td>Anthropology (except 13)</td>
</tr>
<tr>
<td>Applied Behavioral Sciences (except 160B)</td>
</tr>
<tr>
<td>Art (except 2, 3, 4, 5, 11, 16, 101-146)</td>
</tr>
<tr>
<td>Asian American Studies</td>
</tr>
<tr>
<td>Classics</td>
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<tr>
<td>Comparative Literature</td>
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<tr>
<td>Dramatic Art (except 25, 30, 124A, 124B, 124C, 124D, 180)</td>
</tr>
<tr>
<td>Economics (except 11A, 11B 12, 103)</td>
</tr>
<tr>
<td>Education (except 100, 114)</td>
</tr>
<tr>
<td>English (except A, 1, 25, 26, 104)</td>
</tr>
<tr>
<td>Foreign languages (except 1)</td>
</tr>
<tr>
<td>Geography (except 1, 3, 4, 102, 105, 106, 107, 108, 110, 111, 112, 162)</td>
</tr>
<tr>
<td>History</td>
</tr>
<tr>
<td>Human Development</td>
</tr>
<tr>
<td>Integrated Studies</td>
</tr>
<tr>
<td>Linguistics</td>
</tr>
<tr>
<td>Music (except 1, 41, 43, 44, 45, 46, 141, 143, 144, 145, 146)</td>
</tr>
<tr>
<td>Native American Studies</td>
</tr>
<tr>
<td>Philosophy (except 12, 112, 133)</td>
</tr>
<tr>
<td>Political Science</td>
</tr>
<tr>
<td>Psychology (except 103, 108, 129, 131)</td>
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<tr>
<td>Religious Studies</td>
</tr>
<tr>
<td>Rhetoric (except 1, 3)</td>
</tr>
<tr>
<td>Sociology (except 46A, 46B, 106)</td>
</tr>
</tbody>
</table>

Technical electives permit you to tailor a program to your own academic and career objectives. For some, the technical electives offer the opportunity to prepare for a specific occupation. For others, it is an opportunity to broaden their background in the sciences and engineering.
All upper-division courses in engineering, physics, chemistry, statistics, and mathematics (except Mathematics 101) are suitable as technical electives. If you are interested in expanding your knowledge of the basic sciences, you may choose technical electives from the lower-division courses listed under the basic science and mathematics electives. Many upper- and lower-division courses in the agricultural, earth, and life sciences—as well as a few in the humanities—qualify as technical electives.

Technical elective credit is allowed for engineering special-study courses (199's) up to a maximum of 5 units for each separate and substantially different project. Academic credit is allowed for engineering internship courses (192's), up to a maximum of 5 units per quarter; but a total of not more than 3 units of an engineering 192 may be counted toward technical elective credit.

**Unrestricted electives:** Any course for which University credit is allowed is acceptable as an unrestricted elective in the engineering curricula.

**GRADING**

**Passed/Not Passed Option**

(For general information on Passed/Not Passed grading, see page 55.)

While registered in the College of Engineering, you may enroll in a maximum of one course per quarter in which you choose the Passed/Not Passed (P/NP) grading option. Courses that are graded P/NP only may be taken simultaneously with the courses for which you exercise the Passed/Not Passed option.

In the engineering curricula, only those units taken to satisfy the requirements for humanities-social sciences electives, English 1, Comparative Literature 1, 2, or 3, Rhetoric 1 and 3, unrestricted electives, or requirements identified in the appropriate Upper Division Program as “technical electives,” may be taken on a Passed/Not Passed basis. All others (including required courses and basic science and mathematics electives) must be taken for a letter grade.

You must meet the following conditions to exercise the Passed/Not Passed option:

- Be in good academic standing (not on probation or subject to dismissal)
- Carry at least 12 units, including the course to be taken P/NP
- Have a P/NP petition approved by the Dean or a designated representative

**HONORS**

**The Dean's Honors List**

The Dean's Honors List is posted quarterly on the bulletin board outside the College of Engineering Undergraduate Office. This list includes the names of all undergraduate Engineering students who have completed at least 12 units during the preceding quarter, exclusive of courses taken on a Passed/Not Passed basis, and who have achieved a grade-point average...
equal to or higher than the minimum grade-point average attained by the upper 16 percent of those registered in the College at the same class level during that quarter. A notation is made on the student's records each time the student qualifies for the Dean's Honors List.

Honors at Graduation

Graduating students in the College of Engineering who have achieved distinguished scholarship while at the University may qualify for honors, high honors, or highest honors. The names of these students are announced at Commencement and this distinction is noted on their records and diplomas. Honors at graduation will be awarded to students who have completed the minimum number of units and acquired the grade-point average needed to qualify for honors. Contact the College Undergraduate Office for details. (See also page 63.)

College Medal

Each year outstanding senior students in Engineering are recommended by the faculty of the College as nominees for the College of Engineering Medal. Academic excellence is the primary basis for selecting the recipient of the award.

ENGINEERING UNDERGRADUATE CURRICULA

Aeronautical Engineering

Aeronautical engineering is the application of scientific knowledge to flight or movement in the atmosphere. Specific objectives are the design, development, and manufacture of airplanes, V.T.O.L. aircraft, and high-speed ground transportation systems. Within this context aeronautics becomes an essential branch of mechanical engineering in which knowledge in areas related to transportation is strengthened. For example, the aerodynamics and structural design of a high-speed train and a low-speed airplane have much in common. The undergraduate curriculum is intended to combine the fundamentals of basic engineering disciplines with those in the areas of aerodynamics, propulsion, controls, and aeronautical structures. This training is intended to prepare the student for technical leadership in this rapidly changing field. A broad range of technical elective courses is available. You are encouraged to select these courses from among the several areas of specialization listed below.

AREAS OF SPECIALIZATION

Aeronautics and Transportation: Effective transportation requires vehicle operation under conditions which introduce many of the design problems that in the past have been considered unique to aeronautics. This area of specialization endeavors to provide students with the necessary background to work effectively in this expanding area of high-speed transport vehicle design and development.
Suggested technical electives:

- Mechanical Engineering 124, 150A, 150B, 161, 162, 163, 172
- Civil Engineering 131A, 131B
- Electrical and Computer Engineering 157A, 157B
- Applied Science 115
- Engineering 106, 169, 190
- Environmental Studies 160

Suggested advisers:

B.R. White, J.W. Baughn, P.G. Migliore

**Low-Speed Aerodynamics:** This area of specialization is intended for students who have an interest in the dynamics and aerodynamics of flight and should provide them with the necessary background in aerodynamics, structures, and propulsion to engage in design of low-speed aerodynamic vehicles.

Suggested technical electives:

- Mechanical Engineering 124, 150A, 150B, 161, 162, 163, 165, 172
- Civil Engineering 131A, 131B, 138
- Electrical and Computer Engineering 150, 157A, 157B
- Applied Science 115
- Engineering 148, 190

Suggested advisers:

B.R. White, H. Brandt, P.G. Migliore

**Agricultural Engineering**

Agricultural engineers apply engineering principles to problems of food and fiber production, storage, and processing; animal and plant environments; agricultural wastes management; irrigation and drainage; and other phases of agriculture and related industries. Agricultural engineering is unique in that it requires a general understanding and appreciation of the biological and agricultural sciences, plus a thorough knowledge of basic and applied engineering.

The curriculum includes a substantial number of technical electives that make it possible for you to develop a broad program of study or specialize in one or more of the areas described below. The suggested technical electives listed for each area of specialization include courses that would enhance your knowledge in that particular area. The lists are not intended to be restrictive or all-inclusive.

Lower-division students planning to follow the Agricultural Engineering curriculum are advised to select their basic science and mathematics electives from courses such as Biology 1, Botany 2, Physiology 2, and Chemistry 8A and 8B. Bacteriology 2 and Chemistry 8B are prerequisites to several of the suggested upper-division technical electives for the Food Engineering and Agricultural Processing area of specialization.

**AREAS OF SPECIALIZATION**

**Food Engineering and Agricultural Processing** is concerned with the conversion of agricultural products into food, feed, or fiber. The engineering sciences of fluid mechanics, heat and mass transfer, and an understanding of biological materials, are applied in the analysis, design, and development of operations and systems for food manufacturing and agricultural processing. Concepts of sorting, cleaning, size reduction, handling, storage, refrigeration, drying, food manufacturing, and others are studied.

Suggested technical electives:

- Agricultural Engineering 133, 134
- Biochemistry and Biophysics 101A, 101B
- Chemistry 5, 8A, 8B, 107A, 107B
- Chemical Engineering 151
- Electrical and Computer Engineering 150
- Engineering 103B, 105B, 111
- Food Science and Technology 104, 108, 111, 131, 150
- Mechanical Engineering 165

**Irrigation and Drainage** applies engineering and scientific principles in the design and operation of irrigation and drainage systems. Emphasis is placed on the use of water in agriculture, water quality, on-farm irrigation, and drainage system design, water law, hydrology, and hydraulics.

Suggested technical electives:

- Agricultural Engineering 140, 141
- Atmospheric Science 105
- Civil Engineering 141, 141L, 142, 144
- Engineering 111
- Water Science 103, 104, 110A, 110B, 141, 150, 154, 160, 172

**Packaging and Handling** involves the design of systems and packaging to preserve product quality during handling, shipment, and storage, from origin to point of use. The properties of foods, environmental conditions, and packaging materials are studied, as well as the behavior of products and packages under dynamic, static, and long-term loading. The economic use of materials and of shipping and storage volumes are considered in the analysis and design of systems.

Suggested technical electives:

- Agricultural Economics 114
- Agricultural Engineering 125, 133, 134
- Civil Engineering 161
- Engineering 111, 122, 140
- Food Science and Technology 111, 113, 131
- Mathematics 133
- Mechanical Engineering 152, 155

**Power and Machinery** involves the design, development, and application of field machines and power units for crop production. The economic aspects of mechanization and the effects of machines on soils, crops, and people are considered. Procedures for developing machine components and synthesizing them into engineering systems are studied.

Suggested technical electives:

- Agricultural Economics 140
Agricultural Engineering 112, 114, 117, 118, 119, 157
Agricultural Engineering Technology 133
Civil Engineering 131A, 132A
Engineering 102B, 104B, 111, 122, 140
Mechanical Engineering 150A, 150B, 151, 152, 155

**Structures and Environment** emphasizes the design of agricultural structures. Various structures are analyzed for their functional effectiveness, efficiency of space and labor utilization, and economic value to an overall enterprise. The structure is considered as a means of providing an optimum environment for animal production, product storage and conditioning, or crop production in greenhouses. Environment modification, micrometeorology, and agricultural wastes management are studied.

Suggested technical electives:
- Agricultural Engineering 125
- Atmospheric Science 20, 105, 123, 124, 125, 131, 133
- Civil Engineering 131A, 131B, 132A, 132B, 132C, 134, 147, 148A
- Mechanical Engineering 165
- Physiology 100A, 100B, 149

**FOREST ENGINEERING OPTION**

Forest Engineering is the application of engineering principles and silvicultural knowledge in the management of forests and forest land. Ecological, aesthetic, and recreational aspects of this renewable natural resource are integrated into systems for the production of wood products. Students study systems and equipment for timber harvesting, forest residue management, reforestation, forest recreational facilities, soil and water control and conservation, forest road development, materials handling, and other phases of forestry. This option is administered in cooperation with the Department of Forestry and Resource Management at UC Berkeley. Two or three quarters of your junior year are spent on the Berkeley campus, following a ten-week summer field course sequence at the UC Forestry Camp near Quincy.

Students who transfer to the University from another college to enter this program should apply for admission to the Davis campus even if they plan to attend the Berkeley campus before coming to Davis. These students, as well as those attending the Davis campus before going to Berkeley, obtain Intercampus Visitor status that authorizes them to register on the Berkeley campus for the quarters to be spent on that campus. Application forms for Intercampus Visitor status are available from the Department of Agricultural Engineering.

Suggested technical electives:
- Atmospheric Science 105
- Geography 161
- Resource Sciences 100
- Water Science 141
- Forestry 105 (at Berkeley)

Any elective listed under Upper-Division Program for Forest Engineering Option and not used to fulfill a specific requirement

**Chemical Engineering**

Chemical Engineering is concerned with application of the principles of chemistry and engineering to the production of useful products. The products of the process industries range from antibiotics to zirconium, from petroleum to plutonium, from agricultural chemicals and foods to synthetic plastics. Chemical engineers are increasingly concerned with chemical and engineering processes related to the environment, food production, and medicine. Preparation for careers in chemical engineering requires an understanding of both engineering and chemical principles to develop proficiency in conceiving, designing, and operating new processes.

The Chemical Engineering curriculum has been planned to provide a sound knowledge of engineering and chemical sciences so that you may achieve competence in treating not only current technical problems but also those that will arise in the technologies of the future. In the junior year attention is focused on basic engineering courses, particularly thermodynamics, fluid mechanics, and energy transfer. In the senior year these fundamentals are drawn together and applied in a study of mass transfer phenomena and processes, process design, and process dynamics. The program is strengthened and broadened with introductory courses in the electrical and mechanical sciences.

**TECHNICAL ELECTIVES AND AREAS OF SPECIALIZATION**

The curriculum includes 22 units of technical electives, which allows you to strengthen specific areas in Chemical Engineering, to explore new areas, or pursue areas of specialization. You are free to choose your own technical electives, but for those pursuing a normal Chemical Engineering program, Chemistry 111A and 128C are especially recommended and selections from the following list should be considered for the remaining units: Applied Science 115; Chemical Engineering 158; and Mathematics 118A, 118B, 120; and Statistics 130A, 130B. The most popular areas of specialization, together with lists of suggested technical electives, are identified and discussed in the following paragraphs.

The premedical and prebiomedical engineering areas of specialization have been specifically designed so that you may prepare for graduate work in biomedical engineering or meet the undergraduate requirements for entrance into medical school. Because of the emphasis on the natural sciences and their application to fluid mechanics, mass transport, heat transfer, thermodynamics, reaction kinetics, and process dynamics, you are well-prepared to understand similar problems in living systems. Many biological phenomena such as blood flow, passive solute transport, and energy exchange can be dealt with using the theoretical tools learned as an undergraduate.
Applied Chemistry: The Chemical Engineering curriculum includes an important core of chemistry courses. Students can take advantage of this background to build a strong program in chemistry by choosing electives from among advanced undergraduate chemistry courses.

Suggested technical electives:

Applied Mathematics: The mathematics specialization is designed both to strengthen the student’s understanding of the foundations of engineering science and to improve the ability to treat complex engineering problems. Courses in abstract algebra, advanced calculus, and the theory of differential equations provide a sound theoretical background, while courses in analytical and numerical analysis provide the techniques for solving a wide range of engineering problems.

Suggested technical electives:
Applied Science 115
Chemical Engineering 159
Engineering 180
Statistics 130A, 130B

Biochemical Engineering: This area of specialization prepares students to do graduate work in enzyme engineering or biochemical engineering and for employment in the fermentation, drug, and food industries.

Suggested technical electives:
Bacteriology 2, 102
Biochemistry 101A, 101B, 101L, 123, 123L
Food Science and Technology 106

Energy Engineering: This area of specialization is designed to introduce you to the various energy sources and energy conversion methods.

Suggested technical electives:
Engineering 111, 160, 162
Agricultural Engineering 112
Mechanical Engineering 161, 162, 163

Environment Engineering: The environment engineering area of specialization prepares the student to deal with problems of environmental quality by developing knowledge of fundamental chemical and transport phenomena, that is, chemical reaction processes coupled with fluid mechanics, heat transfer, and mass transfer. Such a foundation in basic chemical engineering science, plus the usual chemical engineering analysis and design courses, along with other courses involved specifically with environmental topics, prepares the student to seek employment with industry or government. For this specialization six courses should be selected from the following list:

Suggested technical electives:
(Air Environment)
Atmospheric Science 121A, 121B, 123, 125

Civil Engineering 149, 242, 244
Environmental Toxicology 131
(Water Environment)
Bacteriology 2
Biochemistry and Biophysics 101A, 101B
Civil Engineering 147, 148A, 240, 243A, 243B, 246A, 246B
Water Science 41

Food Process Engineering: This area of specialization prepares students to do graduate work in food science and technology and to work in the food processing industry.

Suggested technical electives:
Bacteriology 2
Biochemistry and Biophysics 123
Food Science and Technology 104, 104L, 111, 119AT, 131, 150, 150L

Prebiomedical Engineering: This area of specialization is designed to prepare you for graduate work in biomedical engineering. Early planning of a complete course schedule in consultation with a Chemical Engineering adviser is important to provide space for Biological Sciences 1.

Suggested technical electives:
Four to six courses from Anatomy 100; Biochemistry and Biophysics 101A, 101B; Biological Sciences 1; Physiological Sciences 101A, 101B; Physiology 111A, 111B, 112, 113.

Premedical: Inclusion of both organic and physical chemistry in the curriculum allows you to complete the premedical requirements while satisfying the requirements of the Chemical Engineering major. Those electing the premedical (including pre-veterinary) area of specialization should verify the specific preparation requirements with a pre-med adviser before making a final decision on electives. In order to insure that room is provided in your program for the biology courses, it is important to prepare a course schedule (with a Chemical Engineering adviser) as early in your freshman year as possible.

Suggested technical electives:
Chemistry 128C
Three to five biology or biochemistry courses such as Biochemistry and Biophysics 101A, 101B; Biological Sciences 1; Genetics 100A, 115; Physiology 112, 113, 114; Zoology 2-2L, 100

Civil Engineering

Civil engineering is devoted to the improvement of the human environment for the purposes of making our activities productive, safe, and enjoyable, and providing aesthetically pleasing surroundings. The profession contributes directly to humanity’s continued health and well-being by the planning and design of systems that provide plentiful supplies of potable water; freedom from disease-carrying wastes; land-, water-, and air-transportation; housing and other structures; flood control; and large recreational facilities.
Areas of specialization within civil engineering include (1) Civil Engineering Planning, (2) Environment Engineering, (3) Structural Engineering, Structural Mechanics and Geotechnical Engineering, (4) Transportation Planning and Engineering, and (5) Water Resources Engineering. You may specialize in one or more of these areas by selecting appropriate technical electives; such specialization is not required. You are urged to consult a faculty adviser when developing your individual program.

Because of the direct concern of professional civil engineers for the quality of human life, civil engineering majors are encouraged to include courses such as Economics 125A and 125B; Environmental Studies 145, 160, and 166; Political Science 108, 109, and 186; and Sociology 143 among their technical electives. Other technical electives of possible interest to majors in all five of the areas of specialization include Applied Science 115, Engineering 160 and 180. Additional information concerning the areas of specialization and suggested courses are given in the following paragraphs.

**AREAS OF SPECIALIZATION**

**Civil Engineering Planning:** Specialization in this area is directed toward planning of resources utilization and development of projects on an urban or regional scale. Civil engineering planning requires an understanding of the basic principles of engineering, economics, law, planning concepts and techniques, environmental sciences, public administration, and politics. You are encouraged to plan your program early with the aid of a faculty adviser and to complement the suggested technical electives with courses in the humanities and social sciences.

Suggested technical electives:
- Agricultural Economics 147, 148, 176
- Civil Engineering 137, 143, 146, 152, 153, 160, 161, 162
- Economics 125A, 125B, 130, 131
- Engineering 106, 118
- Environmental Studies 145, 160, 161, 166, 168A, 168B, 172
- Geography 106, 155, 162
- Geology 134
- Statistics 130A, 130B
- Political Science 181
- Water Science 150

**Environment Engineering:** Specialization in this area is concerned with improving and maintaining the quality of the air, land, and water environments that affect our health and well-being in the face of increasing population and expanding industrial activity. The program is based on a firm basic science and civil engineering foundation and emphasizes the design of waterborne, solid, and airborne waste management systems; the design of potable water-supply systems; and environment monitoring.

Suggested technical electives:
- Applied Science 115
- Atmospheric Science 120, 121A, 121B, 123, 125
- Bacteriology 102, 130A
- Biochemistry and Biophysics 101A, 101B
- Chemical Engineering 154A, 154B, 156A, 156B
- Chemistry 107A, 107B, 110A
- Civil Engineering 143, 145, 146, 147, 148B, 149, 152
- Engineering 118, 160
- Environmental Studies 150A, 150B, 150C, 151, 162, 166
- Statistics 130A, 130B

**Structural Engineering, Structural Mechanics, and Geotechnical Engineering:** This area is concerned with the conception, design, analysis, economics, and construction of man-made structures such as buildings, bridges, highways, and dams. The principles of structural engineering are applicable to all types of structures and all sources of loadings. Structural mechanics emphasizes the more analytical aspects of structural engineering. Geotechnical engineering emphasizes the application of the principles of soil mechanics to the design or prediction of performance of foundation and earth structures.

Suggested technical electives:
- Applied Science 115
- Art 121A, 121B, 121C
- Civil Engineering 131B, 132A, 132C, 134, 136, 137, 138, 139, 162, 173, 175, 177
- Engineering 104C, 122, 148, 180
- Mathematics 128A, 128B, 128C

**Transportation Planning and Engineering:** Specialization in this area is concerned with the development, coordination, and management of transportation systems for the movement of people and goods in a manner compatible with societal demands. Transportation planning blends knowledge of the basic concepts of engineering, economics, and planning in the development of policies, programs, and projects. Transportation systems engineering blends knowledge of many engineering disciplines in the design, construction, operation, and maintenance of transportation facilities in the form of an integral system. You are urged to acquire an awareness of the social sciences and environmental sciences through courses in these areas.

Suggested technical electives:
- Agricultural Economics 148
- Civil Engineering 137, 149, 152, 153, 160, 161, 162
- Engineering 118, 160
- Environmental Studies 168A, 168B, 172, 173, 179

**Water Resources Engineering:** This area includes hydraulics, irrigation and drainage, and water resources systems design. Hydraulics is concerned with flow in pipe and open-channel water distribution systems and through hydraulic structures. Water resources systems design is concerned with the comprehensive development of water resources for multiple use. Emphasis is placed on principles of planning,
analysis and engineering design and operation as related to the water needs of industry, agriculture, recreation, and other activities.

Suggested technical electives:
- Agricultural Economics 14B, 176
- Atmospheric Science 120, 121A, 121B
- Civil Engineering 143, 144, 145, 146, 148B, 152, 153
- Electrical and Computer Engineering 112, 150, 151
- Environmental Studies 128, 150A, 151
- Geography 162
- Political Science 172
- Water Science 103, 110A, 150, 160

**Electrical and Computer Engineering**

Present-day Electrical and Computer Engineering embraces a broad spectrum of disciplines based on the physical and mathematical sciences. Electrical and Computer Engineering encompasses diverse fields such as automation and control, instrumentation, communications, information processing, micro-miniaturization of integrated circuits, and solid-state electronic devices. Work in these fields is being applied in a variety of industries, communications including transportation, medicine, education, and business.

The Department of Electrical and Computer Engineering offers four broad major programs: (1) General Electrical and Computer Engineering, (2) Electrical and Computer Engineering with emphasis on Computers, (3) Electrical and Computer Engineering with emphasis on Electronics, Circuits and Signal Processing, and (4) Electrical and Computer Engineering with emphasis on Solid-State Microwaves and Quantum Electronics. All four curricula share the same core of required courses in the fundamentals of Electrical and Computer Engineering. The General curriculum provides maximum flexibility for students who want to design their own package of upper-division technical elective courses. For example, a student can plan a program that provides depth in one or more areas of specialization, or as an alternative, a program that provides breadth in the overall field of Electrical and Computer Engineering.

Curricula (2), (3), and (4) above are designed to guide students who specifically want emphasis in one of these three general areas. However, students who elect one from these three curricula still have considerable flexibility in the choice of upper-division technical electives. As in the General Electrical and Computer Engineering curriculum, this flexibility can be used to obtain either depth in these areas of specialization or breadth.

All four curricula enable students to prepare for careers as practicing engineers or for graduate study in Electrical and Computer Engineering (or both). Close correlation between theory and practice is emphasized in each curriculum, each requires a total of 180 units of credit, and each is described more fully below. The name of the particular curriculum selected will appear on the Student Record (academic transcript).

**Electrical and Computer Engineering (General):** All upper-division, required courses for the General Electrical and Computer Engineering curriculum are listed on page 182. These requirements include a core of eight courses:

- Engineering 100;
- Electrical and Computer Engineering 110, 111, 112, 130A-130B, 140 and 170;

and 30 units of technical electives to be chosen by the student, subject to two constraints:

- at least three units must be from an upper-division Electrical and Computer Engineering course with a laboratory (excluding Engineering 100 and Electrical and Computer Engineering 111), and
- at least 12 units must be from courses included in the group of Design technical elective courses listed in the upper-division major requirements.

The core of eight courses, which is common to all four curricula, provides a foundation in electromagnetics, physical electronics, electrical and electronic circuits, and computer structure and language.

A suggested group of technical electives that would provide maximum breadth of exposure to the overall field of electrical and computer engineering is:

- Engineering 118

**Electrical and Computer Engineering (Computers):** All upper-division required courses in Electrical and Computer Engineering curriculum, with emphasis on Computers, are listed on page 182. These requirements include the common core of eight courses described under the General Electrical and Computer Engineering curriculum above; computer courses (Electrical and Computer Engineering 170, 171, 180 and three courses to be chosen by the student from the group of computer design elective courses specified on page 182); 12 units of technical electives; and a 3-unit laboratory course selected from the group of laboratory electives. The specialization courses treat the theory, design, and application of computing systems, and include a variety of areas of specialization such as computer organization, digital systems design, software systems, automata theory, formal languages, and artificial intelligence.

**Electrical and Computer Engineering (Electronics, Circuits and Signal Processing):** All upper-division required courses in the Electrical and Computer Engineering curriculum, with emphasis on Electronics, Circuits and Signal Processing, are listed on page 182. These requirements include the common core of eight courses described under the General Electrical and Computer Engineering curriculum; five specialization courses (Electrical and Computer Engineering 151, 160 and three courses to be chosen by the student from the group of design technical elective courses specified on page 182); 15 units of additional technical electives; and a 3-unit laboratory course selected from the group of laboratory electives. The specialization courses treat the theory, design, and application of
Electronics, circuits, and signal processing systems. They include a variety of areas of sub-specialization, such as analog waveform, circuits and systems, sampled data, digital circuits, and systems including solid-state and integrated circuits; control systems, automation, and instrumentation; and communications systems, data transmission, and information processing.

Electrical and Computer Engineering (Solid-State, Microwaves and Quantum Electronics): All upper-division required courses in the Electrical and Computer Engineering curriculum, with emphasis on Solid-State, Microwaves and Quantum Electronics, are listed on page 182. These requirements include the common core of eight courses described under the General Electrical Engineering curriculum; six specialization courses (Electrical and Computer Engineering 131A, 145A, and four courses to be chosen by the student from the group of design elective courses: see page 183; 12 units of additional technical electives; and a 3-unit laboratory course selected from the group of laboratory electives. The specialization courses treat the theory, design and application of solid-state, microwave and quantum electronic devices and systems, including integrated circuit devices, magnetic devices, lasers and superconductivity.

Materials Science and Engineering

Materials Engineering is directed towards an understanding of the structure, properties, and behavior of materials.

Modern society demands new and improved materials with capabilities far superior to common metals, alloys, and ceramics. New materials are needed for high-speed transportation systems, surgical and dental implants, new generations of power plants, and solid-state electronic devices in computer and communication technology.

The development of new materials and the understanding of present-day materials demand a thorough knowledge of basic engineering and scientific principles including crystal structure, elastic and plastic behavior, thermodynamics, phase equilibrium and reaction rates, and physical and chemical behavior of engineering materials.

The undergraduate program in materials science and engineering provides you with the background for activities in research, processing, and the design of materials. The services of materials engineers are required in many different engineering operations, from fracture behavior in automobiles to fatigue behavior in aircraft frames, from corrosion behavior in petro-chemical refineries to radiation-induced damage in nuclear power plants, and from fabrication of steel to design of semiconductors.

Materials engineers are also increasingly involved in developing the new materials needed to attain higher efficiencies in existing and proposed energy conversion schemes.

The Materials Science and Engineering curriculum is based on a common core of courses that is basic to engineering. These courses, taken during your first two years, provide you with a strong foundation in fundamental engineering concepts. Your third and fourth years are primarily devoted to studying subjects in the materials sciences.

Technical electives, selected from various other engineering, physical, and natural science disciplines, give some degree of specialization at the bachelor's degree level. They also prepare you for research in a selected area at the graduate level.

AREAS OF SPECIALIZATION

Twenty-nine technical elective units may be selected to complete the undergraduate Materials Science and Engineering program. By selecting the appropriate technical electives and humanities and social science electives, you may orient the program to suit your interests and career objectives. Examples include production and development, applied research, basic research, teaching, and management.

Upper-division courses in engineering, chemistry, physics, mathematics, and biological sciences are generally acceptable as technical electives.

The following technical elective courses and the suggested areas of specialization are guidelines to assist you and your adviser in the preparation of study lists. You may elect to take courses from a number of these areas of specialization, or you may wish to concentrate on one or two areas.

Suggested technical electives:

Automatic Control and Systems Analysis:
- Mechanical Engineering 155, 171, 172
- Electrical and Computer Engineering 150, 157A, 157B
- Engineering 118

Biomedical Engineering:
- Chemistry 107A, 107B
- Biological Sciences 1
- Engineering 134
- Zoology 2
- Physiology 111A, 111B, 112, 113
- Physical Education 101, 102

Chemical Corrosion:
- Chemistry 110A, 110B, 110C or 107A, 107B
- Chemical Engineering 151, 152A, 152B
- Engineering 134

Computers:
- Applied Science 115
- Electrical and Computer Engineering 171, 172, 175, 176, 177, 180, 181, 182
- Statistics 130A, 130B

Electronic Materials:
AREAS OF SPECIALIZATION

Creative Design: The creation and improvement of products, processes, or systems which are mechanical in nature are the primary goals of a professional mechanical engineer. This is a challenge now more than ever, because the solutions to such major social concerns as environmental pollution, mass transportation, raw material shortages, and energy concerns will depend heavily on the engineer’s ability to create new types of machinery and mechanical systems.

The engineer-designer must have a solid and relatively broad background in the basic physical and engineering sciences and have the ability to organize and solve a variety of problems. In addition to having technical competence, the designer must be able to consider the socioeconomic consequences of the design and its possible impact on the environment. Product safety, reliability, and economics are other considerations.

Suggested technical electives:

- Mechanical Engineering 124, 128A, 128B, 150B, 151, 152, 155, 162, 163, 172
- Applied Science 115
- Civil Engineering 131A, 132A
- Agricultural Engineering 118, 119, 133, 134
- Engineering 104C, 111, 118, 122, 140, 142, 160

Suggested advisers:

- C. W. Beadle, J. M. Henderson, M. L. Hull, A. T. Yang

Energy Systems: This area is specifically designed for those who would like to work in the fields of power generation, propulsion for transportation, and energy conversion. It is in these fields that the increased efficiency of systems and the impact of potential environmental pollution are assuming more importance in the design stage.

The program of study is based on the fundamentals of fluid mechanics, thermodynamics, and heat transfer. These fundamentals are applied to such diverse topics as combustion engines, gas turbines, heat exchangers, nuclear reactors, MHD power generators, solar energy systems, and others.

Suggested technical electives:

- Engineering 160
- Mechanical Engineering 110, 151, 162, 163, 165

Suggested advisers:

- J. W. Baughn, H. Brandt, H. A. Dwyer, W. H. Giedt, M. A. Hoffman, B. E. Lauder, A. A. McKillop

Systems Dynamics and Control: Modern engineers are increasingly concerned with the performance of integrated dynamics systems in which it is not possible to optimize component parts without considering the overall system.

Systems Dynamics and Control is concerned with the modeling, analysis, and simulation of all types of dynamic systems and with the use of automatic control techniques to change the dynamic characteristics of

Mechanical Engineering

The modern mechanical engineer uses basic science in the design and manufacture of complex engineering systems. This requires the application of physical and mechanical principles in the development of machines, energy conversion systems, materials, and equipment for guidance and control.

Preparation for this broad field of engineering requires a thorough knowledge of mathematics, physics, chemistry, fluid mechanics, thermodynamics, heat transfer, mass transfer, electricity, manufacturing processes, properties of materials, and economics.

The Mechanical Engineering curriculum is based on a common core of engineering courses taken in the first two years. The third year is spent in further study of fundamental courses, and in the fourth year you may tailor your studies to your own interests by selecting courses in controls and systems analysis, fluid mechanics, heat transfer, thermodynamics, mechanical design, and materials science. You can prepare either for graduate study in Mechanical Engineering or obtain a broad background for entering engineering practice at the bachelor’s level.

A broad range of technical elective courses is available. Students are encouraged to select these courses from among the areas of specialization listed below.

Areas of specialization:

- Creative Design
- Energy Systems
- Systems Dynamics and Control
systems in useful ways. The emphasis in this program is on the physical systems that are closely related to mechanical engineering, but the techniques for studying these systems apply equally well to social, economic, and other dynamic systems.

Suggested technical electives:
- Mechanical Engineering 124, 134, 152, 172
- Electrical and Computer Engineering 112, 151
- Engineering 122, 140, 160

Suggested Advisers:
- J. W. Brewer, M. Hubbard, C. Karnopp, D. L. Margolis

Transportation Systems: An important aspect of Mechanical Engineering has traditionally involved the planning, design, and operation of transportation systems. As society recognizes the increasing importance of optimizing transportation systems to minimize environmental degradation and energy expenditure, engineers will need to consider major innovations in the way people and goods are moved. This will require competence in vehicle dynamics, propulsion, and control, and an understanding of the problems caused by present-day modes of transportation.

Suggested technical electives:
- Engineering 122, 160
- Mechanical Engineering 124, 127, 128A, 128B, 134, 152, 161, 162, 172
- Civil Engineering 131A, 149, 160

Suggested advisers:
- M. Hubbard, C. Karnopp, D. L. Margolis

GRADUATE STUDY IN ENGINEERING

The following departments offer courses of study leading to both the Master of Science and Doctor of Philosophy degrees. Programs in these departments are particularly appropriate for those wishing to prepare for careers in teaching, research, or analytical design.
- Agricultural Engineering
- Applied Science (Davis-Livermore)
- Chemical Engineering
- Civil Engineering
- Electrical and Computer Engineering
- Mechanical Engineering
- Electrical and Computer Engineering (Doctor of Engineering degree only)
- Mechanical Engineering

Graduate students in engineering are permitted wide latitude in selecting courses and research or design subjects at both the master's and doctoral levels. A purposeful and well-integrated course of study is planned with the help of an adviser or guidance committee.

More general information may be found in the Announcement of the Graduate Division, obtainable from the Dean of the Graduate Division. Detailed information on graduate study in engineering is contained in the College of Engineering Bulletin, available from the College Undergraduate Office.

Off-Campus Learning

Many courses in engineering are available on the campus television network at receiving sites in Livermore, Sacramento, Marysville-Yuba City, and the Diablo Valley. Those interested in TV classes should contact the Engineering Departments at addresses listed in the courses section.

Graduate Certificate Program

For engineers who already have a degree, the College of Engineering offers a Graduate Certificate Program. This program consists of course work in selected engineering subjects, and requires fewer units than the degree programs. The purpose of the Graduate Certificate Program is to provide practicing engineers with an opportunity to develop additional expertise in specific areas, and to explore new fields of technical interest.

General requirements for the program are:
- 15 units from courses not specifically required of UC Davis undergraduate engineering majors
- At least 9 of these 15 units must be from formal graduate courses
- Graduate Division acceptance

Further information on the Graduate Certificate Program may be found in the College of Engineering Bulletin.
The College of Letters and Science offers programs of study that expose a student to the worlds of human experience, of ideas, of artistic accomplishments, and of matter and things. These four worlds are the domains of the social sciences, the humanities, the fine arts, and the natural sciences, respectively. Although separate and distinct to the casual observer, these areas are interconnected and may be studied in a coherent curriculum. It is within this curriculum that you will be able to explore a variety of academic fields, engage in the pursuit of fundamental knowledge primarily for its own sake, and gain the capacity for independent study and thought.

A well-balanced liberal education, including in-depth study of a major field, should prepare you for a satisfying life, whatever your career. And since more and more career opportunities depend on the completion of a basic letters and science curriculum, such an education will also have a vocational value.

The main emphasis in the College remains, however, on the ends of living rather than on the means. Undergraduate education in the College stresses breadth rather than specialization.

Within the specific standards of scholarship and unit distribution that the College has established for its programs of study, there are three groups of requirements crucial to the realization of the College's educational goals: the English Composition Requirement, the Breadth Requirements, and the Major Requirements.

The English Composition Requirement is designed to insure that you are well-versed in the skills of written communication.

The Breadth Requirements provide you with a broad background of knowledge, help you to explore the interdependencies of knowledge, and acquaint you with other cultures.

The Major Requirements enable you to gain intellectual depth and competence in a selected area of study. Bachelor of Arts (A.B.) and Bachelor of Science (B.S.) degrees are offered by the College. These degrees are conferred upon your completion of the University's requirements and the College's general education and major requirements detailed on the following pages.

Every student is personally responsible for seeing that these graduation requirements are met. (Changes in graduation requirements, other than those in the major, adopted after publication of the General Catalog, are posted on the Letters and Science bulletin board opposite Room 175, Mrak Hall.)

STUDENT SERVICES

Information:
Dean's Office
150 Mrak Hall
752-0392

The primary function of the Dean's Office is to assist students with questions concerning academic matters and program planning. The deans and academic counselors staff an advising service designed especially to assist undeclared students with selecting a study program and in their search for a major. All students are welcome, however, to come in for general academic advising.

This office can also help you with questions concerning College requirements, scholarship (probation and disqualification), and other academic matters. Problems which cannot be resolved by staff assistants are referred to academic deans or counselors who are regularly available to students by appointment.

The Dean's Office also performs a number of regular functions:

- Maintains a file of your academic record

An education which emphasizes job skills may prepare you for the quarter of your waking life spent at work, but a liberal arts education prepares you for all of life.

— Dean, Letters and Science
ADVISING

Faculty Advising

Good advising means the difference between an exciting and an indifferent educational experience. Given the range of programs and courses offered within the College of Letters and Science, good advice is essential if students are to design an educational program that will best fit their needs and individual goals.

In the College of Letters and Science, the relationship between student and faculty adviser is largely a voluntary bond. Thus, the effectiveness of advising depends both on the perceptiveness of the adviser and the initiative of the student.

An adviser can assist you not only in meeting minimal degree requirements, but also in taking maximum advantage of the resources available in the University. You are encouraged to talk to faculty advisers in different fields to enable you to make educational decisions on the basis of the broadest possible body of information and ideas. Although degree requirements may appear many and complex, they leave substantial room for individualization of study programs. With the help of faculty advisers, you can keep open as many options as possible while still progressing toward your major degree objectives.

Remember, it is your responsibility to maintain regular contact with your faculty adviser. A good relationship is developed by meeting frequently and discussing honestly and thoughtfully your problems and expectations. A conference at least once a quarter is especially desirable for new students during their first year in the College and for seniors during the final quarters preceding graduation.

Feel free to come to the Dean’s Office for consultation on any academic matter.

New students are assigned to an adviser when the University receives their Statement of Intention to Register. If you indicated an interest in a particular program on your application for admission, your adviser will be a faculty member associated with that major. If you change your major, you will be reassigned.

If your faculty adviser happens to be unavailable at a critical time, you should ask the department or program administering your major for an alternate adviser to assist you temporarily. Department and program offices are listed in the Class Schedule and Room Directory.

New students are required to see their faculty adviser at least once every quarter during their first year on campus to discuss educational goals, course program, and progress.

If you participate in the Summer Advising and Registration Conference, you will be assisted in planning your Fall Quarter program by a temporarily assigned summer faculty adviser. You must contact the regular adviser you have been assigned during Orientation Week of the Fall Quarter.

Continuing students who have completed three quarters in residence in the College are no longer obligated to consult an adviser; they are urged, however, to maintain regular contact with an adviser in their major to avoid program errors which may delay graduation.

Undeclared students who are as yet uncertain of their goals, and especially students lacking a clearly identifiable interest, are urged to make an appointment with one of the deans or academic counselors in the College Academic Advising Office (150 Mkr Hall).

Seniors should maintain close contact with their adviser in order to insure that they are meeting the major requirements.

Peer Advising

Student-to-student advising is an important part of the University advising services. Refer to the index under "Advising" for information on the various peer advising programs.

Preprofessional Advising

The College of Letters and Science does not offer special preprofessional programs. Students who plan to prepare for a professional school undertake a normal program leading to an A.B. or B.S. degree. Most courses required by a professional school are included in the requirements for the bachelor's degree, and additional courses you need may be taken as electives. You should become aware of the requirements for prospective professional schools early in your career in order to plan a suitable program. You may obtain further assistance from the Health Sciences Advising Office, the Pre-Law Advising Office, Pre-Business Advising Office, or the Work-Learn and Career Planning and Placement Center.

TEACHING CREDENTIAL

The teacher education program is administered by the Graduate Division. See page 105 for more complete information.
THE MAJOR

There are three types of programs which satisfy requirements for the major: departmental majors, interdepartmental majors, and individual majors.

Major Programs Offered by the College of Letters and Science

Following is a list of the major programs offered by the College of Letters and Science. All but three of the majors lead to a Bachelor of Arts degree. Those which lead to a Bachelor of Science degree are indicated by a footnote symbol (see below). Courses listed in the Catalog under Astronomy, Chinese, Classics, Education, Integrated Studies, Japanese, Oriental Languages and Civilization, Portuguese, Scandinavian, and Swedish are taught by teaching departments or programs in the College of Letters and Science, but no undergraduate majors with these names exist.

Afro-American Studies
American Studies
Anthropology
Applied Physics
Art History
Art Studio
Bacteriology
Biochemistry
Biological Sciences
Botany
Chemistry
Classical Civilization
Comparative Literature
Dramatic Art
East Asian Studies
Economics
English
French
Genetics
Geography
Geology
German
Greek
History
International Relations
Italian
Latin
Linguistics
Mass Communication
Mathematics
Medieval Studies
Mexican-American (Chicano) Studies
Music
Philosophy
Physical Education
Physics
Physiology
Political Science
Political Science: Public Service
Psychology
Religious Studies
Rhetoric
Russian
Russian Literature and History
Sociology
Spanish
Statistics
Zoology

1Offers a program leading to the Bachelor of Science degree as well as a program leading to the Bachelor of Arts degree.
2Offers the Bachelor of Science degree only.

Declaration of Major

Students who have not declared a major must do so by the time 100 units have been completed. If you fail to declare a major, a hold will be placed on your further registration. It will be removed only when your Petition for Declaration or Change of Major is on file in the Dean's Office. Petitions can be obtained from faculty advisers or the offices administering the respective major programs. Office locations are printed in the Class Schedule and Room Directory. As a part of the petitioning procedure, you must, in consultation with an adviser, prepare a projected plan of study. You are accepted into the major only after your adviser and the Dean have signed, approved, and endorsed the petition. The department or curriculum committee supervising the major program will assign you to a faculty adviser.

Individual Majors

The individual major is a program organized by a student in consultation with faculty advisers who are expert in the requisite fields of interest. If you wish to undertake an individual major, request the appropriate forms, which include detailed instructions, from the Dean's Office, 150 Mrak Hall. Program requirements are outlined on page 231.

Multiple Majors

If you are interested in two or more areas of study, you should consider the possibility of pursuing your goals by completing one or more of the optional minors offered by the College along with your major. This is usually the best approach from an educational point of view and offers maximum flexibility in planning your program of courses. The alternative, and most common type of multiple major, is the double major which leaves considerably less freedom of choice.

After endorsement of the major petitions by the appropriate faculty advisers, the Dean may approve declaration of more than one major, if there are significant differences between the disciplines and the requirements of the major programs involved. In addition, approval is subject to the following conditions:

1. Overlap between the two majors involved in a request may not normally exceed 8 upper-division units.
2. It must be possible to complete all degree requirements within the 195-unit limit on registration (see page 97).
3. At the time of request, a substantial part of the preparatory subject matter for both majors must have been successfully completed.

Requests for multiple majors must be based on sound academic and educational considerations. Frequently, when a major (whether departmental, interdepartmental, or individual) is supplemented with a carefully selected program of courses or a minor that supports and amplifies your special interest, your educational goals are better served than when two or more major programs are studied in their entirety.
Certain combinations of majors cannot be approved. Please see the Dean's Office for current information on prohibitions.

**Cross-College Major**

You may simultaneously pursue major programs in two undergraduate colleges on the Davis campus. The same conditions and criteria apply as for multiple majors (see above). The requirement for a substantial and significant difference between the disciplines involved is enforced strictly in the case of proposals for cross-college majors. In addition, cross-college programs will not be approved if the majors involved are available within a single college as well. For example, cross-college programs between the Colleges of Letters and Science and Agricultural and Environmental Sciences will not be approved if one of the majors is Bacteriology, Biochemistry, Biological Sciences, Botany, Genetics, Physiology, or Zoology.

**Change of Major Within the College**

You may change from one major to another within the College with the Dean's approval. Consent of the department or committee in charge of your proposed new major is also required. Admission into a major program may be denied if your grade-point average in courses required for the selected major is less than 2.00.

Procedures for change of major within the College are the same as for declaration of major (see page 91), and the same conditions apply.

Except under unusual circumstances, no change of major will be permitted after you attain senior standing (135 units).

**Change of Major Accompanied by Change of College**

In order to change from one college to another, you must be in good standing (not on probation or subject to disqualification).

If you are in good academic standing and want to transfer into the College of Letters and Science, you must petition to do so within the first five weeks of the quarter. Petitions, which are available at the Registrar’s Office and the Dean’s Office, must be endorsed by your new faculty adviser and signed by your former College Dean before being submitted to the Letters and Science Dean for consideration and approval.

A 2.00 grade-point average in the courses required for the new major is usually necessary at the time of transfer. Requests for changes of major from students in senior standing may be approved only under unusual circumstances.

**Grade-Point Averages in the Major**

In addition to the general University requirement of a C average (2.00) for all University work, the College stipulates the following additional criteria:

You must have an average of at least 2.00 for all UCD courses required for the major; you must also have at least a 2.00 average for all upper division courses required for the major. To obtain these minimal aver-ages in the major, you may, with approval of your adviser, repeat courses that were graded D or F. If you have to repeat a course more than once, you need the Dean's approval.

A department or curriculum committee may refuse to accept you into a major they administer if you do not have at least a 2.00 average in the courses required for the major.

If your performance is unsatisfactory (less than 2.00) after you have declared a major program, you may be required to withdraw from that major by the Dean, upon written recommendation from the chairperson of the department or the curriculum committee that administers the major.

**THE MINOR**

Departments and teaching programs may offer optional minors to students in the College of Letters and Science. Completion of a minor is not required for a degree, but you may elect to satisfy the requirements of one or more minors and have completion of the minor(s) certified on your transcript. Most departments and programs that offer a minor list course requirements in the Majors and Courses section of this catalog. Following is a list of teaching departments and programs which offer minor programs:

- American Studies
- Anthropology (Biological Anthropology, Social-Cultural Anthropology)
- Art (Art History, Art Studio)
- Biological Sciences
- Botany
- Classics (Greek, Latin)
- Comparative Literature
- Dramatic Art
- East Asian Studies
- Education
- English
- French
- Geography
- Geology (Geology, Economic Geology, Engineering Geology, Environmental Geology, Geochemistry, Geomorphology, Geophysics, Oceanography, Paleobiology)
- German (German Language, German Literature)
- History
- Italian
- Linguistics
- Mathematics
- Mexican-American (Chicano) Studies
- Music
- Oriental Languages and Civilizations (by arrangement)
- Philosophy
- Physics (Classical Physics, Quantum Physics, General Physics)
- Political Science
- Psychology
- Religious Studies (Religious Studies, Oriental Religions, Judaism, Christian Studies)
- Rhetoric
- Russian (Russian Language, Russian Literature)
- Russian History and Literature
- Sociology (Sociology, Sociology — Social Welfare, Sociology — Law and Society)
- Spanish
- Statistics
Certification of a minor on the transcript indicates that you have completed a coherent program of courses in an area of interest outside your major. The minor may complement your major, but it is not particularly meaningful unless the field of study is significantly different from that of your major.

A minor consists of 18 to 24 units in upper-division courses specified by the department or program. At least half of these units and courses must be completed in residence on the Davis campus. You are also expected to complete all courses that are prerequisite to the upper-division courses. In order to request certification of a minor, you must have a grade-point average of 2.000 in all courses required for the minor. At most one course used in satisfaction of your major may be applied to your minor. If you elect more than one minor, these minors may not have any courses in common.

Some departments and programs do not offer a minor, while others may offer several. You can elect only one minor in a subject area. If the department or program you are interested in does not list a minor in this catalog, check with that department or program office.

If you want to have completion of a minor certified on your transcript, you must file a request with the Letters and Science Dean’s Office in the quarter preceding graduation. Thus, June graduates have to file during the Winter Quarter. The minor does not have to be completed when you file your request, but requirements must be satisfied at the time of graduation. The Dean’s Office has forms available for this purpose. The specific deadlines will be announced.

REQUIREMENTS FOR THE BACHELOR’S DEGREE

University Requirements

University requirements for the bachelor’s degree are described beginning on page 60.

College Requirements

Unit Requirements. A minimum of 180 units is required for the degree (see page 95 for restrictions on credits that may be counted toward the 180 units). Of these units, 64 must be upper-division units which include 48 units from Letters and Science teaching departments and programs.

English Composition Requirement. The English Composition requirement can be met in one of two ways:

1. by passing the English Composition Examination (see page 96) upon completion of 70 units of degree credit; OR
2. by completing with a grade of C- (or P) or better
   a. one course in English composition from English 1, 2, 3, 20, Comparative Literature 1, 2, or 3; AND

Breadth Requirements. The two requirements that comprise the breadth requirements are:

1. Foreign Language requirement
   A.B. degree: the 12-unit level or the equivalent in one language (see page 96 for details).
   B.S. Degree: none.

2. Area requirements
   A.B. degree: A total of 52 units in social sciences, humanities and fine arts, and natural sciences/mathematics with a minimum of 12 units in each area. A maximum of 20 units may be counted toward any one area. An additional 12 units of upper-division courses offered by Letters and Science teaching units other than the major department or program.
   B.S. degree: A total of 90 units in natural sciences/mathematics; and a total of 20 units in social sciences and/or humanities and fine arts.

(All of the courses used to satisfy this requirement must be chosen from those on the Area Requirement List shown on page 94.)

Major Program Requirements. Requirements for major programs are described in the Majors and Courses section of this catalog, beginning on page 131. These requirements are fulfilled by completing a major program offered by a teaching department or curriculum committee in the College of Letters and Science (see page 97).

Scholarship Requirements. For all UCD courses required for the major program, the minimum grade-point average is 2.000. For all upper division UCD courses required for the major program, the minimum grade-point average is 2.000. See page 60 for University requirements.

Residence Requirement. While registered in the College of Letters and Science a minimum of 27 upper-division units, including 18 upper-division units in the major, must be completed on the Davis campus. For University requirements, see page 62. (Work completed while enrolled in the Education Abroad Program does not satisfy campus or College residence requirements.)

Area Requirement List

Courses numbered 48, 92, 97T, 97TC, 98, 192, 197T, 197TC, 198, and from 200 through 499 cannot be counted toward satisfaction of the area requirements. A maximum of 10 units in special study courses (99, 194H, 199) may be counted toward area requirements. Subject to the restrictions just listed, courses acceptable for fulfilling breadth requirements are classified as follows:

Humanities and Fine Arts

Afro-American Studies 10.
American Studies. A.B. degree: equally divide a maximum of 16 units between humanities/fine arts
and social sciences. B.S degree: 12 units allowed toward social sciences and humanities/fine arts.

Art.
Asian American Studies 1, 150A.
Cantonese 2, 3, 4, 5, 6.
Classics.
Comparative Literature. All courses except first course taken from either 1, 2, 3 (or English 1, 2, 3, 5F, 5P). All subsequent courses in Comparative Literature may be counted toward humanities/fine arts.

Dramatic Art.
English. All courses except A, 25, 26, 28, and first course taken from either 1, 2, 3, 5F, or 5P (or Comparative Literature 1, 2, or 3). All subsequent courses in English may be counted toward humanities/fine arts.

Foreign Language. A.B. degree: all courses in foreign language departments, including literature courses, except the first 6 units of course work (course 1 or the equivalent in most languages offered on the Davis campus) in the language offered in satisfaction of Foreign Language requirement.

History.
Linguistics 1, 106, 107, 196.
Medieval Studies.
Music.

Philosophy.
Religious Studies.
Rhetoric.

Social Sciences

Afro-American Studies 100, 101B, 107, 110, 120, 121.
American Studies. (See "Humanities/Fine Arts" above.)

Anthropology. All courses except 1, 5, 13, 150, 151, 152, 153A, 153B, 154A, 154B, 155, 156, 195, 196.
Asian American Studies 2, 100, 110, 111, 150B.

Chicano Studies 10.

Economics. All courses except 12.

Education. All courses except 114.

Geography. All courses except 1, 3, 102, 105, 106, 107, 108, 110, 111, 112, 115, 117.

Linguistics. All courses except 1, 106, 107, 196.


Political Science.


Sociology. All courses except 46A, 46B, 106.

Natural Sciences and Mathematics


Astronomy.
Bacteriology. All courses except 101.
Biochemistry and Biophysics.

Biological Sciences. All courses except 12, 19.

Botany.
Chemistry.

Entomology 10, 100.

Genetics.


Geology.

Human Anatomy 101.

Mathematics.

Physical Education 101, 102, 103, 113.

Physics.

Physiology.


Statistics.

Zoology.
COLLEGE POLICIES AND PROCEDURES

Inquiries concerning the policies and procedures listed in this section should be directed to the Dean's Office, College of Letters and Science, 150 Mrak Hall. See also the section on Registration, beginning on page 53.

Credit for Courses

Advanced Placement Examinations. For credit allowed on units earned through Advanced Placement Examinations, see page 58.

Education Abroad Program. Full University credit may be awarded for courses taken through the Education Abroad Program. See page 178 for further information.

Extension Courses. Students in residence may apply credit earned in University Extension courses toward the 180-unit requirement, provided written approval has been obtained from the Dean prior to enrollment. The degree credit allowed by the Dean for Extension courses is usually less than the unit value listed in the course description. A maximum of 9 units may be offered for elective credit only. Such units and courses may not be applied toward fulfillment of the Area, Foreign Language, Upper-Division, or Senior Residence requirements of the College. No grade-points are assigned for courses completed in University Extension.

Graduate and Professional Courses. You must obtain the recommendation of the instructor in charge and the department chairperson—in addition to approval from the Dean—prior to enrollment in order to receive elective credit toward the degree for the following kinds of courses:

- Graduate courses 200-298
- Professional courses for teachers 300-398 offered outside of the College of Letters and Science
- Postgraduate professional courses 400-498 offered by professional schools (Courses in this series which are offered by teaching departments and programs in the College of Letters and Science do not require the Dean's approval.)
- All variable-unit courses in the 200, 300, and 400 series

Special-study courses in the graduate and professional series, such as courses 299, 399, and 499 do not satisfy degree requirements. Undergraduate students in the College cannot receive credit for such courses.

Before enrolling in graduate or professional courses, you must meet certain minimal conditions. You must have an overall UC grade-point average of 3.3 and 18 units of upper-division instruction in subject matter basic to the course. Exceptions may be considered if your preparation warrants.

You may count 9 units in courses numbered 200 through 298 and a combined total of 9 units in the 300 and 400 series as elective credit toward the degree. Units earned in courses in the 200, 300, and 400 series do not count as upper-division units and nonstandard courses in these series are included in the 30-unit limit on nonstandard courses.

Internship Courses. Student internships (generally courses numbered 92 and 192) are available through many Letters and Science departments. You must have completed a minimum of 84 units before credit will be allowed for an upper-division internship course.

Unit Credit Limitations. For certain courses, limits have been established for the number of units that can be counted towards the 180-unit minimum required for the degree. To avoid discovering just before graduation that you are short units, keep track of the number of units you have taken in each of the following categories:

Professional courses (300 and 400 series, except 399 and 499 courses): 9 units maximum. (See Graduate and Professional Courses above.)
Extension courses: 9 units maximum by petition. (See Extension Courses above.)
Graduate courses: 9 units maximum by petition. (See Graduate and Professional Courses above.)
Internship courses (numbers 92, 192): 12 units maximum. (See Nonstandard courses below.)

95
Nonstandard courses (92, 97T, 97TC, 99, 192, 197T, 1977C, 199 and similar courses): 30 units maximum or ¼ of the units taken at UCD, whichever is the smaller. (Note separate unit limits on internship, special study, and tutoring courses.)

Passed/Not Passed courses: Maximum of ¼ of UCD units graded “P” taken at student’s option. (Note University limitation pages 55-56.)

Physical Education 1: 6 units maximum.

Special Study courses (99, 194H, 199): 5 units maximum in any one quarter. (See under Nonstandard courses above.)

Tutoring courses (97T, 97TC, 197T, 197TC): 10 units maximum. (See under Nonstandard courses above.)

Repeated Courses. You may repeat a course in which you received a D, F, or NP. If the course you would like to repeat is part of a sequence (e.g., Mathematics 16A, 16B, 16C; French 1, 2, 3, 4, 6) and you have already passed a subsequent course in the sequence (e.g., you want to repeat French 2, but you have already passed French 3), you should check with the Dean’s Office and the department regarding whether you can receive grade-point and/or unit credit. (See also page 57.)

Transfer Courses in English Composition. Transfer courses considered by the Dean to be equivalent or comparable to English 1, 2, 3, 20, 103A-F, or Comparative Literature 1, 2, 3 will be accepted toward satisfaction of the requirement. Note that English 103 or the equivalent must be taken after you have completed 84 units of transferable degree credit.

If your transfer work does not include an acceptable English composition course taken after you had completed or accumulated 84 units, you may take English 103 at Davis or fulfill the requirement by examination (see below).

ENGLISH COMPOSITION EXAMINATION

The English Composition requirement can be met with a passing score in the English Composition Examination.

This academic year, the examination will be offered on the following Saturday mornings:

November 1, 1980
January 31, 1981
April 25, 1981

You are advised to complete this requirement in your junior year. There are no examinations administered during the summer.

Sign-up rosters will be posted on the Dean’s Office bulletin board, Mrak Hall foyer, Monday through Thursday of the week prior to each examination date. (Students in the College of Engineering may sign up in 2136 Bainer Hall.)

The Letters and Science English Composition Examination Form, available at the UCSD Bookstore, is required.

FOREIGN LANGUAGE REQUIREMENT (A.B. degree)

Acceptable Languages. The Foreign Language requirement may be satisfied in any language offered at UCD, or for which transfer credit is allowed from another academic institution.

You may also satisfy this requirement by examination in a language not offered on the Davis campus. In this case, the Dean’s Office will assist you in making arrangements to take an examination on another University of California campus, with a faculty member who teaches the language in question.

Satisfaction of the Requirement. The Foreign Language Requirement should be completed by the end of your first or second year, as program priorities permit. This is particularly important if you plan to apply for the University’s Education Abroad Program (junior year abroad).

The Foreign Language Requirement may be satisfied by examination or completion of language courses as follows:

1. Foreign Language Placement Test. This test does not yield unit credit — it only determines whether the Foreign Language Requirement has been met, or at which point in the language sequence you should enroll.

   If you are a transfer student, you may validate your knowledge of a language learned in high school by taking this test. A test may not be taken, however, in a language for which you have already received degree credit. Consult your Status Card, which is issued by the Dean’s Office prior to admission to the College.

2. CEEB Achievement Test. Earning a qualifying score of at least 500 on a College Entrance Examination Board (CEEB) Foreign Language Achievement Test satisfies the requirement. This test may be taken at any time during your high school career. Once your score is on file at the Undergraduate Admissions Office you should petition for satisfaction of the Foreign Language Requirement at the Letters and Science Dean’s Office.

3. CEEB Advanced Placement Examination. A score of 5, 4, or 3 on any foreign language College Entrance Examination Board (CEEB) Advanced Placement Examination taken in high school will satisfy the Foreign Language requirement.

4. Course Completion in College (or the equivalent). A.B. degree: 12-unit level in one language (e.g., Spanish 2 or Latin 3). B.S degree: as required in the major program.

   If you have successfully completed the second or third year of a language in the 10th or higher grade in high school you may receive unit credit for course 1 of that language on a P/NP grading basis only.

5. Proficiency Examination. If you have not completed the required level language course, but assume you have attained equivalent knowledge, you may satisfy
the language requirement by passing a proficiency examination. For more information consult the appropriate foreign language department.

**PASSED/NOT PASSED GRADING**

**Filing Procedures**

Passed/Not Passed petitions are available for students in good academic standing in the Dean's Office, 150 Mrak Hall, on the dates listed in the Class Schedule and Room Directory, and must be filed in person.

No signature other than yours is required on the petition. For detailed information, see page 55.

Graduating seniors, and other students planning to undertake graduate or professional studies, should consult an adviser before petioning for Passed/Not Passed in courses required for the major program.

**Limitation on Credit for Units Graded P**

Excluding courses which are graded on a Passed/Not Passed (P/NP) basis only, the number of units graded P that may be accepted towards a degree in the College of Letters and Science is limited to not more than one-fourth of the units completed in residence at UCD.

The Academic Senate limits the total number of courses graded P, including units earned in courses graded "P/NP only," to one-third of the units completed on the Davis campus. This limitation applies to all Davis undergraduates, including Letters and Science students (see page 56).

**REGISTRATION BEYOND THE 195-UNIT LIMIT**

A minimum of 180 units is required for the bachelor's degree, and you are expected to fulfill all degree requirements within the 180- to 195-unit range. Once 195 units have been completed, you may register only with the permission of the Dean. Permission will be granted for sound educational reasons and for a limited time only. You will be expected to adhere to the specific program of courses agreed upon and to meet other conditions that may have been set. Approval must be obtained before course enrollment materials can be made available to you for the quarter following completion of 195 or more units.

If you are in good standing, you will be able to complete 12 quarters or the equivalent (e.g., four years) of college work even if you have earned more than 195 units before you finish your fourth year. You must petition for continuation, however, and file the quarter-by-quarter course program you have planned.

**UNIT LIMITATIONS**

Ordinarily, a full-time student is expected to take an average of no fewer than 12 units a quarter. (Note the Minimal Progress Requirements on page 59.)

Students in their freshman year and transfer students in their first quarter of residence may not take more than 17 units each quarter. For all other Letters and Science students, the study list may not exceed 21 units each quarter. These unit limitations include non-credit remedial courses and repeated courses, but make-up work to remove incomplete grades is not included.

**SENIOR DEGREE CHECK**

During the final quarter of your junior year, or no later than the first quarter of your senior year, you should request a Degree Check from the Dean's Office. A statement indicating any unfulfilled University and College degree requirements will be sent to you. To insure receipt of this statement before the beginning of the succeeding term, you must file the request during the first five weeks of a quarter. Information about your progress toward completing requirements in the major should be obtained by conferring with a faculty adviser for your major program.

**HONORS**

**The Dean's Honors List**

In order to be placed on the Dean's Honors List at the end of a regular quarter, you must satisfy two criteria:

1. Complete at least 12 units for a letter grade during that quarter;
2. Earn a grade-point average, for that quarter, that places you in the upper 16 percent of the students registered in the same class level and college.

To remain on the Honors List you must meet these same standards every quarter. This list is posted quarterly on the College bulletin board in the foyer of Mrak Hall.

**Honors with the Bachelor's Degree**

Two categories of honors may be awarded at graduation, based on the following minimum grade-point requirements:

<table>
<thead>
<tr>
<th>Total Units Completed at UC</th>
<th>Average of UC Work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Honors</td>
</tr>
<tr>
<td>45-89</td>
<td>3.5</td>
</tr>
<tr>
<td>90-134</td>
<td>3.4</td>
</tr>
<tr>
<td>135 and over</td>
<td>3.3</td>
</tr>
</tbody>
</table>

Recommendation from the major department, requested by the Dean's Office, is also required if you are eligible for highest honors. In some departments and programs completion of an honors program or thesis is an additional requirement for "highest honors."

You will not be awarded honors with the bachelor's degree if more than eight units of grade I (Incomplete) appear on your transcript. The College Committee on Honors may consider exceptions to this condition. Petitions for this purpose should be submitted to the Dean's Office. (See also page 63.)

**University and College Medals**

Graduating seniors with a distinguished academic record in the College of Letters and Science may be recommended by the faculty as nominees for the College’s Herbert A. Young Medal. Each June, one medalist is selected from among the graduates of the current academic year. Academic excellence is the primary basis for selecting the recipient of this award.

The college also nomination for the University Medal.
The Graduate Division

The Graduate Division is the academic home of approximately 3,000 post-baccalaureate students who are seeking advanced degrees in more than 70 graduate programs on the Davis campus.

Graduate study and research are administered by the Graduate Council, a standing committee of the Davis Division of the Academic Senate, and by the Dean of the Graduate Division. A Universitywide Coordinating Committee on Graduate Affairs determines general policies and establishes common procedures.

In developing its graduate programs, the Davis campus has taken advantage of a special pattern of organization allowing great flexibility: the creation of graduate "groups" which cut across the usual lines of faculty division into departments and colleges. A "group" is a graduate faculty whose membership is determined by research interest, not by department affiliation. Groups may be organized to offer an interdisciplinary program or to augment the faculty of a department, permitting participation in that discipline by faculty members who hold appointments in other departments.

Research is, of course, an integral part of graduate education. The Office of Research in the Graduate Division has as its primary purpose the administration of extramural grants and contracts. A portion of the total function has been decentralized to the several colleges, which review research proposals with regard to their consistency with the campus academic plan and resources of the colleges. Current emphasis in research development is on broad programs relating to the environment, programs in which faculty and students from a wide spectrum of formal disciplines may participate.

ADVANCED DEGREE PROGRAMS AT DAVIS

The following advanced degrees are offered at UC Davis: Master of Administration (beginning fall 1981), Master of Arts, Master of Science, Master of Fine Arts, Master of Arts in Teaching, Master of Engineering, Master of Health Services, Master of Education (in Agricultural Education), Master of Preventive Veterinary Medicine, Candidate in Philosophy, Doctor of Engineering, and Doctor of Philosophy. Those departments or groups offering programs for the degree of Doctor of Philosophy may, if they choose to do so, recommend the degree Candidate in Philosophy for all students formally advanced to candidacy. In addition to these graduate degrees, professional degrees are offered in the Schools of Law, Medicine, and Veterinary Medicine.

Majors for graduate study and the advanced degrees offered in each are shown below. General requirements for degrees are published in the Announcement of the Graduate Division. Specific requirements are available from the office of the department concerned.

Majors and Degrees

Administration (M. Admin.) — refer to Graduate School of Administration
Agricultural and Environmental Chemistry (M.S., Ph.D.)
Agricultural Economics (M.S., Ph.D.)
Agricultural Education (M.Ed.)
Agronomy (M.S.)
Anatomy (M.S., Ph.D.)
Animal Behavior (Ph.D.)
Animal Science (M.S.)
Anthropology (M.A., Ph.D.)
Art (M.F.A.)
Atmospheric Science (M.S., Ph.D.)
Avian Sciences (M.S.)
Biochemistry (M.S., Ph.D.)
Biomedical Engineering (M.S., Ph.D.)
Biophysics (M.S., Ph.D.)
Botany (M.S., Ph.D.)
Chemistry (M.S., Ph.D.)
Child Development (M.S.)
Classics (M.A.)
Clinical Psychology (Ph.D.)
Community Development (M.S.)
Microbiology (M.A., Ph.D.)
Music (M.A., M.A.T.)
Nutrition (M.S., Ph.D.)
Pharmacology and Toxicology (M.S., Ph.D.)
Philosophy (M.A., Ph.D.)
Physical Education (M.A.)
Physics (M.A., Ph.D.)
Physiology (M.S., Ph.D.)
Plant Pathology (M.S., Ph.D.)
Plant Physiology (M.S., Ph.D.)
Plant Protection and Pest Management (M.S.)
Political Science (M.A., Ph.D.)
Preventive Veterinary Medicine (M.P.V.M.) — refer to School of Veterinary Medicine
Psychology (M.A., Ph.D.)
Range Management (M.S.)
Rhetoric (M.A.)
Russian (M.A.)
Sociology (M.A., Ph.D.)
Soil Science (M.S., Ph.D.)
Spanish (M.A., Ph.D.)
Statistics (M.S., Ph.D.)
Textiles (M.S.)
Vegetable Crops (M.S.)
Veterinary Medicine (D.V.M.) — refer to School of Veterinary Medicine
Water Science (M.S.)
Zoology (M.A., Ph.D.)

Graduate Groups

Programs sponsored by graduate groups with faculty drawn from more than one department are listed below. If you are interested in one of these areas, write to the chairperson for more information.

Agricultural Education
Mary C. Regan, Ph.D.
Applied Behavioral Sciences
Agricultural and Environmental Chemistry
Cornelius S. Ough, D.Sc.
(Viticulture and Enology)
101 Enology Building (752-0696)
Anatomy
George H. Cardinet III, D.V.M., Ph.D.
1271C Haring Hall
Animal Behavior
Peter S. Rodman, Ph.D.
(Anthropology)
328 Young Hall (752-0745/1988)
Atmospheric Science
Bryan C. Weare, Ph.D.
(Land, Air and Water Resources)
139 Hoagland Hall
Avian Sciences
C. Richard Grau, Ph.D.
109 Asmundson Hall (752-1300)
Biochemistry
Mark G. McNamee, Ph.D.
149 Briggs Hall (752-3611)
Biomedical Engineering
James F. Shackelford, Ph.D.
(Mechanical Engineering)
2020 Bainer Hall (752-0580/2842)

Biophysics
David W. Daemer, Ph.D.
5330 Storer Hall

Botany
Richard H. Falk, Ph.D.
274 Robbins Hall

Child Development
Susan Crockenberg, Ph.D.
(Applied Behavioral Sciences)
129 AOB-IV (752-0770)

Clinical Psychology
Margaret S. Steward, Ph.D.
UC Davis Medical Center
4430 V Street (453-2609)
Sacramento, CA 95817

Community Development
(Applied Behavioral Sciences)
106 AOB-IV (752-2244)

Comparative Literature
Robert M. Torrance, Ph.D.
972 Sproul Hall

Comparative Pathology
David R. Strombeck, D.V.M., Ph.D.
3121 Medical Science 1A

Computing Science
V. Ralph Algazi, Ph.D.
Electrical and Computer Engineering

Earth Sciences and Resources
Kenneth L. Verosub, Ph.D.
(Geology)
175 Geology-Physics Building
(752-6911/0350)

Ecology
R. Merton Love, Ph.D.
Ecology Graduate Group
2148 Wickson Hall (752-6751)

Endocrinology
Howard A. Bern, Ph.D.
4079 Life Sciences Building, UC Berkeley

Engineering
Warren H. Giedt, Ph.D.
2006 Bainer Hall

Food Science
Gerald F. Russell, Ph.D.
(Food Science and Technology)
4440 Chemistry Annex

Genetics
S. Richard Snow, Ph.D.
357 Briggs Hall (752-0200)

Horticulture
Wesley P. Hackett, Ph.D.
140 Environmental Horticulture

Immunology
Eli Benjamini, Ph.D.
(Medical Microbiology)
3147 Medical Science 1A (752-3156)

International Agricultural Development
Donald R. Nielsen, Ph.D.
(Land, Air and Water Resources)
113 Veihmeyer Hall

Linguistics
Lenora Timm, Ph.D.
905 Sproul Hall

Microbiology
David Pratt, Ph.D.
(Bacteriology)
258 Hutchison Hall (752-0262)

Nutrition
Hubert Heitman, Jr., Ph.D.
210 Animal Science

Pharmacology and Toxicology
Theodore C. West, Ph.D.
(Pharmacology)
4453 Medical Science 1A (752-3200)

Physiology
James M. Boda, Ph.D.
(Animal Physiology)
192 Briggs Hall

Plant Physiology
Barbara D. Webster, Ph.D.
(Agronomy and Range Science)
Hunt Hall (752-2468)

Plant Protection and Pest Management
Steven R. Radosevich, Ph.D.
367 Briggs Hall

Preventive Veterinary Medicine
Walter W. Sadler, D.V.M., M.P.H.
2079 Haring Hall

Range Management
R. Merton Love, Ph.D.
227 Hunt Hall

Soil Science
H. Michael Reisenauer, Ph.D.
(Land, Air and Water Resources)
139 Hoagland Hall (752-1406)

Statistics
Julius S. Blum, Ph.D.
469 Kerr Hall

Textiles
S. Haig Zeronian, Ph.D.
(Division of Textiles and Clothing)
129 Everson Hall (752-6550)

Water Science
James W. Bigger, Ph.D.
(Land, Air and Water Resources)
113 Veihmeyer Hall
ADMISSION STANDARDS

Students admitted to graduate status at the University of California must hold a bachelor’s degree or the equivalent from an institution of acceptable standing and must have evidence of high scholastic ability. Generally, a minimum grade-point average of B in upper division course work in the applicant’s final two years of undergraduate study, or evidence of comparable scholarship, is required. Meeting the minimum requirements does not assure admission; students who are admitted are selected from among those applicants meeting the minimum standards.

Applications for admission are evaluated in terms of scholastic qualifications and formal preparation for the graduate field of study. An applicant whose scholastic record or undergraduate program of study is judged inadequate as a foundation for advanced academic or professional study may be denied admission. This procedure applies to all applicants, whether they come from schools or colleges within the University of California or elsewhere. Departments may have special requirements for admission to graduate status, and some departments and schools require an additional application for admission to their advanced degree program.

Application for Admission

Application forms may be obtained by writing to the Dean of the Graduate Division, University of California, Davis, CA 95616. APPLICATIONS FROM U.S. CITIZENS SHOULD BE ON FILE BY THE FOLLOWING DATES:

- June 1 for Fall Quarter
- October 1 for Winter Quarter
- January 1 for Spring Quarter

APPLICATIONS FROM NON-CITIZENS MUST BE FILED ONE MONTH PRIOR TO THESE DATES. HOWEVER, SINCE MANY DEPARTMENTS EFFECTIVELY CLOSE APPLICATIONS WELL IN ADVANCE OF THESE DEADLINES, EARLY FILING (preferably eight to twelve months prior to the date of registration) IS STRONGLY RECOMMENDED.

The application must be accompanied by a money order or bank check for $20 ($25, effective for applications to Fall Quarter 1981) made payable to The Regents of the University of California. This fee is nonrefundable. In cases where complete records are filed later than the above dates, registration may be delayed, thus making you liable for a late registration fee of $10.

Official transcripts of record covering all college and university work completed to date, together with official evidence of degrees conferred, should accompany or immediately follow your application. A separate original and official record must be presented from each institution previously attended. Your transcripts and all other official credentials are retained in the files of the Office of the Dean of the Graduate Division. In addition to having your records sent to this office, you must have in your possession an official record for use in conferences with departments and for other purposes here. The Graduate Division office copy may not be borrowed.
Applications for programs leading to a Ryan teaching credential or specialist credential, and for the degrees of Juris Doctor, Doctor of Medicine, Doctor of Veterinary Medicine, and Master of Preventive Veterinary Medicine must be filed directly with the appropriate department or professional school.

**Reentry**

If you were formerly enrolled in a regular session as a graduate student and wish to return, you must apply for reentry and pay the Reentry Application Fee of $20 ($25 effective for Fall Quarter 1981) at least six weeks before the beginning of the quarter in which you wish to enroll. The Reentry Application may be obtained from the Graduate Division. Transcripts of all work undertaken since you were last registered in graduate status at Davis must be presented with the Reentry Application. (There is no assurance of reentry, as applicants for reentry will be considered in competition with other applicants for the program.)

**International Students**

Applicants for admission to the Graduate Division with credentials from universities and colleges in foreign countries are advised to make their initial inquiry at least one year before the date of intended enrollment to permit processing of records.
If your undergraduate preparation has been in a language other than English, you must furnish positive evidence that your command of both spoken and written English will permit you to profit from the instruction offered. A report from the Test of English as a Foreign Language (TOEFL), which is administered by the Educational Testing Service for the College Board, is required. The TOEFL is given three times a year at many testing centers abroad, and full information is available from the Educational Testing Service, Princeton, N.J. 08540.

On arrival, international students take the special University examination in English. Those who do not pass are assigned to remedial courses. Even though you have been admitted, registration may be deferred until you acquire an adequate command of English.

**Graduate Study Without an Advanced Degree Objective**

If you do not wish to become a candidate for a higher degree, you may be admitted to a specified field of study for course work only. Such a program, which requires the approval of the Dean of the Graduate Division, must have a definite scholarly or professional purpose. The scholastic requirements for admission are the same as those for degree programs.

**GENERAL REQUIREMENTS FOR ADVANCED DEGREES**

A graduate degree is awarded to recognize a student's command of a wide range of knowledge in an academic field. It is not awarded merely for the fulfillment of technical requirements, such as residence, or the completion of specific courses.

**Master's Degree**

Students working toward a master's degree must be registered in residence for at least three quarters. Two regular six-week Summer Sessions may count as the equivalent of one quarter. Usually, all work for the master's degree is done in residence on the Davis campus. With the consent of the graduate adviser and the Dean of the Graduate Division, however, some work taken elsewhere may be credited toward your degree. The normal limit for such transfer credit is 6 units from another institution or up to one-half of the unit requirement in courses from another campus of the University — if the units were not used to satisfy the requirements for another degree.

A master's degree may be awarded upon completion of one of two basic plans in which either a thesis or a comprehensive examination is required.

**Ph.D. Degree**

The degree Doctor of Philosophy as granted at the University of California is not merely certification of having fulfilled technical requirements such as residence and the completion of fundamental courses. It means that the recipient possesses knowledge of a broad field of learning and has given evidence of distinguished attainment in that field; it is a warrant of critical ability and powers of imagination and synthesis. It means, too, that the candidate has presented a dissertation containing an original contribution to the knowledge of the chosen field of study.

Students working toward a doctorate must be registered and in University residence for a minimum of six regular quarters. Experience indicates that it takes considerably longer than this to complete a degree program. Two consecutive regular Summer Sessions may count as the equivalent of one regular quarter.

There is no University unit requirement for the doctoral degree. However, individual programs have course requirements which must be completed prior to your admission to the Qualifying Examination.

The Qualifying Examination is administered by a committee appointed by the Dean of the Graduate Division. The Examination is intended to demonstrate your critical ability, powers of imagination and synthesis, and broad knowledge of the field of study. Upon recommendation of the Qualifying Examination Committee, and with the approval of the Graduate Council, you may repeat the Examination one time.

After successful completion of the Qualifying Examination, you are advanced to Candidacy for the degree. At this time, a committee is appointed to direct you in your research problem and guide you in the preparation of the dissertation.

**Normative Time to the Ph.D. Degree.** The University of California has adopted a policy statement on the normative time in which students are expected to complete the requirements for the Ph.D. degree programs. The policy establishes the period of full-time registration in which a student entering a Ph.D. degree program with a bachelor's degree and without any stated deficiencies should be able to complete the requirements of a particular program. The normative time for Ph.D. programs at Davis is expressed in terms of academic years, each academic year being comprised of three quarters in full-time registered status. The normative time for all Ph.D. programs at Davis is either four or five academic years.

Under the normative time policy, the University policy on continuous registration from the first quarter of enrollment to completion of degree requirements, unless on an approved leave of absence, will be strictly enforced. There is a financial incentive for completing the Ph.D. program within the normative time; students formally advanced to candidacy are currently eligible each quarter for a partial fee-offset grant until completion of the Ph.D. degree or until the cumulative time in graduate status at UCD exceeds the normative time to degree in a student's field of study.

**PROGRAM OF STUDY**

New students are assigned an adviser within the appropriate department or graduate group who assists them in planning a program of study. The program will depend to some degree on the student's undergradu-
ate training, and may include undergraduate courses to remove deficiencies. Each student must satisfy the degree requirements as published in the Announcement of the Graduate Division. Additional requirements for study may be established by the department or group and approved by the Graduate Council. These requirements often include a core of required courses, but considerable flexibility is permitted to suit individual needs. Undergraduates at Davis who plan to pursue graduate study should consult with their major adviser early in their senior year to guarantee adequate preparation.

INTERCAMPUS EXCHANGE PROGRAM

As a graduate student registered on any campus of the University, you may become an Intercampus Exchange Student with the approval of your graduate adviser, the chairperson of the department or group in which you wish to study on the host campus, and the Dean of the Graduate Division on both the home and the host campuses.

Although as an Intercampus Exchange Student you have library, health service, and other student privileges on the host campus, you are considered a graduate student in residence on your home campus. The grades obtained in courses on the host campus are transferred to your home campus and entered on your official record.

Application forms may be obtained at the Office of the Dean of the Graduate Division six weeks prior to the beginning of the quarter in which you wish to participate in the program.

FELLOWSHIPS, ASSISTANTSHIPS, AND LOANS

Fellowships are awarded by the Fellowship Committee of the Graduate Council on the basis of scholarship and promise of outstanding academic and professional contribution. Applicants who plan to enter in a Fall Quarter and wish to be considered for a fellowship or graduate scholarship must file the combined Application for Admission and Fellowship no later than January 15 preceding the Fall Quarter to be attended. These applications are considered only once a year. If you are continuing in graduate status at Davis you must file an application for fellowship and graduate scholarship for continuing students with your major department or graduate group chairperson on or before January 15. Applications for both new and continuing students may be obtained from the Graduate Admission/Fellowship Office, 252 Mrak Hall.

Teaching assistantships and research assistantships are available in many departments. Interested students should inquire at the office of the department in which they wish to study.

Information regarding Graduate Fellowships that are supported by various Federal and outside agencies is available at the Graduate Division.

The Financial Aid Office has information about loans for graduate students (see page 39).

TEACHER CREDENTIAL PROGRAM

The teacher education program at UC Davis is administered by the Graduate Division.

Acceptance into the multiple-subject teaching credential (elementary) program does not require any specific campus major. If you are accepted to this program, you can meet the State requirements for a diversified major by completing a regular University major and one of the following alternatives:

- The additional requirements for the newly approved UC Davis Diversified Waiver Program;
- The additional requirements for the newly approved Mexican-American (Chicano) Studies Diversified Waiver Program; OR
- Achieving a passing score on the National Teachers Examination (Common Section).

California State single-subject teaching majors (secondary) for which Davis students can qualify are: agriculture, art, English (including drama and speech), foreign languages, government, history, home economics, life science, mathematics, music, physical education, physical science, and social science. For information concerning University majors and campus waiver programs which satisfy these single-subject majors, or State-approved examinations available to test competence in these single-subject majors, consult the appropriate adviser in the departments of Education or Applied Behavioral Sciences.

Admission to the teacher education program is by the Graduate Division. Eligibility requires a scholarship record of B (3.0) or better in all upper-division work undertaken in the last two years of undergraduate study. For the 1981-82 program, applications and filing deadlines should be obtained from the departments of Education, 174 Kerr Hall or Applied Behavioral Sciences (home economics and agricultural education), 106 AOB-IV.

Recent legislation makes the teacher education program also available to upper-division students. With careful planning it is possible for some students to complete requirements for a preliminary credential as undergraduates. This credential allows you to teach for five years while finishing the fifth year of academic work required for the clear credential. Specific requirements may be obtained from the Department of Education.

Students considering teaching as a career should consult the departments of Education or Applied Behavioral Sciences as early as their freshman year. Because of the complexity of the Teacher Preparation and Licensing Law and the requirements of Davis campus programs, students are encouraged to maintain close contact with education advisers throughout their undergraduate years.
Professional Schools

Requirements and Preparation

Eligibility for admission to one of the University of California professional schools or curricula is contingent upon the successful completion of an undergraduate program of preprofessional training of 2 to 4 years, depending upon requirements for specific schools. Announcements and information describing admission and course requirements for a particular school are available by writing to the school of your choice in care of the appropriate University campus.

Legend and addresses:

(B) University of California, Berkeley 94720
(D) University of California, Davis 95616
(I) University of California, Irvine 92717
(LA) University of California, Los Angeles 90024
(R) University of California, Riverside 92502
(SD) University of California, San Diego, La Jolla 92093
(SF) University of California, San Francisco 94143
(SB) University of California, Santa Barbara 93106
(SC) University of California, Santa Cruz 95064

Direct inquiries about schools and curricula in San Francisco (except Hastings College of the Law) in care of: Office of Student Admission.

Professional schools and curricula requiring 2 to 3 years of undergraduate preparation:

School of Business Administration (B)
School of Criminology (B)
Curriculum in Cytotechnology (SF)
Curriculum in Dental Hygiene (SF)
Schools of Dentistry (LA, SF)
Curricula in Education (B, D, I, LA, R, SB, SC)
School of Engineering (I)
School of Engineering and Applied Science (LA)
School of Forestry and Conservation (B)

School of Journalism (B)
Curriculum in Medical Illustration (SF)
Curriculum in Medical Technology (SF)
Schools of Medicine (D, I, LA, SD, SF)
Schools of Nursing (LA, SF)
School of Optometry (B)
School of Pharmacy (SF)
Curriculum in Physical Therapy (SF)
Schools of Public Health (LA, B)
School of Veterinary Medicine (D)

Professional schools requiring a bachelor's degree in appropriate field of study for admission:

Graduate Schools of Administration (D, I, R)
School of Architecture and Urban Planning (LA)
Graduate Schools of Business Administration (B, LA)
Schools (or Departments) of Education (B, D, I, LA, R, SB, SC)

Preparation for education credentials is available as follows:

Kindergarten — Primary (LA, SB)
Elementary Teaching (B, D, I, LA, R, SB, SC)
Secondary Teaching (B, D, I, LA, R, SB, SC)
Special Education (R)
Special Secondary (D, SB)
Junior College Teaching (B, LA, R, SB)
Pupil Personnel Services (B, SB)
Reading Specialist (D)
School Librarianship (B, LA)
School Psychology (B, D, SB)
Special Services (LA, SB)
Supervision (B, LA)
Administration (B, LA)
Graduate School of Journalism (B)
Schools of Law (B, D, LA)
Hastings College of the Law (SF)
School of Librarianship (B)
School of Library and Information Science (LA)
Graduate School of Public Policy (B)
Schools of Public Health (LA, B)
Schools of Social Welfare (B, LA)
Scripps Institution of Oceanography (SD)

PREPROFESSIONAL TRAINING

Preprofessional programs do not — in and of themselves — lead to a bachelor’s degree. Since professional schools cannot accommodate all qualified applicants, students should prepare themselves for alternate careers and are expected to pursue a major program while completing their preprofessional requirements.

With careful planning it is possible for students to undertake any one of a variety of majors. While most students interested in the health sciences will elect a major within the biological sciences, majors as varied as psychology, engineering, and art can be equally acceptable. Law schools, in particular, do not prescribe any specific major program. They give equal consideration to all qualified applicants completing a course of study which gives them a broad cultural background and includes intensive work for a substantial period of time in a selected field of study.

REFERRAL INFORMATION

Although the Davis campus offers course work in preparation for admission to most of the schools listed above, the referral information which follows relates to the types of preprofessional training in greatest demand at Davis.

Students are strongly urged to read this catalog and the appropriate professional school announcement carefully before consulting faculty and staff about admission requirements. Communicate directly with personnel at the professional school to which you expect to apply if you need more detailed information. A list of general reference books which may be of interest is presented at the conclusion of this section.

ADMINISTRATION

A Graduate School of Administration is being established on the Davis campus to offer a Master of Administration degree, with the first class to be admitted by the fall of 1981. The two-year graduate program will involve both public and private administration. (See page 113 for details.)

BUSINESS ADMINISTRATION AND PUBLIC POLICY

Preparation for study: See published announcements of schools of business administration and public policy. For advice and counsel, see the departmental advisers in the Department of Economics (380 Kerr Hall, 752-0741) or Agricultural Economics (118 Voorhies Hall, 752-1517); or see the Pre-Business School (Peer) Adviser located in 359 Kerr Hall, 752-6512.

FORESTRY

Preparation for Study: Consult this catalog (pages 69, 81, 282) and the announcement of the Department of Forestry and Conservation, UC Berkeley.

Preforestry advisers: Jack Major (Botany Department, 7 Robbins Annex, 752-0621 or 752-0617) or C.C. Delwiche (Land, Air and Water Resources, 273 Hoagland Hall, 752-1511 or 752-1409).

LAW


Advising: Students interested in legal careers should consult the Pre-Law Adviser, Pre-Law Advising Office, South Hall, 752-3009. Information is available about law school admission procedures, academic program planning (see also page 29), and career possibilities.

School of Law, UC Davis: Consult this catalog (page 115), the Announcement of the School of Law, or the Law School Admissions Office, 115 King Hall, 752-6477.

HEALTH SCIENCES

At the Davis campus only preparatory work is offered. Professional training for all fields except Medicine and Veterinary Medicine must be completed elsewhere. Degree work is offered at Davis for dietetics, but students must apply elsewhere for the required postgraduate internship. Information regarding careers in dietetics or nutrition can be obtained from the Nutrition Department or the Work-Learn and Career Planning and Placement Center on campus. Contact the Health Sciences Advising Office, South Hall (phone 752-2672) regarding curricula and schools for all health science fields.

Suggested Curricula. As specific school requirements vary, students should either contact the schools directly, or contact the Health Sciences Advising Office for more detailed information. Students transferring into a professional program offered at the undergraduate level must complete that school’s general education requirements.

Students are advised that in California most professional programs are unable to accommodate all applicants. Students may wish to consider applying also to out-of-state programs. Professional school admissions committees evaluate applicants on the basis of their course work and grades, work experience in health care, and community activities, and letters of recommendation.

Courses listed under each of the following health fields of study are general requirements only.

Clinical Laboratory Technology

To qualify for the required twelve-month medical technology traineeship in California, students need to complete a baccalaureate degree, which includes the following minimum coursework requirements as specified by the State Department of Health.

Biological sciences: 27 units, including instruction in hematology (Clinical Pathology 101), Immunology (Veterinary Microbiology 126 or Medical Microbiol-
ogy 107), and medical microbiology (Veterinary Microbiology 127).

Chemistry: 24 units, including Chemistry 1A, 1B, 1C, 5 and Biochemistry 101A-101B or Physiology 110. Physics 2A, 2B, 2C.

Mathematics or calculus, at least one term.

Strongly recommended courses include: parasitology (Veterinary Microbiology 132, Medical Microbiology 215, or Entomology 156-156L); and a laboratory in clinical chemistry (e.g., Clinical Pathology 102 or Biochemistry 101L).

Recommended courses include: organic chemistry (Chemistry 8A-8B); physics (Physics 3A-3B-3C); hematology (Clinical Pathology 101L); immunology (Veterinary Microbiology 125L); medical microbiology (Veterinary Microbiology 127L); physiolo-

ogy 110-110L; virology (Veterinary Microbiology 128 or Biological Sciences 162); histology (Zoology 122).

Suggested electives: genetics (Genetics 100A-100B or 120); Human Anatomy 101; virology laboratory (Veterinary Microbiology 130); advanced immunology (Veterinary Microbiology 270); computer programming (Engineering 5, Mathematics 19, or 29); electronic instrumentation (Electrical and Computer Engineering 195A-195B); business management (Agricultural Economics 112).

Requirements vary among training programs. Students should check the individual program for additional required courses.

**Dentistry**

Students complete three to four years of preprofessional course work prior to admission to the three- or four-year dental curriculum. The Dental Admission Test should be taken in April, one year prior to projected date of admission. Check individual catalogs for exact prerequisites.

Biological sciences (at least one year with laboratory). Strongly recommended: Biological Sciences 1; Zoology 2-2L; Physiology 110-110L; Zoology 100-100L; Biochemistry 101A-101B. Recommended: Zoology 105 or 106, Bacteriology 2, and 3 or 102.

Chemistry 1A-1B-1C, and 8 to 12 units of organic chemistry with laboratory (e.g., courses 128A-128B-128C and 129A are usually taken, but, in some schools, courses 8A-8B, and 128A and 129A may be substituted). Check individual catalogs for specific requirements.

English: one year. (Rhetoric classes may not be substituted for English.)

Physics 2A-2B-2C, 3A-3B-3C.

Psychology: two courses. Recommended: Psychology 1, 16, 112, or 168.

Suggested electives: Statistics 13 or Agricultural Science and Management 150; Mathematics 16A-16B-16C; Genetics 100A-100B or 115; sculpture course, art practice (Art 11).

**Health Care Administration**

A public administration or business management orientation is recommended for the baccalaureate and master's degree work. Schools of public health and graduate school programs in administration offer professional training. Elective courses may be selected from the following:

Agricultural Economics (e.g., courses 18, 112, 117, 171A, 171B).

Applied Behavioral Sciences (e.g., courses 151, 152, 153, 154, 155, 160A, 160B, 162, 163, 164, 172).

Community Health 101, 121, 126, 204.
Economics (introductory and accounting, courses 131, 134, 150A, 151A).
Engineering 5, 10, 15.
Epidemiology and Preventive Medicine 102, 103A, 103B, 103C.
Food Service Management 123.
History (e.g., courses 171C, 174A-174B, 185B).
Statistics 13 or Agricultural Science and Management 150; Mathematics 19.
Political Science (e.g., courses 100, 101, 102, 156, 180, 181, 182, 183, 187, 188).
Psychology 1, 112, 115, 168.
Rhetoric 1, 3.
Sociology (e.g., courses 154, 180).

**Medical**

Students complete three to four years of preprofessional course work prior to admission to medical school. The Medical College Admission Test must be taken at least one year prior to expected date of admission. Check individual medical college catalogs or contact the Health Sciences Advising Office for specific requirements for each school. Any major is appropriate for admissions; the following courses are required by most schools.

Biological sciences: five quarters, with laboratory.
(Biological Sciences 1, Zoology 2-2L, Physiology 110, 110L, Bacteriology 2, 3 recommended). Chemistry 1A-1B-1C; one year organic, with laboratory (e.g., Chemistry 8A-8B-128A-129A or preferably 128A-128B-128C and 129A-129B-129C). Physics: one year, with laboratory (e.g., 2A-2B-2C, 3A-3B-3C).

English: one year.
Recommended: one year of calculus (e.g., Mathematics 16A-16B-16C).

**Nursing**

Two years are usually required to complete prerequisites prior to transferring into two- or three-year baccalaureate nursing programs. General requirements include:

Bacteriology 2, 3.
Chemistry 1A, 1B, 8A, 8B.
English 1, 3.
Human Anatomy 101, 101L.
Physiology 2-2L or 110-110L.
Psychology 1.
Sociology 1.
Recommended courses include: Nutrition 10 or 110; Human Development 100A or Psychology 112; Anthropology 2; Rhetoric 1, 3; Physics 3A, 10; Zoology 2, 2L; Family Practice 127; Community Health 101; Psychiatry 255, 256; Biological Sciences 19, Psychology 15 or 106.

Specific requirements are subject to change; students are advised to contact specific schools regarding additional requirements. An R.N. license may also be earned through Associate degree programs (A.S. or A.A.) offered by community colleges or through hospital diploma programs.

**Occupational Therapy**

Basic preprofessional training may be taken either at the undergraduate or graduate level. Students must transfer to another school to obtain professional training. Applicants are expected to be proficient in some arts and crafts activities and preferably knowledgeable in some industrial arts and recreational skills.

Biological Sciences 1.
Chemistry 1A, 1B.
English 1 or 3.
Human Anatomy 101, 101L.
Human Development 100A-100B or Psychology 112.
Physiology 2-2L, or 110-110L (recommended).
Psychology 1, 16, 168.
Rhetoric 1 or 3.

Sociology: one course or Anthropology 1 and 2.
Suggested electives: Human Development 100C, 102, 130, 131, 141; additional psychology; Physics 2A-2B-2C, 3A-3B-3C, 10; Physiology 111A-111B, 112-113; Community Health 101; Genetics 10; Nutrition 10; art and design courses; Physical Education 103, 105, 113, 125, 131; Behavioral Biology 451, 468; Family Practice 127, 406A, 406B, 406C. CSU San Jose requires a "skills" course.

**Optometry**

Two years minimum preparation is required prior to transfer into a four-year Doctor of Optometry degree curriculum. Students must take the Optometry College Admission Test, one year prior to projected date of admission. Test is usually given in November, January and March. Check individual catalogs for exact prerequisites.

Biological sciences (one year with laboratory). Recommended: Biological Sciences 1; Bacteriology 2 or 102 and 3; Zoology 2-2L or 105 or 106 or Human Anatomy 101 or Anatomy 100; Physiology 2-2L or 110-110L.

Chemistry: one year of general (Chemistry 1A, 1B, 1C) and one year of organic with laboratory (6A, 8B and 128A-129A or 128A-128B-128C and 129A-129B-129C). Required by a few schools: 9 units of organic chemistry.

English: one year (may include rhetoric).
Mathematics 16A-16B. Required by some schools: Mathematics 16C; Statistics 13. Agricultural Science and Management 150 may be substituted.

Physics 2A-2B-2C, 3A-3B-3C.
Psychology: two courses, Psychology 1 and one upper division course.
Suggested electives: economics, sociology, biochemistry, additional biological sciences.
Pharmacy

One to two years minimum preprofessional course work is required prior to transfer to professional training. Students may be required to take the Pharmacy College Admission Test one year prior to projected date of admission. Each school has its own requirements; experience in the field is usually required; USC requires its own examination. Check individual catalogs.

Biological sciences (one year with laboratory). Recommended: Zoology 2-2L, 100; Bacteriology 2 or 102, 3; Biological Sciences 1.

Chemistry: one year of inorganic chemistry with laboratory (Chemistry 1A-1B-1C); one year of organic with laboratory (Chemistry 128A-128B-128C-129A-129B-129C). UCSF requires Chemistry 5, but no organic chemistry.

Economics: one macroeconomics course. A few schools require Economics 1A-1B.

English: one year, composition and literature course.

Mathematics 16A, 16B, 16C.


Psychology: one course.

Suggested electives: courses in behavioral psychology, speech, communication, sociology, anthropology, history, and political science.

Physical Therapy

Basic preprofessional training is available for both the undergraduate and graduate levels; students must obtain preprofessional training from another school. Each physical therapy program has its own specific requirements. General requirements include:

Biological Sciences 1.

Chemistry: 1A, 1B. Recommended: 1C, 8A, 8B, 9A, 9B.

English 1, 3.

Human Anatomy 101, 101L.

Physics 2A, 3A. Many schools require also Physics 2B, 2C, 3B, 3C.

Physiology 2-2L or 110-110L (110-110L strongly recommended.)

Psychology 1 and 168.

Rhetoric 1, 3.


Suggested electives: Human Development 100A-100B or Psychology 112 and Human Development 100C, 131, 141; Bacteriology 2 and 3; Sociology 1, 3; Zoology 2-2L, 106, 143; Anatomy 215; Physical Education 101, 102, 103, 105, 113, 125, 131; Chemistry 1C; Behavioral Biology 451; Community Health 101; Family Practice 127; additional psychology.

Physician Assisting

Physician Assistant programs often require courses in biology and chemistry, and up to two years of college. One to two years of direct patient care (i.e., nurse, orderly, corpsman) are advisable to meet minimum prerequisites. The majority of the programs are for training people who are interested in assisting the primary care physician in a rural setting, but training in a specialty and employment in urban settings are also available.

Speech Therapy

Students must transfer to another school for preprofessional and professional training through a master's degree or special teaching credential program.

Speech therapy and audiology programs are highly specific in their entrance requirements at both the undergraduate and graduate levels. UC Davis offers courses that satisfy a few of the requirements, however it has no preprofessional major for these fields. For information on courses at Davis which are acceptable toward specific programs in speech therapy and audiology, you may contact either the Health Sciences Advising Office or the professional program in which you are interested.

School of Medicine, UC Davis: Consult page 119 of this catalog, the School of Medicine Bulletin, or the Office of Student Affairs, School of Medicine, 752-3170.

School of Veterinary Medicine, UC Davis: Consult this catalog, page 123, the Announcement of the School of Veterinary Medicine, or the Office of Student Services, School of Veterinary Medicine, 752-1383.

REFERENCE BOOKS

School catalogs and reference texts are available in the Reference Room of the Shields Library, the Health Sciences Library, or the Health Sciences Advising Office: Some recommended publications are as follows:

American Universities and Colleges, edited by the American Council on Education.

Graduate Programs and Admissions Manual, published by the Graduate Record Examination Board and the Council of Graduate Schools in the United States.

Admission Requirements of American Dental Schools, published by the American Association of Dental Schools.

Medical School Admission Requirements U.S. and Canada, published annually by the Association of American Medical Colleges.

Pharmacy School Admission Requirements, published annually by the American Association of Colleges of Pharmacy.
The Graduate School of Administration expects to admit its initial class in Fall Quarter 1981. At maturity, the School will have approximately 300 students and a faculty of approximately 25.

The degree of Master of Administration requires the satisfactory completion of a two-year course of study comprising six quarters. In addition to completing an approved sequence of courses and seminars, degree candidates are expected to complete intensive supervised internships in approved organizational settings.

The basic premise of the Graduate School of Administration is that administration has a generic character such that many of its concepts and principles are applicable in both the private and public sector. Drawing on many disciplines, the program offers first-year students a central core of courses which set forth administration’s general components and build a foundation for subsequent specialization. These courses will cover economic analysis, policy analysis, quantitative methods, and organizational theory and behavior. During the second year, students take specialized courses which will prepare them to become practitioners in the public or private sectors. Fields of specialization will include business management, financial management, and management of public programs. Additional concentrations in engineering management and environmental and natural resources management are under consideration.

Admission Requirements

A bachelor’s degree and a firm interest in professional management are prerequisites for admission to the Graduate School of Administration. Although the program and certain concentrations within the program will have specific prerequisites (such as elementary statistics and microeconomic theory) students may be conditionally admitted pending completion of specific prerequisites. The School hopes to draw students from diverse backgrounds, both in terms of working experiences and the disciplines in which the bachelor’s degree was awarded.

The admissions committee will require:

- Transcripts from all previously attended institutions of higher education
- Scores from the Graduate Management Admissions Test, and
- Three letters of recommendation and a personal statement.

Admission Procedures

Interested applicants should write to the Dean, Graduate School of Administration, University of California, Davis, CA 95616, for a full description of admissions requirements and procedures. Students applying for fellowships and scholarships must apply before January 15, 1981. Application and supporting materials for regular admission must be received no later than March 1, 1981.
The School of Law offers a three-year professional curriculum leading to the degree of Juris Doctor. The fall of 1980 will see the School enroll its fifteenth class.

The program of the School is designed to combine the best features of traditional legal education with the development of new interests and approaches necessary for training lawyers to meet the demands of the future. In addition to the traditional professional curriculum, the School offers opportunities for practical experience through clinical programs and for in-depth study of an area of law in an individualized program of classroom work, research, writing, and experience in the community. It also seeks to promote critical evaluation of law and legal institutions in a broad perspective, integrating non-legal disciplines with professional legal education.

The School is fully accredited by the American Bar Association, is a member of the Association of American Law Schools, and has a chapter of the Order of the Coif.

Preparation for the Study of Law

No specific college major is required for admission to the School of Law, and there is no prescribed pre-law program. Your college record and Law School Admission Test (LSAT) score must, of course, demonstrate that you are highly qualified for the study of law.

As a pre-law student, you should plan a course of study that will give you a broad cultural background and include intensive work for a substantial period of time in a selected field of study. Pre-law students should develop the ability to communicate easily, persuasively, and accurately; to understand people and institutions; to gather and weigh facts; and to solve problems and think creatively. You should be able to read rapidly with comprehension, and express yourself clearly, completely, and concisely, both orally and in writing — in short, it is most important that you obtain mastery of the English language.

Assistance in program planning may be obtained from the Pre-Law Advising Office, South Hall, 752-3009 (see pages 29 and 108).

For additional information, see the official Pre-Law Handbook, published annually and prepared by the Law School Admission Council and the Association of American Law Schools. This book includes material on the law and lawyers, pre-law preparation, applying to law school, and the study of law, together with individualized information on most American law schools. It may be found at college bookstores or ordered from Law School Admissions Council, Box 2000, Newtown, PA 18940.

ADMISSION

Requirements for Admission

Your application for admission to the School's professional curriculum must show a record of sufficiently high caliber to demonstrate qualification for the study of law. A bachelor's degree or an equivalent degree from an approved college or university must be earned prior to the time you begin work in the School.

Your application will be reviewed by the School of Law Admissions Committee, which seeks students of demonstrated academic ability, as evidenced by LSAT scores and the undergraduate grade-point average (GPA). Applicants with LSAT scores below 400 will not be considered. Applicants with LSAT scores between 400 and 450 and undergraduate GPAs below 3.0 are rarely admitted. The Committee seeks students of diverse backgrounds. In this regard, the Committee considers ethnic and economic factors, advanced degrees or other advanced studies, significant work experience, and extracurricular and community activities.
during and after the college years. An applicant's growth, maturity, and commitment to the study of law are major concerns.

Students are admitted only on a full-time basis and only in August.

Law School Admission Test (LSAT)

All applicants are required to take the Law School Admission Test administered by the Educational Testing Service. Testing centers have been established for the convenience of applicants in all parts of the United States and in many foreign countries. Tests are given four times a year: February, June, October, and December. If at all possible, you should take the test by October, and in any event not later than December, for admission the following fall. The completed test application blank, accompanied by the fee, must be postmarked at least 30 days before the date of the test to insure the applicant's being registered.

To obtain application forms, information about the test, specific test dates, and the location of testing centers, write to: Law School Admission Test, Law School Admission Services, Box 2000, Newtown, PA 18940.

Admission Procedures

Complete details of admission procedures are included in the School's bulletin, Announcement of the School of Law.

1. Application for admission to the School of Law and to the Graduate Division of the University for the program leading to the degree of Juris Doctor should be made on forms supplied by the School. Application forms and the School bulletin may be requested from the Office of Admissions, School of Law, University of California, Davis, CA 95616. The completed application must be returned to that same office, accompanied by a $25 nonrefundable application fee in the form of a check or money order made payable to The Regents of the University of California.

The last date for filing completed application forms, together with all supporting documents, including LSAT scores, Law School Data Assembly Service (LSDAS) reports, and letters of recommendation, is March 1 of the year in which admission is sought. Early filing of all application materials is strongly recommended and will materially assist the School of Law Admissions Committee in its considerations. No application will be considered if received after March 1 of the year in which admission is sought.

2. Applicants must take the Law School Admission Test and request that the score be reported to the School. You are urged to take the test as early as possible, and in no event later than December preceding the year in which admission is sought.

3. You should register with the LSDAS no later than December 1 by completing and mailing the registration form supplied with each LSAT/LSDAS information packet. A transcript from each college or university attended should then be sent directly to the Law School Data Assembly Service, Law School Admission Services, Box 2000, Newtown, PA 18940.

4. An official transcript of college work completed during the first semester or quarter of the applicant's senior year must be submitted directly to the School of Law as soon as it is available. Failure to do so may delay consideration of your application materials. Successful applicants are required to submit directly to the School of Law a final transcript showing the award of a bachelor's degree.

5. Two letters of recommendation from objective and responsible persons to whom you are well known must be provided. At least one of these letters should come from a faculty member under whom you studied while in college. These letters of recommendation should be sent directly to the Office of Admissions before the Law School Admissions Committee can seriously consider your application.

6. When accepted by the School of Law, you are simultaneously admitted to the Graduate Division on the Davis campus of the University for the program leading to the degree of Juris Doctor. If you intend to pursue studies leading to other graduate degrees, or wish to become a candidate for a Combined Degree Program (see page 117), you must make separate application to the Graduate Division prior to commencing such studies.

Admission to Advanced Standing

If you have completed at least one year of work in another approved law school, you may be admitted to advanced standing with credit for not more than one year of such work. No application for advanced standing will be considered until the Office of Admissions has received transcripts for all prior law school work.

Application procedures for advanced standing are the same as described above with the addition of (1) a letter from the dean of any law school previously attended indicating that you are in good standing; (2) at least one letter of recommendation from a law professor; and (3) transcripts of all law school work. The deadline for transfer applications is June 30 of the year for which transfer is sought. Committee decisions on advanced standing are normally made in late July or August of the year in which admission is sought.

Students who have been disqualified at another law school will not be admitted to this school.

Minority Recruitment

The students and faculty of the UCD School of Law recognize the desperate need for minority lawyers. The School, therefore, actively solicits applications from Native American, Black, Filipino, Asian, and Chicano students. Obviously, a legal career is neither the only nor, in many instances, the most desirable way to deal with racism, poverty, and the myriad social, political, and economic problems which besiege this country—but it is one way to approach their solutions.
The School of Law, in cooperation with the Association of American Law Schools (AALS) and the Council on Legal Education Opportunity (CLEO), participates in programs designed to increase the number of minority law students. CLEO applications may be obtained by writing to: Council on Legal Education Opportunity, 818 18th Street N.W., Suite 940, Washington, D.C. 20006.

Applications for the special summer program for Native American students may be obtained from the School of Law, University of New Mexico, 1117 Stanford Drive N.E., Albuquerque, N.M. 87106.

The Mexican-American Legal Defense and Education Fund (MALDEF) has monies available for Chicano students who have applied to law school. Applications may be obtained by writing to: Mexican-American Legal Defense and Education Fund, 28 Geary Street, 6th Floor, San Francisco, CA 94108.

**PROFESSIONAL CURRICULUM AND DEGREE**

The course of study in the professional curriculum requires six semesters for completion and extends over a period of three years. It is designed for full-time students only; no part-time or evening program is offered. New students are admitted only at the beginning of the Fall Semester.

When you satisfactorily complete the professional curriculum of 84 semester units, and the required period of resident study, you will be recommended for the degree of Juris Doctor.

The first year's work is prescribed and provides the essential foundation for subsequent legal study. Satisfactory completion of the first-year courses is, in all cases, a prerequisite to second- and third-year courses. The work of the second and third years is elective. Students who fail to attain satisfactory grades may be required to withdraw from the School at the end of any academic year.

Courses taken in summer sessions at other accredited law schools may, with prior permission, be credited toward the units required for the professional degree.

The courses of the professional curriculum are listed beginning on page 235.

**Combined Degree Programs**

Students with interests in areas such as anti-trust, business, labor law, criminal law, or ecology, may find a combined degree involving law and another discipline such as economics, business, sociology, or science advantageous. In order to encourage this kind of study, the School, in conjunction with other schools and University departments, has established Combined Degree Programs. Under these programs, a student may work toward a J.D. degree and a master's degree in another discipline at the same time. In some instances it may be possible to work on a Ph.D. degree as well.

Normally, a Combined Degree Program will take at least 3 1/2 to 4 years. You will usually be able to earn up to 8 semester-hours of law school credit for work in the related discipline and normally can complete the combined degrees in less time than it would take to earn the two degrees separately. The first year of the Combined Degree Program must be taken entirely in the School of Law. During the remaining years, course work may be divided between the law school and the related discipline. You must satisfy the admission requirements for both programs and file applications with both units.

Degree programs are presently available in combination with the UC Berkeley School of Business for the M.B.A. degree, and with UCD departments for the M.A. degree in economics and sociology. The law school will attempt to work out an additional program if you are interested in other disciplines. You may enroll in the Combined Degree Program any time prior to the beginning of your third year in law school. If you are interested in pursuing a Combined Degree Program, and have made a separate application to another school or department, you should indicate this on the School of Law admission form.

**SEMESTER SYSTEM**

The School of Law operates on a semester system rather than the quarter system used on the remainder of the Davis campus.

**Academic Calendar 1980-81**

<table>
<thead>
<tr>
<th></th>
<th>Fall 1980</th>
<th>Spring 1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-year Introductory Program begins</td>
<td>Sun, Aug 17</td>
<td></td>
</tr>
<tr>
<td>Law School instruction begins</td>
<td>Mon, Aug 25</td>
<td>Mon, Jan 12</td>
</tr>
<tr>
<td>Labor Day holiday</td>
<td>&quot;Mon, Sept 1</td>
<td></td>
</tr>
<tr>
<td>Thanksgiving holiday period*</td>
<td>Thurs-Fri, Nov 27-28</td>
<td></td>
</tr>
<tr>
<td>President's holiday*</td>
<td>Mon, Feb 16</td>
<td></td>
</tr>
<tr>
<td>Spring vacation period</td>
<td>Mon-Fri, Mar 23-27</td>
<td></td>
</tr>
<tr>
<td>Spring instruction resumes</td>
<td>Mon, Mar 30</td>
<td>Fri, May 1</td>
</tr>
<tr>
<td>Law School instruction ends</td>
<td>Fri, Dec 5</td>
<td>Sat-Wed, May 2-6</td>
</tr>
<tr>
<td>Reading period</td>
<td>Sat-Wed, Dec 6-10</td>
<td>Sat-Wed, May 7-22</td>
</tr>
<tr>
<td>Law school examination period</td>
<td>Thurs-Tues, Dec 11-23</td>
<td>Fri, May 22</td>
</tr>
<tr>
<td>Last day of semester</td>
<td>Tues, Dec 23</td>
<td>Sat, May 23</td>
</tr>
</tbody>
</table>

*Academic and administrative holiday.

**APPLICATION MATERIALS**

The Announcement of the School of Law and application materials may be obtained by writing to the Office of Admissions, School of Law, 115 King Hall, University of California, Davis, CA 95616.
The Doctor of Medicine degree requires the satisfactory completion of a four-year course of study comprised of 15 consecutive quarters. Course work is conducted on the Davis campus, at the University of California Davis Medical Center, Sacramento, and in nearby affiliated hospitals.

With the start of the academic term in June 1977, the Medical Sciences-I (MS-I) Complex opened. The new MS-1 Complex provides two lecture halls (each with a capacity of 170), smaller conference rooms, the Health Sciences Library, the Health Sciences Bookstore, and student lounges. A four-story, 200,000-square-foot structure is primarily devoted to multidisciplinary laboratories and faculty offices.

ADMISSION POLICIES

The class entering in the fall of 1980 will be limited to 100 students selected on the basis of academic achievement and promise, as well as personal characteristics that lead the Admissions Committee to feel the candidates will be able to complete satisfactorily the requirements of the medical curriculum and become excellent medical practitioners. Factors taken into consideration include scholastic records, Medical College Admission Test performance, and reports of teachers, advisers, and interviewers with regard to intellectual capacity, motivation, emotional stability, and personal dedication.

The vast majority of openings in the entering class will be awarded to students who are legal residents of the State of California. However, a few out-of-state students may be accepted. The School of Medicine also participates in the program of the Western Interstate Commission for Higher Education (WICHE). In this program are several states which do not offer professional graduate medical education. Applicants from such states found eligible by both the School of Medicine and their own states are charged resident rather than nonresident tuition. Further information may be obtained by communicating with this Commission at Post Office Drawer P, Boulder, CO 80302.

Applicant Selection. The School of Medicine selects students for admission with a view to meeting the needs of society, of the medical profession, and of the School. Because we live in a pluralistic society, and the educational experience is enhanced by the interaction of students from various backgrounds, the School desires diversity in its student body. This is reflected in the School's commitment to expand opportunities in medical education for individuals from groups underrepresented in medicine as the result of societal discrimination and to increase the number of physicians practicing in underserved areas. Therefore, the Admissions Committee, which is composed of individuals from a variety of cultural backgrounds and which is representative of a broad spectrum of medical sciences, evaluates applicants in terms of all relevant factors. These include academic credentials, with due regard to how they may have been affected by disadvantages experienced by the applicant, such personal traits as character and motivation, experience in the health sciences and/or the community, career objectives, and the ability of the individual to make a positive contribution to society, the profession, and the School.

Application Procedures

The School of Medicine participates in the centralized American Medical College Application Service (AMCAS). Application request forms are available from the School's Admissions Office after March 15 of each year. You may also secure this form from other AMCAS-participating medical schools or from your premedical adviser. You need to submit only one application and one set of official transcripts to AMCAS, regardless of the number of member schools to which you are applying.
Upon receipt of the application request form, AMCAS will send you an application for admission, together with descriptive material and instructions. The completed application and other required credentials should be submitted directly to AMCAS for verification, reproduction, and immediate distribution to the medical schools you have indicated.

After your AMCAS application has been received by the School of Medicine, the Admissions Office will notify you and may request two letters of recommendation and a nonrefundable fee of $25. These items should be sent directly to the Chairperson of the Admissions Committee, School of Medicine, University of California, Davis, CA 95616, and not to AMCAS. Recommendations can be in the form of a report by a premedical advisory committee at the college or university where you are enrolled or letters from two faculty members who are familiar enough with you and your abilities to make a meaningful evaluation. It is required that one letter be from a science instructor and the other from a non-science instructor.

Applications will be accepted by the Admissions Committee between June 15 and November 1. It is strongly recommended that you make an early request for application materials from AMCAS and see that the necessary supporting items reach the Committee as soon as possible after the School of Medicine notifies you of receipt of your completed application from AMCAS. The Committee reviews only complete application files and schedules interviews for highly qualified applicants throughout the application period and beyond.

A personal interview is required before a place in the first-year class can be offered. However, because of the large number of applicants, it is not possible to interview each one, and for this reason interviews are held only at the invitation of the Admissions Committee. It is highly desirable that interviews take place at the medical school in order to provide you with first-hand knowledge of programs and facilities and give you the opportunity to meet some of the students. Where circumstances warrant, interviews may be arranged by the Admissions Committee at other locations.

You will be notified of your status as soon as possible after a decision has been reached. As decisions are made, letters of acceptance are sent; this can be as early as mid-December and as late as September.

**Transfer with Advanced Standing**

Students may be admitted by action of the Admissions Committee at levels more advanced than the regular entering level but not beyond the beginning of the third year. Such applicants must meet the entrance requirements for regular status in the School of Medicine, must satisfactorily complete courses elsewhere that are substantially equivalent to those offered in the School of Medicine, and must meet the necessary requirements for the advanced status requested. Applicants may also be required to pass examinations to establish their qualifications for admission. An advanced standing applicant must be a student in good standing at an approved medical school. At UCD the second- and third-year classes begin work in early July. Applications for admission to advanced standing will be accepted until January 1 of the year in which admission is sought.

**Premedical Requirements**

Arrangements for taking the New Medical College Admission Test should be made at the institution at which you are presently enrolled, and the Examining Board should be requested to forward the results to the Chairperson of the Admissions Committee, UC Davis School of Medicine. Information about the test can be obtained at your undergraduate college or directly from MCAT Registration, Box 414, Iowa City, IA 52240. It is desirable that the results of the test be available at the time your qualifications are reviewed. The Admissions Committee recommends that, if feasible, tests be taken in the spring prior to application.

Applicants for admission to the professional curriculum must have satisfactorily completed a minimum of three years (90 semester units; 135 quarter units) of college-level work in an accredited school in the United States or Canada. In most instances, however, completion of a four-year course of study leading to a bachelor's degree is recommended.

Although a specific major in science is not necessary, the following course content at college level is required:

- a. English, one year or the equivalent
- b. Biological science, one year (including laboratory) or the equivalent
- c. General chemistry, one year (including laboratory) or the equivalent
- d. Organic chemistry, one year or the equivalent (If two or more undergraduate organic courses are offered, it is recommended that you elect the more rigorous option.)
- e. Physics, one year or the equivalent
- f. Mathematics, course work to satisfy prerequisites for integral calculus

Upon matriculation, each applicant must have both an overall grade-point average and science grade-point average of at least 3.0 (on a scale where one credit hour of A = 4 points). In calculating grade-point averages, such courses as physical education, military science, and courses taken for graduate degrees will be excluded. Grades of D in any of the required courses cannot be accepted. Required courses may not be taken on a Passed/Not Passed basis unless all courses at your undergraduate institution are graded this way.

While the minimal overall and science GPA requirements at the UCD School of Medicine have been established at 3.0, in exceptional cases a special waiver may be granted by the Faculty of the School of Medicine through the action of the Executive Committee and at the recommendation of the Chairperson of the Admissions Committee.
Applications may be submitted on the basis of work completed plus work in progress. However, all academic requirements must be completed by June 30 of the year for which admission is sought.

Although the minimum scholastic requirements are stated in some detail, it should not be inferred that admission is assured each applicant who meets these requirements. In addition to a high level of academic competence, many other factors which determine success in pursuing a career in medicine are given full weight by the Admissions Committee before it reaches a final decision.

For additional information, contact the School of Medicine Admissions Office or request the School of Medicine Bulletin from the medical school Admissions Office.

### Academic Calendar 1980-81

The School of Medicine operates on a different schedule from the remainder of the campus.

#### Quarter System

<table>
<thead>
<tr>
<th><strong>Summer 1980</strong></th>
<th><strong>Winter 1981</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medical School instruction begins</strong></td>
<td><strong>Medical School instruction begins</strong></td>
</tr>
<tr>
<td>Independence Day (academic and administrative holiday)</td>
<td>Fri, July 4 End of first half of instruction for Core C students</td>
</tr>
<tr>
<td>End of first half of instruction for Core C students</td>
<td>Fri, Aug 1 President’s holiday (academic and administrative)</td>
</tr>
<tr>
<td>Second half of instruction begins for Core C students</td>
<td>Mon, Aug 4 Second half of instruction begins for Core C students</td>
</tr>
<tr>
<td><strong>Quarter ends for Core B students</strong></td>
<td>Mon, Aug 4 Quarter ends for Core A and B students</td>
</tr>
<tr>
<td>Labor Day (academic and administrative holiday)</td>
<td>Fri, Aug 29 Quarter ends for Core C students</td>
</tr>
<tr>
<td><strong>Quarter ends for Core C students</strong></td>
<td>Mon, Sept 1 Spring holiday (academic and administrative)</td>
</tr>
<tr>
<td><strong>Fall 1980</strong></td>
<td><strong>Spring 1981</strong></td>
</tr>
<tr>
<td>Orientation for incoming class</td>
<td>Wed-Fri, Sept 24-26 Medical School instruction begins</td>
</tr>
<tr>
<td><strong>Medical School instruction begins</strong></td>
<td>Mon, Sept 29 End of first half of instruction for Core C students</td>
</tr>
<tr>
<td>End of first half of instruction for Core C students</td>
<td>Fri, Nov 7 Second half of instruction begins for Core C students</td>
</tr>
<tr>
<td>Second half of instruction begins for Core C students</td>
<td>Mon, Nov 10 Quarter ends for Core B students</td>
</tr>
<tr>
<td>Thanksgiving holiday (academic and administrative)</td>
<td>Thu-Fri, Nov 27-28 Memorial Day holiday (academic and administrative)</td>
</tr>
<tr>
<td><strong>Quarter ends for Core A and B students</strong></td>
<td>Tue, Dec 16 Quarter ends for 4th-year students</td>
</tr>
<tr>
<td><strong>Quarter ends for Core C and 4th year students</strong></td>
<td>Fri, Dec 19 Commencement</td>
</tr>
<tr>
<td>Christmas holiday (academic and administrative)</td>
<td>Thu-Fri, Dec 25-26 Quarter ends for Core A students</td>
</tr>
<tr>
<td>New Year’s holiday (academic and administrative)</td>
<td>Thu-Fri, Jan 1-2 Quarter ends for Core C students</td>
</tr>
</tbody>
</table>

| **School of Medicine** | 121 |
The Doctor of Veterinary Medicine (D.V.M.) degree is granted upon completion of a course of study that usually requires eight years. The final four years must be spent in the professional veterinary medical curriculum. Most students planning a career in veterinary medicine broaden their educational experience by completing the baccalaureate degree before applying to the professional school.

**PREPROFESSIONAL TRAINING AND REQUIREMENTS**

Applicants must complete the equivalent of at least three full academic years in an accredited college or university before entering the School of Veterinary Medicine. At the time of application, the applicant must have earned the equivalent of at least 45 of the 58 quarter units of required science courses listed below. You should plan your preveterinary medical education carefully. The required courses should be spaced to permit maximum scholastic achievement. The undergraduate program should include plans for obtaining a baccalaureate degree. An undergraduate major should be selected on the basis of individual interest and aptitude; there is no advantage gained toward admission by selecting one major over another.

Many students planning to enter veterinary school have definite areas of interest within the general field of veterinary medicine. These individuals are encouraged to take courses which will broaden their background in these areas. Some specialized areas include laboratory animal medicine, exotic animal medicine, public health, food animal diseases, and biomedical research. Veterinary and animal experience is considered an important part of your preprofessional training.

**Subject Requirements**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Quarter Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry (general, qualitative, organic, and biochemistry)</td>
<td>24</td>
</tr>
<tr>
<td>Genetics</td>
<td>3</td>
</tr>
<tr>
<td>Physics (general)</td>
<td>9</td>
</tr>
<tr>
<td>Physiology (systemic)</td>
<td>5</td>
</tr>
<tr>
<td>Biology, zoology, embryology (including laboratories)</td>
<td>17</td>
</tr>
<tr>
<td>English composition and additional English or rhetoric</td>
<td>8</td>
</tr>
<tr>
<td>Statistics</td>
<td>4</td>
</tr>
</tbody>
</table>

**Total** 70

Following is a list of courses taught on the UC Davis campus which fulfill the preceding subject requirements.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1</td>
<td>5</td>
</tr>
<tr>
<td>Physiological Sciences 101A or Biochemistry 101A</td>
<td>3</td>
</tr>
<tr>
<td>Chemistry 1A-1B-1C, 8A-8B . . . (5-5-5, 3-3)</td>
<td>21</td>
</tr>
<tr>
<td>English 1 and additional English or rhetoric</td>
<td>8</td>
</tr>
<tr>
<td>Genetics 100A or 120</td>
<td>3</td>
</tr>
<tr>
<td>Statistics 13 or Agricultural Science and Management 150</td>
<td>4</td>
</tr>
<tr>
<td>Physics 2A, 2B, 2C</td>
<td>9</td>
</tr>
<tr>
<td>Physiology 110</td>
<td>5</td>
</tr>
<tr>
<td>Zoology 2-2L, 100-100L . . . (4-2, 4-2)</td>
<td>12</td>
</tr>
</tbody>
</table>

**Total** 70

If you complete the requirements in an institution other than the University of California, Davis, you are urged to check carefully the catalog of your college to be sure you are taking courses comparable in content.
Application Procedures

Students are admitted to the School of Veterinary Medicine only in the fall. Application forms may be obtained any time after July 15 by writing to the Office of the Associate Dean — Student Services, School of Veterinary Medicine, University of California, Davis, CA 95616 or by calling (916) 752-1383. Applications and Graduate Record Examination (GRE) scores for both the General Aptitude Test and the Advanced Test in Biology must be received by this office no later than October 1. Therefore, GRE scores received from the September administration or later administrations of the year the application is filed will not be accepted for consideration. The GRE must be taken within the five-year period prior to the time the application is submitted. At the time of application, the equivalent of at least 45 quarter course units of the required sciences (listed above) must be completed.

Students interested in admission to the School of Veterinary Medicine are urged to request an Announcement of the School of Veterinary Medicine at an early date so that all minimum academic requirements and deadlines are met.

Admission to the School of Veterinary Medicine

Evaluation is based on academic and nonacademic records. The academic record is divided into the required science grade-point average, cumulative grade-point average, and grade-point average for the last year of undergraduate studies. The scores from the Graduate Record Examination are included in the evaluation of your academic record. The principal nonacademic criteria are animal experience, your narrative statement, and letters of evaluation. Other criteria considered helpful by the Faculty Committee and Dean of the School of Veterinary Medicine may be used in the selection process. The minimum acceptable grade-point average for an applicant to be considered for admission to the School is 2.5.

Since scholastic achievement, particularly in the required courses, is a very important criterion for admission to the School of Veterinary Medicine, you are cautioned to use the Passed/Not Passed option sparingly. Work-experience with animals and a familiarity with the veterinary medical profession are considered significant factors in demonstrating motivation and a sincere interest in the profession. Comprehensive letters of evaluation are an important consideration in the review of an application.

In view of the demand from California residents for admission to the School of Veterinary Medicine — each year there are 5 to 6 applications from Californians for each of the 128 first-year openings — and since it is virtually impossible for a California resident to gain admission to a veterinary school elsewhere, it is the stated policy of the University that with only rare exceptions admission to the School is limited to California
residents. The criteria for determining residency are explained on page 313. Specific questions should be addressed to the Attorney-in-Residence Matters, 590 University Hall, University of California, Berkeley, CA 94720. No other persons are qualified to give rulings on residency. In cases where exceptions are made, first preference is given to residents of states participating in the Western Interstate Commission for Higher Education (WICHE). For this reason, an application form will be available only to California residents and individuals from WICHE states. Students residing in WICHE states that do not have a school of veterinary medicine and who wish to participate in this program must be certified by their home state. For the address of state certifying officers, write to the Western Interstate Commission for Higher Education, Post Office Drawer P, Boulder, CO 80302.

Men and women are considered on an equal basis. Socially and economically disadvantaged students are encouraged to apply.

**DEGREES**

**Requirements for the Bachelor of Science Degree in Veterinary Science**

Any student in the School of Veterinary Medicine who does not hold a baccalaureate degree, but has satisfactorily completed the first two years of the professional curriculum and has satisfied the general University requirements (see page 60), is eligible to receive a Bachelor of Science degree in Veterinary Science.

**Requirements for the Doctor of Veterinary Medicine Degree**

A candidate for the Doctor of Veterinary Medicine degree must comply with the following requirements:

- Fulfill the academic standards set forth by the Faculty of the School of Veterinary Medicine
- Possess good moral character
- Study veterinary medicine for the equivalent of 12 quarters of 12 weeks each (the last six quarters must have been spent in the School of Veterinary Medicine, University of California, Davis)
- Maintain a grade-point average of 2.0 (C), computed on all courses taken in the School
- Satisfactorily complete all required work as determined by the Faculty of the School

**The Master of Preventive Veterinary Medicine Degree**

Applicants must hold the Doctor of Veterinary Medicine degree or equivalent degree from an accredited school of veterinary medicine, and be recommended for admission by the faculty committee in charge of the program. Candidates for the degree must satisfactorily complete in residence a minimum of 50 quarter units of approved course work. The program, consisting of a group of required core courses and optional electives, is scheduled over a 12-month period beginning in August. Admission is limited to the beginning date of the program each year.

Specific fields of emphasis are epidemiology, medical statistics, and disease control and eradication. Program options are available for specialization in food hygiene, avian medical practice, and in other areas of preventive veterinary medicine. The program commences with five weeks of instruction in Elementary Statistics prior to the beginning of the Fall Quarter, and is completed after a 10-week period of research and field studies subsequent to the completion of the Spring Quarter.

Inquiries regarding the program should be directed to the Office of the Dean, School of Veterinary Medicine, University of California, Davis, CA 95616.

**The Master of Science and Doctor of Philosophy Degrees**

General information regarding these degrees will be found in the *Announcement of the Graduate Division*, which may be obtained from the Graduate Division at Davis. Additional detailed information may be obtained by writing the chairperson of the department in which you wish to study.
ACADEMIC CREDIT

Academic work at the University is measured by "units of credit." In conjunction with the letter grade you receive from the course instructor, units of credit give a fairly accurate evaluation of the amount of time you have devoted to a given subject. Units of credit also make it possible to anticipate the amount of work involved in a particular course, as well as enabling you to transfer from one campus or university to another without undue difficulty.

The way units of credit are assigned to courses is based on the "Carnegie unit" which assigns one unit of credit for three hours of work by the student per week. Usually this means one hour of lecture or discussion led by the instructor and two hours of outside preparation by the student. In laboratory courses, two or three hours of work in the laboratory are normally assigned for one unit of credit.

In most courses at Davis the standard procedure prevails, so that a three-unit course meets for three hours a week, a four-unit course for four hours, and so on. Courses that are an exception to this pattern may require additional class time or give more demanding assignments. If you have questions about the number of units assigned to a course you should check the "Expanded Course Descriptions" (If your college or department provides them) or inquire from the instructor about what the course will require in the way of outside reading, term papers, problem sets, field trips, and the like. These are not always spelled out completely in the General Catalog. By knowing the amount of work which will be required, you can plan your course-load more systematically and realistically.

gives class hours and room numbers, as well as the most up-to-date information on registration and enrollment procedures. A supplement with changes to the General Catalog and Class Schedule and Room Directory is available near the time for enrollment each quarter.

In the course listings which follow, the quarter in which a course is intended to be given is shown as follows:*
I. Fall Quarter (September to December)
II. Winter Quarter (January to March)
III. Spring Quarter (April to June)
IV. Summer Quarter (July to September) for students in the School of Medicine only

When a course is listed to be offered in even-numbered years or odd-numbered years only, the year involved would be that in which the quarter occurs: e.g., Fall Quarter 1979 would be an odd-numbered year and Winter and Spring Quarters 1980 would be even-numbered years.

A series of course numbers followed by two or three letters (for example, Spanish 101A-101B-101C) is continued through three successive quarters, ordinarily from September to June. The first quarter course listed this way is generally prerequisite to the second, and the second to the third. On the other hand, where A and B portions of a course are listed separately (for example, Economics 102A and 102B), the A course is not a prerequisite to B, unless it is specifically mentioned in the listing of prerequisites.

PREREQUISITES

Prerequisites for courses should be noted carefully; the responsibility for meeting these requirements rests mainly on the student. Certain classes are restricted to

*Courses in the School of Law:
1. refers to Fall Semester (August - December)
2. refers to Spring Semester (January - May)
a limited number of students, and therefore it is especially important that you fulfill the prerequisites by the time the class begins. Otherwise, you may be displaced by a student who does have the necessary prerequisites. If you can demonstrate that your preparation is equivalent to that specified by the prerequisites, the instructor may waive these requirements for you.

**UNDERGRADUATE COURSES**

**Lower-Division Courses**

These courses, numbered 1-99, are open to all students for lower-division credit, but are designed primarily for freshmen and sophomores.

**Variable-Unit Courses** (See below for enrollment procedures) are primarily student-designed and the amount of credit given varies:

- **92 (Internship) courses** enable individual students to obtain practical experience to complement their educational goals or to explore potential career interests and opportunities.

- **97T (Tutoring) and 97TC (Tutoring in the Community)** are courses for students desiring to tutor in a subject in which they are proficient—generally in their major field—while enrolled as an undergraduate.

- **98 (Directed Group Study)** courses are set up on a one-time basis for a group of students in a subject for which no regular courses have been established.

- **99 (Special Study for Undergraduates)** is a course arranged for an individual student who shares with an instructor an academic interest which cannot be accommodated within the formal course structure.

**Autotutorial Courses** are courses in which students instruct themselves at their own pace. These courses can be identified by the letters AT on their course numbers, e.g., 1ATA-1ATB-1ATC, 31ATA, 31ATB.

**Upper-Division Courses**

These courses, numbered 100-199, are open to all students who have met the necessary prerequisites as indicated in the Catalog course description. Preparation should generally include completion of one lower-division course in the given subject or completion of two years of college work.

**Variable-Unit Courses** (see below for enrollment procedures) for upper-division credit include:

- **192 (Internship) courses** enable individual students to obtain practical experience to complement their educational goals or to explore potential career interests and opportunities. Students must have completed 64 units prior to enrollment.

- **194H (Special Study for Honors Students)** courses are for individual students with honor status, as determined by the department offering the course, and who have completed 84 units.

- **197T (Tutoring) and 197TC (Tutoring in the
Community) are the upper-division counterparts of 977 and 97TC.

- 198 (Directed Group Study) courses are the upper-division counterparts of course 98, and are for students judged to have adequate background in the subject proposed for study.

- 199 (Special Study for Advanced Undergraduates) courses are the upper-division counterparts of course 99, and involve supervised independent study and research courses requiring adequate background in the subject proposed for study as well as prior completion of 84 units.

Autotutorial Courses are courses in which students instruct themselves at their own pace. These courses can be identified by the letters AT on their course numbers.

Registration for Variable-Unit Courses

Registration in the above variable-unit courses (numbered 92, 97T, 97TC, 98, 99, 192, 194H, 197T, 197TC, 198, 199) must be approved by the chairperson of the department concerned in a proposal submitted by the instructor in charge. The subject matter in these courses must fall within the instructor's professional competence. These courses, unless otherwise noted, are graded on a Passed/Not Passed basis only. Under special circumstances, an instructor may request from the appropriate college or school Committee on Courses of Instruction approval to award letter grades (except 92, 192 courses). The request must be submitted by the instructor within the first ten days of instruction of the quarter in which the course is offered. Such requests, however, are not automatically approved.

In Special Study Courses (numbered 99, 194H, 199), credit is limited to a total of five units per term.

A maximum of 12 units of Internship Courses (92, 192, or a combination) can be counted toward the 180-unit bachelor's degree requirement.

GRADUATE COURSES

Courses numbered 200-299 are open to students who have completed 18 units of upper-division work basic to the subject matter of the course. However, admission is subject to the approval of the instructor in charge of the course. Grading in variable-unit 299 and 299D courses is Satisfactory/Unsatisfactory.

PROFESSIONAL COURSES FOR TEACHERS

Courses numbered 300-399 are teacher-training courses in the Department of Education and in other departments and are especially intended for teachers or prospective teachers.

OTHER PROFESSIONAL COURSES

Courses numbered 400-499 are in departments and schools other than the Department of Education.

Note: Undergraduates should refer to their college's section regarding any restrictions on degree credit for courses in the 200, 300, or 400 series.

INDEPENDENT STUDY PROGRAM

Information:

752-2331

The Independent Study Program is intended to provide an opportunity for upper-division students to design and pursue a full quarter (12-15 units) of individual study in an area of their special interest.

Under the current system of numbering courses, a program qualifying as Independent Study will consist of one or more courses in the 190-199 series, adding up to a quarter's work. While the theme of such a program may be reasonably broad, a recognizable common thread should unite all the academic work you undertake during an independent study quarter. Regularly offered formal courses will therefore only be acceptable as a part of such a program if they clearly fit its theme and contribute something essential toward the realization of its objectives. The program is definitely not to be considered as merely a way to take more variable-unit courses than normally permitted.

The procedure for enrolling in an Independent Study Program is as follows:

1. Develop, in general terms, a plan of study;
2. Locate a faculty sponsor or panel of sponsors,
and with their help and approval develop a detailed plan;
3. Complete a project proposal form (obtained from the dean of your college) and submit it to the Committee on Courses of Instruction either directly or through your dean's office.

Deadlines will be about two weeks prior to the final enrollment date in the quarter preceding the proposed independent study quarter (see the Calendar on page 6).

You must report the completion or termination of the project to the Committee on Courses of Instruction, which may request additional materials if they were provided for in the project proposal.

For further information contact the chairperson of the Committee on Courses of Instruction, c/o Academic Senate Office, in person or by phone.

INDIVIDUAL MAJOR PROGRAMS

Opportunities for interdisciplinary programs tailored to your own educational objectives are offered by the "Individual Major" in the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science (see page 230).

INTERNERNSHIP PROGRAM

The objective of the Internship Program is to enable students to obtain practical educational experience which will complement and enhance the traditional educational process. An Internship should aid individual students who wish to explore potential career opportunities and assist them in clarifying their personal and educational goals.

Students may undertake an internship by enrolling in a course numbered 92 or 192 under departmental listings. Course 192 requires a minimum of 84 units prior to enrollment. These courses are initiated by the student well in advance of enrollment by first obtaining a "Request for Approval of Internship for Academic Credit" form from the office handling the desired 92 or 192 course, and then making arrangements with a faculty sponsor who subsequently obtains the signature of the department chairperson. The student presents a copy of the approved request form to the Work-Learn and Career Planning and Placement Office on campus and enrolls for the course by Add card through the department involved. The deadline each quarter is the last day for adding courses to the study list. A maximum of 12 units of 92 and/or 192 courses may be counted toward the 180 units required for graduation.

EXTRA-SESSION COURSES

Regularly approved courses (laboratory, field, or other individual work) done outside of a regular session but under the direction of a department of instruction may be accepted upon the recommendation of the depart-

ment in partial fulfillment of the residence requirement for the bachelor's degree. Enrollment is with the consent of the instructor only.

SUMMER SESSION COURSES

If you are a regularly enrolled student or are planning to enroll for the Fall Quarter, you can receive credit toward the degree in Summer Session courses (see page 16 for more information).

It is also possible for students to gain credit for courses taken during the summer at other institutions, provided the courses parallel those given in the University of California. Assurance that such credit will be accepted, however, can be given only after the courses have been completed. You should arrange to have the transcripts of your summer session grades sent to the Registrar for evaluation.

CONCURRENT COURSES

Where classroom space permits and the instructor gives permission, enrollment may be granted to members of the community in regular courses offered on the Davis campus. Such work may be used for admission consideration and for degree recognition. See page 45 for more information.

UNIVERSITY EXTENSION COURSES

Simultaneous enrollment in resident courses and in Extension courses is permitted only with the approval of the dean of your college or school. Credits may also be earned, but previous authorization is necessary.

KEY TO FOOTNOTE SYMBOLS

The following symbols are used throughout the Majors and Courses section to indicate:

* Not to be given 1980-81
1 Absent on leave, 1980-81
2 Absent on leave, Fall Quarter 1980 (semester for Law School)
3 Absent on leave, Winter Quarter 1981
4 Absent on leave, Spring Quarter 1981 (semester for Law School)
5 In residence at President's Office
   (Systemwide Administration)
6 In residence at another campus

The course offerings listed in this catalog are subject to change without notice. For more current quarter offerings, refer to the Class Schedule and Room Directory available in the UCD Bookstore.
Afro-American Studies

(College of Letters and Science)

Cari C. Jorgensen, Ph.D., Program Director
Program Office, 467 Kerr Hall (752-1548)

Committee in Charge
Cari C. Jorgensen, Ph.D. (Sociology), Committee Chairperson
Danlel J. Crowley, Ph.D. (Anthropology, Art)
Cari C. Mack, Jr., Ph.D. (Afro-American Studies)
David L. Olmstead, Ph.D. (Anthropology)
*Frederick J. Simons, Ph.D. (Geography).
Fall-Winter Quarters

Faculty
James R. King, Ph.D., Assistant Professor
Cari C. Mack, Jr., Ph.D., Assistant Professor
Lako Tongun, M.A., Lecturer

The Major Program
The Afro-American Studies Program provides the opportunity for interested students to pursue a thorough study of African-American people. The major program is discipline oriented with the object of focus the Afro-American culture. Special emphasis is on tracing the culture through the transmigration of African people from Africa throughout the Americas. The program requires students to work closely with a faculty member in pursuing work toward the Bachelor of Arts degree. In collaboration with a faculty supervisor, the student must select an area of emphasis to be approved by the Program's major adviser. (Guidelines in selecting an area of emphasis are provided below.)

Upon completion of this program, students will have the background courses needed for graduate work toward a teaching credential or to pursue work in any discipline requiring broad social-scientific preparation.

Afro-American Studies

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afro-American Studies</td>
<td>10</td>
</tr>
<tr>
<td>Two courses from Anthropology 2: Economics 1A, 1B, 1C, Sociology 1, 2</td>
<td>8</td>
</tr>
<tr>
<td>Two courses from History 27A, 27B, 27C, 27D, 27E</td>
<td>8</td>
</tr>
<tr>
<td>One course from Statistics 13, Sociology 46A, or Psychology 41</td>
<td>4</td>
</tr>
</tbody>
</table>

Depth Subject Matter
A coordinated program of upper-division courses, selected and approved in consultation with the major adviser to include:

Core courses: Afro-American Studies 101A, 101B, 101C, or 120, 110
Additional upper-division units chosen to reflect the student's major emphasis

Total Units for the Major 76

Major Program Emphasis
The following areas of emphasis are offered as a guideline for students interested in majoring in Afro-American Studies:

- Cultural of African-Americans emphasis
  - Anthropology 124, Afro-American Studies 107, 120, 121
  - History 177, Political Science 187

- African emphasis
  - History 115A, 116
  - Political Science 134, 146

- Related Upper Division Courses
  - Students who contemplate majoring in Afro-American Studies are advised that the following courses are offered by faculty members in other disciplines and focus on African and Afro-American people and their culture.
  - Anthropology 138A, 138B, 140, 151, 152, 153
  - Applied Behavioral Sciences 151, 152, 153, 159, 172, 174
  - Art 150, Dramatic Art 153, Education 150A, 150B, 150C, English 179, 181
  - History 1020, 115A, 115B, 115C, 115E, 117
  - Music 113B, Political Science 134, 138, 149, 151, 157, 159, Psychology 129, Sociology 107, 130

- Major Adviser
  - J. R. King (752-1886)

- Teaching Credential Subject Representative: See page 106 for the Teacher Education Program.

- American History and Institutions: This University requirement can be satisfied by completion of Afro-American Studies 10, 100, 120, 121. (See also page 61.)

- Courses in Afro-American Studies

  Lower Division Courses

  Upper Division Courses


Afro-American Studies; Agrarian Studies


Agrarian Studies

(College of Agricultural and Environmental Sciences)

The Major Program
Agrarian Studies is a multi-disciplinary program designed for students who seek to broaden their education and are challenged by the scientific, philosophical, and cultural concepts important to understanding of agriculture and its relationship to human society. Through a purposeful integration of science and the humanities the major provides a sound general education important for effective leadership in agriculture and in many agriculturally related aspects of business, government, international services, or teaching. Depth of understanding in your field of agricultural interest is achieved by the selection of specialized courses and in work experience that can be gained in programs offered by Rixix Work-Learn or the campus Work-Learn Center.

With appropriate selections of a field of emphasis and electives, you may also prepare for admission to graduate study or to professional school.

Agrarian Studies

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Social Sciences and Humanities</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written and oral expression (see College requirement)</td>
<td>8</td>
</tr>
<tr>
<td>Cultural anthropology or geography (Anthropology 2 or Geography 3)</td>
<td>4</td>
</tr>
</tbody>
</table>
Courses in Agrarian Studies

Questions pertaining to the following courses should be directed to the instructor or to the Department, 1035 Wickersham Hall.

Agricultural and Environmental Chemistry

(College of Agricultural and Environmental Sciences)

Faculty
See under the Department of Applied Behavioral Sciences.

Agricultural and Environmental Chemistry (A Graduate Group)
Cornell S. Ough, D.Sc., Chairperson of the Group
Group Office, 101 Enology Building (752-0686)

Graduate Study. The Graduate Group in Agricultural and Environmental Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees. Detailed information regarding graduate study may be obtained by writing the Group Chairperson.

Graduate Advisers. See Class Schedule and Room Directory.

Related Courses. See Biochemistry 205; Environmental Toxicology 203, 220, 222L; Food Science and Technology 211, 250, 251; Soil Science 215; Viticulture and Enology 219.

Courses in Agricultural Chemistry

Graduate Courses

290. Seminar (1) I, II, III. The Staff. (Ough in charge) Seminar—1 hour. Selected topics in Agricultural Chemistry, presented by students. (SU grading only.)

296. Group Study (1-5) I, II, III. The Staff. (Ough in charge) Prerequisites: Some knowledge of biochemistry and biophysics, foods, nutritional sciences, plant pathology, and plant physiology. Prerequisite: Instructor. The study of topics related to agricultural biology and crop production. (SU grading only.)

299. Research (1-12) I, II, III, summer. The Staff. (Ough in charge) Arrangements should be made well in advance with a member of the Group in Agricultural and Environmental Chemistry. (SU grading only.)

Agricultural and Home Economics Education

(College of Agricultural and Environmental Sciences)

Faculty
See under the Department of Applied Behavioral Sciences.

Major Programs and Graduate Study. See majors in Home Economics (page 229) and Agricultural Education (page 135), and page 99 for graduate study.


Courses in Agricultural and Home Economics Education

Questions pertaining to the following courses should be directed to the instructor or the Department of Applied Behavioral Sciences, 119 AOB-4.

Lower Division Course

92. Internship (1-12) I, II, III. The Staff. (Leising in charge) Field placement—3-36 hours. Prerequisite: lower division standing; consent of instructor. Supervised internship off and on campus in areas of agricultural education. (IPN grading only.)

Upper Division Courses

100. Concepts in Education (3) I. Goldman, Leising Lecture—2 hours, field observations. Prerequisite: upper division students. Examination of educational institutions. Implications for those entering careers in teaching. (See 1, Agriculture; Sect. 2, Home Economics.)

160. Vocational Education (3) II. Leising Lecture—3 hours. Philosophy and organization of vocational education, with particular reference to educational principles of agriculture, commerce, home economics and industry.


190. Consumer Education (3) III. The Staff (Goldman in charge) Lecture—3 hours. Prerequisite: Consumer Economics 141 or 142 or Consumer Science 100.Enumeration of values, decision-making processes, lifestyle needs of individuals and communities as a basis for teaching of consumer education in various subject areas at all age levels. Offered in odd-numbered years.

192. Internship (1-12) I, II, III. The Staff. (Leising in charge) Field placement—3-36 hours. Prerequisite: lower division standing; consent of instructor. Supervised internship off and on campus in areas of agricultural education. (IPN grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Thompson in charge). (IPN grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Thompson in charge). (IPN grading only.)

Professional Courses

300. Directed Field Experience in Teaching (3) II, III. Goldman, Leising Discussion—1 hour, field experience—3 hours. Prerequisite: course 100. Experience as teaching assistant in agriculture or home economics programs in public schools. May be repeated once for credit. (See 1, Agriculture; Sect. 2, Home Economics.) (IPN grading only.)

301. Planning for Instructional Programs (3) II, III. Goldman, Leising Lecture—3 hours. Prerequisite: courses 100, 300 (may be taken concurrently). Major paradigms in program planning and development. Emphasis on key steps in curriculum development, including selection and organization of educational objectives, learning experiences and teaching materials and resources. (See 1, Agriculture, Sect. 2, Home Economics.)

302. Teaching Methods in Education (2-6) III. Goldman, Leising Lecture (1 hour minimum) laboratory—4-7 hours. Prerequisite: courses 100, 300, and 301. Development of teaching strategies, with special emphasis on designing learning experiences, instructional execution, teaching aids. (See 1, Agriculture 2 units, Sect. 2, Home Economics 2 units.)
Agricultural and Managerial Economics; Agricultural Economics

306A. Field Experience with Future Farmers of America and Supervised Experience Programs (4) I, II, III. Leising Lecture-discussion—2 hours; farm work—6 hours. Prerequisite: acceptance into the Teacher Education Program; course 306B (concurrently). Develop an understanding of the role of the Future Farmers of America and supervised occupational experience programs through planning, conducting, and evaluating actual programs.

328B. Field Experience in Teaching Vocational Agriculture (5-18) I, II. III, Leising Student teaching (corresponds with public school session). Prerequisite: acceptance into the Teacher Education Program; course 306A (concurrently); courses 100, 300, 301, 320. Directed teaching including supervision of occupational experience programs and youth activities in secondary schools or community colleges.

307. Teaching in Secondary Schools (5-18) I, II. Goldman Student teaching (corresponds with public school session). Prerequisite: acceptance into Teacher Education Program; courses 100, 300, 301, 320. Supervised teaching in secondary school or community college general agriculture or home economics. (Deferred grading only, pending completion of course.)

332. Resource Development: Agricultural Education (3) II. Leising Lecture—3 hours. Prerequisite: courses 306A, 306B. Selection and implementation of community resources in teaching.

371. Instructional Materials and Procedures (1) II, III. The Staff (Leising in charge). Individualized instruction—3 hours. Prerequisite: upper division or graduate standing. Directed study of the principles, performance and operating characteristics of materials and methods used in instructional presentations. Course work will be completed through study of individualized instructional modules with students making use of laboratory facilities at their own convenience. (P/NP grading only.)

372. Visual Communication Production (1) II, III. The Staff (Leising in charge). Individualized instruction—3 hours. Prerequisite: course 371 or consent of instructor. Directed study of techniques and procedures for preparing instructional materials. Course will proceed through study of individualized instructional modules with students making use of laboratory facilities at their own convenience. (P/NP grading only.)

373. Multi-Media Communication (1-3) II, III. The Staff (Goldman in charge). Seminar—1 hour; laboratory—3-6 hours. Prerequisite: course 371, 370 (development of multi-media instructional sequences for use in agriculture and home economics education.

381. Family Life Education (3) II. The Staff (Goldman in charge). Lecture—3 hours. Prerequisite: upper division standing; courses on the family, sex education, and teaching methods recommended. Current topics in family life education; Review of selected research; resources, curriculum, teaching strategies, and interdisciplinary approaches to family life education at all age levels. Offered in even-numbered years.

390. Seminar: Issues in Agricultural and Home Economics Education (2) II, Goldman; III, Leising Seminar—2 hours. Prerequisite: acceptance into the Teacher Education Program; courses 306A-306B or 307. Discussion and evaluation of current issues, theories and research in home economics and agricultural education. (Select 1: Agriculture, Sect. 2: Home Economics.) (S/U grading only.)

Agricultural and Managerial Economics

(College of Agricultural and Environmental Sciences)

The Major Program

Agricultural and Managerial Economics focuses on the student's understanding of the total economic

NOTE: For key to footnote symbols, see page 130.

and social environment through study of the agricultural, biological, physical, and social sciences. The major is divided into two areas of specialization: (a) Agricultural Economics and (b) Managerial Economics.

The Agricultural Economics option is a preparatory, professional, and essential preparation for continued study at the graduate level. The emphasis is on the theoretical aspects which lie behind decisions concerning production, marketing, use of resources, prices, and policy. Supplemental courses are offered in statistics, effects of governmental policy, rural appraisal, and related topics.

The Managerial Economics option, while considering the theoretical, deals more with the practical managerial problems. Emphasis is on the decision-making function of management, study of scientific management controls and personnel policies, and procurement and marketing methods. Both options prepare graduates for professional management positions in financial and research institutions not necessarily limited to agriculture.

Agricultural and Managerial Economics

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Written and oral expression (as College requirement, page 70)</td>
</tr>
<tr>
<td>American History and institutions</td>
</tr>
<tr>
<td>Economic principles (Economics 1A-1B)</td>
</tr>
<tr>
<td>Accounting (Economics 11A-11B)</td>
</tr>
<tr>
<td>Statistics (Statistics 12 or Economics 12)</td>
</tr>
<tr>
<td>Mathematics including calculus</td>
</tr>
</tbody>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory: Agricultural Economics 100A, 100B</td>
</tr>
<tr>
<td>One of two options:</td>
</tr>
<tr>
<td>a) Agricultural Economics (Preprofessional)</td>
</tr>
<tr>
<td>Mathematics 16B</td>
</tr>
<tr>
<td>Agricultural Economics 108</td>
</tr>
<tr>
<td>Economics 101</td>
</tr>
<tr>
<td>b) Managerial Economics</td>
</tr>
<tr>
<td>Agricultural Economics 106</td>
</tr>
<tr>
<td>Restricted electives: choose 12 units from</td>
</tr>
<tr>
<td>Agricultural Economics 112, 117, 130, 150A, 150B, 151A, 151B, 160, 161</td>
</tr>
<tr>
<td>AND 4 units from Agricultural Economics 190A-190B or upper division Restricted Electives</td>
</tr>
</tbody>
</table>

Breadth Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural and environmental sciences (excluding agricultural economics, consumer economics, and applied behavioral sciences)</td>
</tr>
<tr>
<td>Natural sciences (including mathematics beyond preparatory subject matter)</td>
</tr>
<tr>
<td>Social sciences (excluding economics, history and philosophy)</td>
</tr>
</tbody>
</table>

Required: 8 units in one area and 12 units in each of the other two.

† Students Meeting the American History and Institutions requirement may substitute social sciences as interpreted under the Social Sciences Breadth Subject Matter requirement.
†† Students graduating with this major are required to maintain at least a C average (2.0) in all upper division Agricultural Economics, Consumer Economics, and Economics courses taken at the University.

Major Program and Graduate Study. See the major in Agricultural and Managerial Economics (this page); and see page 99 for graduate study.

Major Advisers. See Class Schedule and Room Directory.

Unrestricted Electives 55-58

Total Units for the Major 180

Recommended Courses

Students should contact departmental advisers for up-to-date lists of courses which are acceptable for the breadth subject matter requirement.

Major Adviser, J. H. Snyder (Agricultural Economics);

Information Center for the Major, 105 Voortie Hall.

Graduate Study. See page 99.

Agricultural Economics

(College of Agricultural and Environmental Sciences)

Benjamin C. French, Ph.D., Chairperson of the Department

Department Office, 118 Voortie Hall (752-1517)

Faculty

John M. Antle, Ph.D., Assistant Professor
Bayford D. Butler, Ph.D., Lecturer
Hoy F. Carman, Ph.D., Professor
Harold D. Carter, Ph.D., Professor
Robert A. Collins, Ph.D., Assistant Professor
James H. Cothorn, Ph.D., Lecturer
D. Barton DeLoach, Ph.D., Professor Emeritus
Peter H. Farquhar, Ph.D., Associate Professor
Agricultural Economics; Graduate School of Administration

Jerry Foyle, Ph.D., Professor
Benjamin C. French, Ph.D., Professor
Varden Fuller, Ph.D., Professor Emeritus
B. Delworth Gardner, Ph.D., Professor
Leon Garoyan, Ph.D., Lecturer
Richard D. Green, Ph.D., Associate Professor
David E. Hansen, Ph.D., Associate Professor
Arthur Havener, Ph.D., Associate Professor
Trimble H. Hedges, Ph.D., Professor Emeritus
Glenda L. Homer, Ph.D., Lecturer
Richard E. Howitt, Ph.D., Associate Professor
Stanley S. Johnson, Ph.D., Lecturer
Waren E. Johnston, Ph.D., Professor
Desmond A. Jolly, Ph.D., Lecturer
Gordon A. King, Ph.D., Professor
John E. Kushman, Ph.D., Associate Professor
Sylvia Lane, Ph.D., Professor
Elmer W. Laun, Ph.D., Professor
Samuel H. Logan, Ph.D., Professor
Phillip L. Martin, Ph.D., Associate Professor
Alexander F. McCalla, Ph.D., Professor
Agricultural Economics; Graduate School of Administration

Chester O. McClure, Jr., Ph.D., Professor
Charles McGahan, I.I., B., J.D., Lecturer
Charles V. Moore, Ph.D., Lecturer
Kent D. Olson, Ph.D., Lecturer
Quirino Pius, Ph.D., Professor
A. Doyle Reed, Ph.D., Lecturer
Refugio I. Rochin, Ph.D., Associate Professor
Lawrence E. Shepard, Ph.D., Associate Professor
Herbert Snyder, Ph.D., Professor
Stephen H. Sosnick, Ph.D., Professor
Joe E. Staats, Ph.D., Lecturer
James E. Wilen, Ph.D., Associate Professor
(External Studies)

Barbara S. Zoloth, Ph.D., Assistant Professor

Major Program and Graduate Study. See the major in Agricultural and Managerial Economics (this page); and see page 99 for graduate study.

Major Advisers. See Class Schedule and Room Directory.
Courses in Agricultural Economics

Lower Division Courses

1. Economic Basis of the Agricultural Industry (4) Lecture—4 hours. Agriculture and man; the agricultural industry in U.S. and world economies; production and supply, marketing, and financial aspects of major crop and livestock markets; economic and social problems of agriculture in an urban and industrialized economy. Emphasizes California.

Lecture—4 hours. Prerequisite: sophomore standing. Instruction in the background, history and procedure of law; introduction to business law in the field of contracts, business organization, operation and termination, real property, employment, and agency concepts; presentation of applications by the courts and legislature. (P/NP grading only.)

Lecture—1 hour. Prerequisite: consent of instructor. Field trips and experiences to observe the various management aspects of Agricultural Production. Emphasis will be placed on developing the student's understanding and awareness of economics and management and their application in agricultural production. (P/NP grading only.)

90. Special Study for Undergraduates (1-5) I, II, III, The Staff (Chairperson in Charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100A. Intermediate Microeconomics: Theory of Production and Consumption (4) I, II, Ante
Lecture—4 hours. Prerequisite: Economics 1A, 1B, Mathematics 1AB. Theory of individual consumer and market demand, theory of production and supply, agricultural production, pricing, public goods, and non-rivalry in consumption. (P/NP grading only.)

100B. Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics (4) II. French, III, Martin Labor
Lecture—4 hours, discussion—1 hour. Prerequisite: course 100A. Analysis of data for determining market structures, pricing, welfare implications, and public policy implications. (P/NP grading only.)

103. Theory of Economic Optimization (4) I, II
Lecture—3 hours, discussion—1 hour. Prerequisite: course 100B. Mathematics 1A, 1B. Analysis of economic optimization behavior for agriculture and non-agricultural firms, using linear algebra, partial differentiation, convex-concave functions, and Kuhn-Tucker theorems. (Same course as Economics 103.)

106A. Quantitative Methods in Agricultural Economics (4) I. Greer, II, Havemaker
Lecture—3 hours, discussion—1 hour. Prerequisite: Statistics 13, statistical methods for measuring agricultural economic data; descriptive statistics, probability, hypothesis testing, statistical inference, and sampling.

106B. Quantitative Methods in Agricultural Economics (4) II. Paris, III. Foley
Lecture—3 hours, discussion—1 hour. Prerequisite: course 106A. Statistical methods for analyzing quantitative agricultural economic data: linear and multiple correlation and regression analysis.

108. Regional Analysis: Location and Trade (3) III. King Lecture—1 hour. Theory of regional specialization, location, and trade for agricultural products; general economic equilibrum.

112. Fundamentals of Business Organization (4) I, III, McClure
Lecture—2 hours, discussion—2 hours. Prerequisite: upper division standing or consent of instructor. The role of organizations in modern business and public agen-
cies. Principles of planning, decision-making, individual behavior, motivation, leadership, informal groups: conflict resolution, and organizational behavior. (P/NP grading only.)

113. Fundamentals of Marketing Management (4) II. Butler Lecture—4 hours. Prerequisite: Economics 1A. For non-majors only. Nature of product marketing by the business firm. Consumer-product relationships, pricing and demand; new product development; marketing strategy; promotion and advertising; product life cycles; the distribution system; manufacturing; wholesaling, retailing. Government regulation and its effect. Prerequisite: course 106A.

114. Production Management (4) III. Camran
Lecture—4 hours; discussion—1 hour. Prerequisite: Economics 1A, 1B, course 113A recommended. For non-majors only. Principles and procedures for efficient use of resources in processing and handling of agricultural and other products; work scheduling, inventory control; coordination of production and sales. Students having the class may not receive credit for this course.

116. Managerial Accounting (4) III, IV. Sinsick
Lecture—4 hours. Prerequisite: Economics 111B; course 112 recommended. Basic concepts of accounting as a managerial cost tool; procedures for financial reporting; systems and internal control systems; budgeting; interpretation of administrative reports.

125. Agricultural Policy (3) III. Carter
Lecture—3 hours. Analytical treatment of recent and current economic problems and governmental policies and programs affecting American agriculture.

130. Comparative Agricultural Policy (4) I. Hansen
Lecture—4 hours. Agriculture on all continents and in the principal commodity producing countries, and the operation, productivity and earning power in the farm versus the non-farm sector, and development trends.

150. Agricultural Marketing (4) I, II, Cohren; III. Geryan
Lecture—4 hours; discussion—1 hour. Prerequisite: Economics 1A, 1B, course 106B. Analysis of organizational structure and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls.

136. Managerial Marketing (5) II, Carter
Lecture—4 hours. Prerequisite: course 106A, Statistics 13. Application of economic theory and statistics in the study of marketing. Emphasis on measurement and forecasting, market planning, market segmentation, determination of optimal prices and quantities, and cost analysis; conduct of marketing research, marketing models and systems.

140. Farm Management (5) II, Reed; III, Olson
Lecture—5 hours; field trip. Farm organization and resources; economic and technological principles in decision making; analytical techniques and management control problems in organizing and managing the farm business.

145. Farm and Rural Resources Appraisal (4) I, Reed, II, Johnston
Lecture—3 hours; laboratory—3 hours; field trip. Principles of farm and rural appraisal; land utilization in relation to problems of development and valuation. Real estate appraisal instruments and elements of real estate finance.

147. Natural Resource Economics (4) I, Hansen
Lecture—4 hours; discussion—1 hour. Natural resource use problems with emphasis on pest and current policies and institutions affecting resource use, determination of principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public policy issues. Students who have not or are taking course 100A, Economics 100, or the equivalent, must enroll in course 147 (for 2 units) rather than course 147M.

147M. Natural Resource Economics (2) Hansen
Lecture—4 hours; discussion—1 hour. Natural resource use problems with emphasis on pest and current policies and institutions affecting resource use, determination of principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public policy issues. Students who have not or are taking course 100A, Economics 100, or the equivalent, must enroll in this course (for 2 units) rather than course 147.

148. Economic Planning for Regional and Resource Development (3) II, Ante
Lecture—3 hours. Relation of resources to economic growth, including regional problems; planning economic development with particular emphasis on resource use in agriculture and regional and national planning by both centralized and decentralized governments.

152. Agricultural Labor (3) I, Rochin
Lecture—2 hours; field trip. Problems, attributes and characteristics of agricultural employers, employees, and labor contractors. Impact of mechanization; determination of labor demand; labor supply, labor market structure and evolution of efficiency of the labor market, placement and supervision, off-season and in-season unemployment; organization and registration.

151. Economics of Poverty (3) III. Martin
Lecture—3 hours. Prerequisite: Economics 1A/1B or consent of instructor. Economic theories of mean distribution, causes of poverty; economic analysis of political problems; policies to minimize economic inequality; maximize efficiency of opportunity, and establish minimum income levels.

153. Quantitative Analysis for Business Decisions (3) II, Far-
ruath; III, Foyd
Lecture—3 hours. Prerequisite: Mathematics 48A, 49A, and course 106A. Introduction to selected topics in operations research relevant to business decision-making, applied decision theory, game theory, and inventory models.

157. Analysis for Production Management (4) III. Logan
Lecture—4 hours. Prerequisite: courses 100A, 106A. Application of economic theory and quantitative methods in analyzing production management problems including inventory control, production scheduling, quality control, simulation, systems approach, and work measurement.

171. Special Problems of the Urban Farmer (3) I, Cohren
Lecture—3 hours. Prerequisite: Economics 111A, 111B. Financial analysis at the firm level; methods of capital budgeting; estimating the cost of capital, dividend policies; mergers and acquisitions; special current topics in finance.

178. Economic Analysis in Resource Use (3) III. Gardner Labor—4 hours. Prerequisite: Economics 1A, 1B, course 106B or the equivalent. Analysis and application of resource use problems, including public policy issues, economic productivity and natural resource policies, determinants, principles and patterns of natural resource use, resource conservation, and tenure problems and policies.

190A. Senior Research Project (2) II, Snyder, II. Lane
Lecture—1 hour; discussion—1 hour. Prerequisite: course 100A, 106A, or consent of instructor: senior standing. Individual student-defined research project conducted under faculty guidance. Prerequisites: study, data collection, methods of data collection, and preliminary elements of report writing completed before the first quarter. Course 190A-190B required for students seeking departmental honors at graduation; consultant adviser for defenses. (Deferred grading only, pending completion of sequence.)

190B. Senior Research Project (2) Snyder, III. Lane
Lecture—1 hour; discussion—1 hour. Prerequisite: course 100A or consent of instructor: The research report begun in course 190A will be completed and, after evaluation by the instructor, be revised and resubmitted by the student prior to the end of 190B. (Deferred grading only, pending completion of sequence.)

192. Internship (1-6) I, II, III, summer. The Staff (Chairperson in charge)
Laboratory—3-18 hours. Internship experience and credit on a project of subject matter. Students of the Department of Agricultural Economics. Internships are supervised by a member of the staff. (P/NP grading only.)

197. Tutoring in Agricultural Economics (1-3) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Up to 3 hours and duties will vary depending upon the course being tutored. Prerequisite: senior standing in Agricultural Economics and consent of Department Chairperson. Tutoring will lead small discussion groups affiliated with one of the department's regular courses, under the supervision of, and at the option of the instructor in charge of the course. (P/NP grading only.)

199. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor: (P/NP grading only.)

199S. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: junior or senior standing and consent of instructor. Limited to students with advanced preparation in Agricultural Economics. (P/NP grading only.)

Graduate Courses

200A. Microeconomics Theory (5) I, Kushman
Lecture—4 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 104A 16A, 16B, or consent of instructor. Theories of behavior of individual economic agents. Characteristics of market equilibrium in perfectly competitive, imperfectly competitive, and monopolistic markets. (Same course as Economics 200A.)

200B. Microeconomics Theory (5) III. The Staff (Chairperson in charge)
Lecture—4 hours, discussion—1 hour. Prerequisite: course 200A or consent of instructor. Introduction to theories of
Agricultural Education

See Agricultural Education (below); and Home Economics Education.

The Major Program

The Agricultural Education major serves those interested in teaching agricultural sciences in high schools or junior colleges as well as those preparing for a service-type career in agriculture. It prepares graduates whose function will be to supervise youth and adult groups and to direct programs requiring preparation in both agricultural and human resources. State and federal requirements for instructors participating in federally funded vocational programs are also met. The need for scientists, technicians, and creative educators to assist in domestic and international agricultural programs has created a continuing demand for qualified instructors and supervisory personnel. This major also provides general preparation which is appropriate for work in banking, sales and service, rural recreation, and related agricultural industries. Students interested in obtaining breadth in both agricultural and environmental sciences will appreciate the scope and flexibility which this program provides.

Agricultural Education

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter

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1Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.
Agricultural Engineering Technology

Courses. See course listings under Agricultural Engineering Technology (this page), Conservation Technology (page 168), and Engineering: Agriculture (page 185)

Counseled by supplement or expand any of the above areas 14


Lecture—2 hours (first five weeks of quarter). Prerequisite: Plant Science 2, Botany 2, or consent of instructor. A study of shelters and equipment for providing a suitable environment for plant growth; temperature and humidity regulation; and irrigation and equipment for use in plant shelters.

121. Heat Transfer 2 (1) Morrison

Lecture—2 hours. Prerequisite: Physics 18 or 28. Thermal radiation (including solar; convection; conduction; psychrometrics. Emphasis is on applications to processing, structures, and energy conservation.

132. Management of Agricultural Wastes 1 (1) Illinois

Lecture—1 hour. Prerequisite: Agronomy 132 (concurrent). Directed laboratory exercises, field trips and special projects to augment the study of course 132. (P/NP grading only.)

133. Aircraft and Ground Equipment for Crop Protection, Nutrition and Vector Control 2 (2) Illinois

Lecture—2 hours. Prerequisite: Chemistry 118. Physics 20 and 28. Upper division standing. Studies the concept of insect control and application techniques related to the effectiveness of agricultural chemicals and biological materials. Techniques for reducing hazards to crops, livestock, and wildlife.

133L. Laboratory for Equipment for Crop Production (1) Illinois

Laboratory—3 hours. Prerequisite: course 133 (concurrent). Directed laboratory exercises, field trips and special projects to augment the study in course 133. (P/NP grading only.)

141. Technology for Agriculture in Developing Regions 2 (2) Illinois

Lecture—1 hour. Prerequisite: Physics 28. Quantitative relationships among energy flows in various forms through agricultural production and processing as practiced in California today; the sun, plants, animals, fertilizers, irrigation, field machinery, pesticides, transportation, food preservation, distribution.

152. Energy Technology Applications in Agriculture 2 (2) Illinois

Lecture—1 hour. Laboratory—2 hours. Prerequisite: course 151 (may be taken concurrently). Chemistry 13, Physics 28. Technology for utilizing energy from the sun and wind, and other renewable energy sources. Emphasis on photovoltaic generation, practical systems for collecting, transferring, converting, and applying energy for agricultural uses. Energy utilization and conservation.

161A. Fundamentals of Aquacultural Engineering 3 (3) Illinois

Lecture—2 hours. Discussion—1 hour. Prerequisite: Biological Sciences 1 and Mathematics 168, or the equivalent, Application of engineering principles to aquaculture; physical-chemical aspects of aquatic environment, unit processes in aquaculture; fluid flow.

161B. Fundamentals of Aquacultural Engineering 3 (3) Illinois

Lecture—2 hours. Discussion—1 hour. Prerequisite: course 161A. Aquaculture system: Physical aspects of large-scale algal culture; introduction to mathematical modeling of aquaculture systems.

160. Directed Group Study 1, 2 (1-5, I, II, III) III. The Staff (Garrett in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

169. Special Study for Advanced Undergraduates 1, 2 (1-5, I, II, III) III. The Staff (Garrett in charge)

(P/NP grading only.)

Graduate Courses 286. Group Study 1, 2 (1-5, I, II, III) III. The Staff (Garrett in charge)

(Lecture—1 hour. Prerequisite: consent of instructor. (P/NP grading only.)

299. Research 1, 2 (1-12, I, II, III) III. The Staff (Garrett in charge)

(SU grading only.)
Agricultural Practices
(Also of Agricultural and Environmental Sciences)

Courses in Agricultural Practices

Questions pertaining to the following courses should be directed to the instructor or the Office of the Department of Agricultural Engineering, 2050 Bainer Hall.

Lower Division Courses

49A. Field Equipment Operation (I) I, II. Harme Agricultural Engineering)
Laboratory—3 hours. Prerequisites: consent of instructor. Theory and operation of the major types of field equipment, with track-type tractors used in agriculture, forestry, and natural resource management. Essentials of safe equipment operation, the fundamentals of preventive maintenance, fault adjustments and trouble shooting are presented. (P/NP grading only.)

49B. Field Equipment Maintenance (I) I, II. Harme (Agricultural Engineering)
Laboratory—3 hours. Prerequisites: consent of instructor. Theory of operation and maintenance principles for internal combustion engines, power trains, hydraulic and pneumatic controls, introduction to arc and acetylene welding, the care and use of basic hand and shop tools. (P/NP grading only.)

Agricultural Science and Management
(College of Agricultural and Environmental Sciences)

The Major Program

The Agricultural Science and Management major is designed to provide the training required by business or industry to function in the management of the larger, more diverse agricultural operations. Students may specialize in one of three areas: animal science, food science, or plant science. Course work in biological, physical, social, and agricultural sciences with supporting courses in economics, business, and management permits individual flexibility.

Agricultural Science and Management

B.S. Major Requirements:

(For convenience in program planning, the usual courses taken to satisfy the requirement are shown in parentheses. Equal or more comprehensive courses are acceptable.)

Preparatory Subject Matter.......................... UNITS

Biological sciences (including Biological Science 1 and 2 from Botany 2 and Zoology 2); Chemistry 1A, 1B, 8A, 8B; Economics 1A, 1B, 11A, 11B; Mathematics (Agricultural Science and Management 105, Mathematics 16A); Physics 1A or 1B; and Plant Science options; Physics 2A required for Food Science option.

General Subject Matter.......................... 18

English, written, English 1 or 2.......................... 4
English, oral, Rhetoric 1, 3, or Philosophy 9.......................... 4
Social sciences and humanities.................. 10

Common Core Courses.......................... 18-21

Agricultural Economics 100A, 140, plus three additional courses.......................... 18-21

Marketing: Agricultural Economics 113, 130, 136; Finance, Agricultural Economics 117, 120A, 120B, 120C, methods, Agricultural Economics 155; 167; business organizations, Agricultural Economics 18, 112.

Depth Subject Matter.......................... 50

Animal Science options.......................... 7

Genetics 120, Animal Genetics 108

Nutrition 103

Physiology 110

Animal science 20

Choose one course from Animal Science 114, 115, 116, 118A, 118B, 140, and the balance from Animal Genetics 107, 108, 109; Animal Science 105, 110, 111, 117, 119, 125, 124, 127, 128, 129, 131, 141, 157; Bacteriology 177, 178; Nutrition 122, 123; Physiology 121, 130A, 144; Environmental Planning and Management 111.

Agricultural sciences.......................... 14

Courses to support student's objectives to be chosen from the following areas or others with the advisor's approval: agricultural engineering technology, plant science, soil science, water science.

Food Science option.......................... 9

Chemistry 1C, 5

Biophysical 101A, 101B

Mathematics 16B

Physics 2B, 2C (Honors Physics 1A)

Food science and technology.......................... 26

Upper division courses in food science and technology chosen to support student's objectives with the advisor's approval. Courses should include Food Science 115, 120A, 120B, 120C, 110A, 110B.

Plant Science option.......................... 3

Botany 102 or 121, 111A, 111B

Entomology 110 or 112

Genetics 120

Plant Pathology 120

Phytopharmacology 120

Soil Science 2, 2L, 109

Water Science 110A

Restricted electives.......................... 14

Choose courses from agricultural science, plant science, entomology, vegetable crops, and viticulture.

Unrestricted Electives.......................... 32-38

Total Units for the Major.......................... 180

Major Adviser. See Class Schedule and Room Directory.

Departmental Advising Center. Located at 162 Animal Science Building.

Graduate Study. See page 99.

Courses in Agricultural Science and Management

Questions pertaining to the following courses should be directed to the instructor or to the Animal Science Advising Center.

Upper Division Courses

Lecture—3 hours, laboratory—3 hours. Prerequisites: at least two years high school algebra and junior standing. Applications of statistical methods to the analysis and interpretation of research data in plant, animal, behavioral, and food and nutritional sciences. Lectures cover concepts and biostatistical theory. Specialized laboratory sections cover procedures, data processing and interpretations.

19R. Forestry in Agricultural Science and Management (I) I, II, III. The Staff Seminar—1 hour. Prerequisite: upper division major or consent of instructor. Reports and discussions of current development in the agricultural industry. (P/NP grading only.)

Agronomy
(College of Agricultural and Environmental Sciences)

Faculty

See under Department of Agronomy and Range Science.

Major Programs and Graduate Study. See majors in Plant Science (page 276) and Range and Wildlife Sciences (page 285); and page 99 for graduate study.

Related Courses. See Plant Science and Range Management.

Courses in Agronomy

Questions pertaining to the following courses should be directed to the instructor or to the Academic Advising Center, 132 Hunt Hall.

Lower Division Courses

21. Agricultural Science and the Food Crisis (2) I, II. Paine Lecture—2 hours. An interdisciplinary approach to the food issue. Lectures will be given by several departments to discuss such areas as agronomy, nutrition, economics, water science, agricultural engineering, political science, and anthropology. Both agricultural and non-agricultural majors are encouraged to enroll.

Agronomy Internship (1-12) I, II, III, summer. The Staff (Agricultural Engineering, political science). Elective—3 to 12 hours. Prerequisites: consent of instructor. Work experience on or off-campus in all subject areas pertaining to agronomy. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

100. Principles of Agronomy (4) I. Paine, II. Travis Lecture—3 hours, discussion—1 hour. Prerequisite: a course in general botany and/or Plant Science 2 or consent of instructor. Fundamentals of field crop production and agrochemical problem solving using ecological, physiological and genetic principles.
Agronomy and Range Science; American Studies

100L. Principles of Agronomy Laboratory (1) [C] Webster, III. Travis
Laboratory—3 hours. Prerequisite: course 100L (may be taken concurrently). Field-oriented introduction to principles of agronomic crop production.

111. Cereal Crops of the World (4) [I] Schiller Lecture—3 hours. Laboratory—2 hours. Prerequisite: courses 100, 100L. Botany 2. Contribution of cereal crops to man's development; adaptation, production, utilization, and factors determining quality of wheat, oats, barley, rice, corn, and sorghum. Emphasis is on recent developments and scientific improvements.

112. Forage Crop Ecology (3) [II] Raguse Lecture—4 hours. Laboratory—2 hours. Prerequisite: Botany 2 or consent of instructor. Forages as a world resource in food production. Ecological principles governing the adaptation, establishment, growth, management of perennial and annual forages, including pasturage, rangelands and hay. Aspects of forage quality which affect feeding value to livestock.

112L. Forage Crop Ecology Laboratory (1) [II] Raguse Laboratory—3 hours includes four half-day field trips. Prerequisite: course 112L. Greenhouse experiments and problems set to supplement course 112. Field trips related to forage plant breeding, management, and utilization.

113. Fiber, Oil and Sugar Crops in a Changing World (4) [I] Mikkelsen, Knolles, Hills
Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2 or equivalent. Study of growth and development of crop plants with emphasis on reproductive structure and pollination, and techniques to morphological analysis.

120. Morphology and Reproduction of Agronomic Crops (3) [III] Webster
Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2 or the equivalent. Study of growth and development of crop plants with emphasis on reproductive structure and pollination, and techniques to morphological analysis.

120L. Internship (1-12) [III] Summer. The Staff (Department Chairperson in charge)
Laboratory—3-120 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learning experience on or off campus in all subject areas pertaining to agronomy. Internship supervised by a member of the faculty. (P/N grading only.)

197T. Tutoring in Agronomy (1-3) [I-II-III, III] The Staff (Quaslet in charge)
Prerequisite: course to be tutored or the equivalent; upper division standing and consent of instructor. Designed for undergraduate students who desire tutoring experience. Students will assist in courses under the direction of the faculty. May be repeated for credit up to a total of 5 units. Same course may not be tutored more than one time. (P/N grading only.)

196. Directed/Group Study (1-5) [I-II-III, III] The Staff (Quaslet in charge)
Prerequisite: consent of instructor. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) [I-II-III, III] The Staff (Quaslet in charge)
Prerequisite: upper division units of agronomy. (P/N grading only.)

Graduate Courses

205A-205B. Design, Analysis and Interpretation of Experiments (3-3) [II-III] Geng, Williams
Lecture—2 hours discussion—1-2 hours. Prerequisite: graduate standing in Plant Science; Agricultural Science and Management 150; knowledge of elementary FORTRAN or ALGOL recommended. The planning and analysis of field and laboratory experiments with emphasis on the biological interpretation of results.

210. Agricultural Research Planning and Management (3)
Peterson
Lecture—2 hours discussion—2 hours. Two full-day field trips. Prerequisite: graduate standing in any agricultural field of study and consent of instructor. An analysis of the procedures in planning, managing, evaluating, and utilizing agricultural research to promote agricultural development.

221. Advanced Plant Breeding (4) [III] Teuber
Lecture—3 hours laboratory—3 hours. Prerequisite: Plant Science 125. Advanced topics in plant breeding. Genetic diversity and centers of origin of cultivated plants, mating systems in plants, polygeny, host-parasite relationships, role of mutants in plant breeding, and other topics of current interest.

222. Quantitative Genetics and Plant Improvement (4) [II] Allard
Lecture—4 hours. Prerequisite: Plant Science 113; Genetics 105; or consent of instructor. Genetic forces affecting populations. Formulation of breeding plans based on principles of population and quantitative genetics. Offered in even-numbered years.

223. Selection Theory in Plant Breeding (3) [II] Jain
Lecture—2 hours discussion—2 hours. Prerequisite: course 222 or consent of instructor. Theory and application of selection to plant populations for improvement of quantitative characters. Statistical genetic analysis of quantitative character expression and methods for obtaining maximum efficiency in plant breeding sesions. Offered in odd-numbered years.

224. Chromosome Evolution (4) [IV] Dvorak
Lecture—3 hours; laboratory—3 hours. Prerequisite: Genetics 101 or consent of instructor. Structure and function of chromosomes. Dynamics of their evolution at the molecular and structural levels.

225. Manipulation of Plant Chromosomes (3) [IV] Dvorak
Lecture—4 hours; laboratory—4 hours. Prerequisite: Genetics 101A, 100B or Genetics 120. Application of chromosome manipulation in plant genetics and plant physiology. Development and utilization of genetic tools in gene mapping, analysis of genetic architecture of plant genomes, and interspecific gene transfer.

230. Advanced Population Biology (3) [II] Jain
Lecture—2 hours; discussion—1 hour. Prerequisite: Genetics 103, recommended — a basic course in ecology (Botany 117, Zoology 125, etc.). The dynamics of growth and evolution of populations. Genetic and ecological aspects of population regulation and integration. Natural selection within and among populations. Intra- and inter-specific competition and community structure and diversity. Offered in even-numbered years.

231. Advanced Topics in the Ecology of Crop and Range Plant Communities (5) [III] Laude
Lecture—4 hours. Prerequisite: Plant Science 101. Analysis and quantitative description of the structure and dynamics of field crop and range communities in relation to interplant competition, population functions, en-vironmental stresses and adaptation.

232. Advanced Topics in the Physiology of Crop and Range Plants (3) [I] Huflaker
Lecture—3 hours. Prerequisite: Botany 111B or Plant Science 102. Physiological aspects of vegetative and reproductive growth of crop and range plants in relation to nitrogen assimilation and allocation.

233. Biological Nitrogen Fixation (4) [II] Valentine
Lecture—2 hours; seminar—1 hour. Current concepts of the physiology, microbiology, biochemistry, genetics, and regulation of free-living and symbiotic N-fixing organisms. Integration and translation of basic research to develop strategies for improving N-productivity of agronomic crops.

260. Seminar in Crop Growth, Production and Utilization (1-2) [I-III] Law, Peterson
Seminar—1-2 hours. Topics of current interest related to plant growth processes, production and management systems, and utilization of crops for food, fiber and fiber crops.

291. Seminar in Plant Breeding and Evolution of Cultivated Plants (1-2) [I] Schiller; [II] Dvorak
Seminar—1-2 hours. Topics of current interest related to plant breeding systems and the origins of evolution of cultivated plants.

297T. Tutoring in Agronomy (1-3) [I-II-III, III] The Staff (Quaslet in charge)
Prerequisite: graduate standing; consent of instructor; and course to be tutored or the equivalent. Designed for graduate students who desire teaching experience but are not teaching assistants. May be repeated for a total of 5 units. Same course may not be tutored more than one time. (S/U grading only.)

296. Group Study (1-5) [I-II-III, III] The Staff (Quaslet in charge)
Directed study in areas of plant physiology, plant genetics, plant biochemistry, agricultural chemistry, or soil-plant relationships of field crops and range and pastures. (S/U grading only.)

299. Research (1-12) [I-II-III, III] The Staff (Quaslet in charge)
Research involving research in plant physiology, plant genetics, plant biochemistry, agricultural chemistry, or soil-plant relationships of field crops. (S/U grading only.)

Agronomy and Range Science

Engineering and Environmental Sciences

Calvin O. Quaslet, Ph.D., Chairperson of the Department
Department Office, 133 Hunt Hall (752-1703)

Faculty

Robert W. Alard, Ph.D., Professor (Agronomy and Range Science, Genetics)
Benjamin N. Beard, Ph.D., Lecturer
R. William Breidenbach, Ph.D., Lecturer
John P. Conrad, Ph.D., Professor Emeritus
Beecher Crampton, M.S., Senior Lecturer
Jan Dvorak, Ph.D., Associate Professor
Keri W. Foster, Ph.D., Assistant Professor
Shu Geng, Ph.D., Associate Professor
Jack Hills, Ph.D., Lecturer
Ray C. Huffaker, Ph.D., Professor
Subodh K. Jain, Ph.D., Professor
Milton B. Jones, Ph.D., Lecturer
Paulden F. Knowles, Ph.D., Professor
Horton M. Laude, Ph.D., Professor
William M. Longhurst, Ph.D., Professor Emeritus
Robert S. Loomis, Ph.D., Professor
R. Merton Love, Ph.D., Professor Emeritus
John W. Menke, Ph.D., Assistant Professor
Duane S. Mikkelsen, Ph.D., Professor
Maurice L. Peterson, Ph.D., Professor
Donald A. Phillips, Ph.D., Associate Professor
Calvin O. Quaslet, Ph.D., Professor
Charles A. Raguse, Ph.D., Professor
William Rains, Ph.D., Professor
Paul L. Rowell, Ph.D., Lecturer
J. Neil Rutgers, Ph.D., Lecturer
Charles W. Schaller, Ph.D., Professor
Donald E. Seaman, Ph.D., Lecturer
Ernest H. Stanford, Ph.D., Professor Emeritus
Larry R. Teuber, Ph.D., Assistant Professor
Robert L. Travis, Ph.D., Associate Professor
Carl L. Tucker, M.S., Lecturer
Ray C. Valentine, Ph.D., Professor
Barbara D. Webster, Ph.D., Professor
William A. Williams, Ph.D., Professor
Frederick P. Zechiel, Jr., Ph.D., Professor Emeritus

Courses. See course listings under Agronomy (page 137) and Range Management (page 286).

American Studies

(Office of Letters and Science)

Jay Meching, Ph.D., Program Chairperson
Program Office, 816 Sproul Hall (752-3377)

Committee in Charge

David A. Robertson, Ph.D. (English), Committee Chairperson, Fall, Spring Quarters
Jeffrey Weidner, Ph.D. (Animal Physiology), Committee Chairperson, Winter Quarter
Daniel H. Catron, Ph.D. (History), Committee Chairperson, Spring Quarter
Stephen C. Jen, Ph.D. (Geography), Committee Chairperson, Fall, Winter Quarters
 nicotine

Fall Quarter

David Scofield, Wilson, Ph.D. (American Studies), Committee Chairperson, Fall, Winter Quarters

Winter-Spring Quarters
Faculty
Jay Mechling, Ph.D., Associate Professor
Merline A. Williams, M.A., Lecturer
David Scofield Wilson, Ph.D., Associate Professor

The Major Program
Students who choose American Studies are usually those who feel too limited by a narrow, departmental approach to American experience. The American Studies major is interdepartmental, providing the student the opportunity to combine courses from the natural sciences, social sciences, and humanities. The seven core courses, taught by the American Studies faculty, pay special attention to theoretical and methodological issues and practices critical to the study of American culture. This is the shared work all American Studies students do together in relatively small classes, combining classroom and field studies. Students also design an individual course of study (another eleven or twelve courses) around their own special interests. Some may choose to design an individual emphasis around an area like American literature or American history. Others may choose an interdisciplinary subject like women's studies, regional studies, popular culture studies, or the fine arts, and others choose to emphasize cross-cultural studies. Because the undergraduate student's American Studies major is individualized, it is important to contact an adviser early and to continue to work closely with your adviser throughout your program.

Career Alternatives. As an interdisciplinary major, American Studies provides a good liberal arts and sciences undergraduate education. American Studies maximizes the student's contact with a variety of subject matter and approaches. This flexibility means that our majors have been able to move into a broad range of career settings, including journalism, law, medicine, nursing, law enforcement, environmental planning, teaching, library science, museum curatorship, and business. Some students discover new career possibilities through our program of internships in American institutions.

American Studies
A.B. Major Requirements:

Preparatory Subject Matter

American Studies

Preparation: 10-20 units

1A. Technology, Science and American Culture (4) I. Mechling
Lecture—2 hours; discussion—2 hours. Critical examination of the role of American science and technology as cultural systems which define the natural world and man's relation to it; mutual influence and interaction of these systems and other cultural systems (arts, politics, social thought, religion, etc.).

1D. Tradition and Revolution in American Culture (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Critical examination of the role of tradition and revolution in American culture, past and present, emphasizing changes and continuities, and the role of intellectual and institutional change in the arts, humanities, and social, political, and economic movements.

1F. The Popular Image of Women in America (4) III. Williams
Lecture—2 hours; discussion—1 hour. Directed analysis of popular media. Lecture; media exposure; special projects.

2. Forms of American Wisdom (2) I. Wilson
Lecture—1 hour; discussion—1 hour. An exploration of the forms of wisdom that define American culture — e.g., folk knowledge, prophetic scriptures, public religion, science, politics, and the connection between the popular female image and the demands of the female audience for the male consumer.

Fieldwork in American Civilization (4) III. The Staff
Lecture—2 hours; discussion—2 hours; evaluation of written and visual, and oral field reports and conferences with individual students. A practical introduction to the multi-disciplinary techniques of gathering, organizing, and interpreting the data of American experience; exercises in participant observation, interviewing, and group and individual field work. Prerequisite: at least one course from one sequence: Anthropology and Sociological or Anthropology and Sociology. The emphasis on the selection and application of appropriate concepts, methods, and techniques.

45. Introduction to American Studies (4) I, III. Williams, Wilson
Lecture—2 hours; discussion—2 hours; evaluation of written papers and conferences with individual field work. Prerequisite: at least one course from one sequence: Anthropology and Sociology or Anthropology and Sociology. The emphasis on the selection and application of appropriate concepts, methods, and techniques.
Anatomy; Animal Behavior

American Studies Program. Individual research on American Studies topics. (Deferred grading only, pending completion of sequence.)

192. Internship in American Institutions (1-15) I, II, III. The Staff (Chairperson in charge)
Prerequisite: enrollment dependent on availability of internship positions, with priority to American Studies majors and those completing course 30. Supervised internship and study within and about key organizations in American civilization: banks, universities, museums, schools, historical societies, governmental and social agencies, etc., with attention to the techniques of participant observation and the collection of ethnographic data. May be repeated for credit for a total of 15 units. (P/NP grading only.)

197T. Tutoring in American Studies (1-5) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-5 hours per week. Prerequisite: consent of Chairperson of American Studies Program. Tutoring in lower division American Studies courses, usually in small discussion groups. Periodic meetings with the instructor in charge: reports and readings. May be repeated for credit when the tutoring is for a different course. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Chairperson of American Studies Program. (P/NP grading only.)

Graduate Courses

206. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU grading only.)

209. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU grading only.)

Anatomy

See Anatomy (below); and Human Anatomy (under Medicine, School of)

Anatomy

(School of Veterinary Medicine)

George H. Carden III, D.V.M., Ph.D., Chairperson of the Department
Department Office, 1321 Haring Hall (752-1174)

Faculty

George H. Carden III, D.V.M., Ph.D., Professor
Leslie J. Faust, Jr., Ph.D., Associate Professor
Dallas M. Hyde, Ph.D., Assistant Professor
Logan M. Julian, V.M., Ph.D., Professor
Ralph L. Kelchii, D.V.M., Ph.D., Professor
Carleton L. Lohse, D.V.M., Ph.D., Associate Professor
Charles G. R. Plopper, Ph.D., Assistant Professor
Walter S. Tyler, D.V.M., Ph.D., Professor

Courses in Anatomy

Upper Division Courses

100. Systematic Anatomy (4) I, II, III, IV. The Staff (Chairperson in charge)
Lecture—4 hours per week; laboratory—4 hours. Prerequisite: Zoology 2 or 2L. Lec., dissect., and demonstrations emphasizing the typical structure of the anatomical systems of the dog, chicken, and chum salmon.

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Laboratory—6-15 hours. Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201. Advanced Systematic Anatomy (5) I, II, III. The Staff (Chairperson in charge)
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 100 or consent of instructor. Detailed dissections comparing the anatomy of the dog, sheep, chicken, and pig. Emphasis placed on the unique aspects of each species and their use in research.

202. Organology (2) II. The Staff (Julian in charge)
Lecture—2 hours. Prerequisite: course 100 or the equivalent and consent of instructor. Comparative development, growth patterns, and composition of selected organs: liver, kidney, lung, mammary gland, brain, and a skeletal muscle. Offered in even-numbered years.

205. Ultramicroscopic Anatomy (3) I. The Staff (Tyler in charge)
Lecture—3 hours. Prerequisite: histology; electrophysiology. Electron microscopy of cells and tissues. Offered in odd-numbered years.

206. Topography of Body Surfaces (3) I. The Staff (Tyler in charge)
Lecture—1 hour. Discussion—1 hour. Information concerning the three-dimensional topography of internal and external body surfaces, both normal and abnormal, as revealed by scanning electron microscopy of cells, tissues, organs, and replicates will be compared and correlated with that derived from other techniques. Offered in even-numbered years.

207. Perspectives in Morphological Research (3) III. The Staff (Tyler in charge)
Lecture—2 hours. Discussion—1 hour. Consideration of the principles and applications of modern morphological methods and their role in biomedical research. Examples of specific methods include stereochemistry, computer analysis of images, scanning and transmission electron microscopy, histochemistry, autoradiography, rapid freezing, and vascular injection. Offered in odd-numbered years.

210. Principles of Histohematology (3) I. The Staff (Tyler in charge)
Lecture—2 hours. Laboratory—3 hours. Prerequisite: Zoology 107. Biochemistry 101A. Principles of enzyme histochemistry of animal tissues applicable to light and electron microscopy. Offered in odd-numbered years. (SU grading only.)

215. Veterinary Histology (5) II. The Staff (Faust in charge)
Lecture—3 hours. Laboratory—4 hours. Prerequisite: Zoology 2-2L. The microscopic anatomy of tissues and organs of mammals and avian species of veterinary significance.

233. Tumor Biology (3) I. Faust, Cardin, Benjamin, Friedman, Manning, Thelen, Troy
Lecture—3 hours. Prerequisite: graduate standing and consent of instructor. Growth, invasion, and metastasis of tumors; mechanisms of carcinogenesis; intrinsic and extrinsic etiologic factors. Offered in odd-numbered years.

239. Seminar (1-5) III. The Staff (Chairperson in charge)
Seminar—1 hour. (SU grading only.)

239. Advanced Group Study in Surgical Anatomy (2-4) I, II, III. The Staff (Chairperson in charge)
Laboratory—6-12 hours. Prerequisite: Veterinary Medicine 107 or consent of instructor. Selected topics in topographical, radiographic, and regional anatomy as they apply to the clinical sciences.

249. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Laboratory—6-15 hours. Prerequisite: consent of instructor. (SU grading only.)

249. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Laboratory—6-36 hours. Prerequisite: consent of instructor. (SU grading only.)

Anesthesiology

See Medicine, School of

Animal Behavior (A Graduate Group)

Peter S. Rodman, Ph.D., Chairperson of the Group
Group Office, 328 Young Hall (752-0745/1988)

Faculty

The Group includes faculty from eight departments in three schools and colleges.

Graduate Study. The Graduate Group in Animal Behavior offers the Ph.D. degree with a specialization in the area of three areas: (1) ethology and the evolutionary basis of animal behavior; (2) physiological basis of animal behavior; and (3) behavior of domestic animals. A specialization will emphasize the adaptive and evolutionary basis of animal behavior.

Preparation. Appropriate preparation is a bachelor's or master's degree in one of the following disciplines related to behavior such as psychology, anthropology, zoology, ethology, ecology, entomology, genetics, or animal behavior. In addition, at least one course from each of the following four areas must be taken before admission into the program or before the end of the first year in the program:

- General genetics: Genetics 100A, 100B, or the equivalent
- Evolution: Statistics 13, or the equivalent
- Psychology 150 or Zoology 155, or the equivalent

Breadth Requirement. The following core courses or the equivalent are required of all students:

- Systemic physiology: Physiology 110-110L or Zoology 142-142L (7 units)
- Statistical analysis: Psychology 207 or Agronomy 205A-205B (4-6 units)

Financial support is available to animal behavior research: Animal Behavior 201 (3 units)

College seminar in animal behavior: Animal Behavior 290 (1-3 units)

Ecology: Entomology 104, Environmental Studies 100, or Zoology 125 (9-4 units)

College teaching: Biological Sciences 210 (2 units)

Comparative psychology: Psychology 250 (4 units)

Specialization. In addition to the requirements listed above, students must also take several courses in one of the three areas of specialization with substitution as approved by the advisor.

Graduate Adviser: E. O. Price (Animal Science).

Courses in Animal Behavior

Graduate Courses

201. Scientific Approaches to Animal Behavior Research (3) I. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: graduate standing and consent of instructor in charge. Philosophical issues, goals, strategies and tools in field and laboratory research.

Harn (Physiological Sciences), Lott (Wildlife and Fisheries Biology)
Lecture—3 hours. Prerequisite: graduate standing and a course in animal behavior or consent of instructor. History of animal domestication, the role of natural and artificial selection in domestication, the influence of environment and experience on domestic and non-domestic animal behavior and human-animal interactions. Offered in even-numbered years.

209. Seminar in Animal Behavior (1-3) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: consent of instructor. Selected topics in animal behavior. (SU grading only.)
Animal Genetics

See Biochemistry; and Biochemistry and Biophysics

Animal Genetics

(College of Agricultural and Environmental Sciences)

Faculty

See under Department of Animal Science.

Related Courses. See Agronomy 221, 222, 223; Plant Pathology 215; Plant Science 113; Vegetable Crops 220.

Courses in Animal Genetics

Questions pertaining to the following courses should be directed to the instructor or to the Animal Science Advising Center, 162 Animal Science Building.

Upper Division Courses

106. Population Genetics and Animal Breeding (3) III. Gull Lecture—3 hours. Prerequisite: Genetics 102. One course in statistics recommended. Treatment of the principles of population genetics as they apply to artificial and natural populations. Stress on the application of single-gene Mendelian theory to animal breeding and genetics. Lectures will develop an appreciation of the utility of the theory and prepare students for more advanced study.

107. Genetics and Animal Breeding (4) III. Bradford Lecture—3 hours; discussion—1 hour. Prerequisite: course 106 or the equivalent. Integrated view of population and quantitative genetics as they pertain to animal breeding. Course content restricted to basic principles defining mating systems and selection methods with current examples presented where possible. Emphasis given to those characters important to the production of food and the exploitation of these characters in livestock and poultry.

108. Methods in Quantitative Animal Breeding (2) II. Kennedy Lecture—3 hours. Prerequisite: course 107. Methods and procedures in quantitative animal breeding; repeatability, heritability and genetic correlation estimation; single and multiple trait selection methods.

109. Mammalian Genetics Laboratory (2) I. Bradford Lecture—1 hour; laboratory—2 hours. Prerequisite: course 107 (may be taken concurrently). Consent of instructor. Laboratory work on experimental animals and human materials. Effects of inbreeding and selection on genetic variation; effects of environmental factors on changes in gene frequency;

198. Directed Group Study (1-5) II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Selected topics relating to animal genetics. (P/N grading only.)

NOTE: For key to footnote symbols, see page 130.

Graduate Courses

204. Theory of Quantitative Genetics (3) I. Gull Lecture—2 hours; discussion—1 hour. Prerequisite: course 107, or the equivalent. Treatment of the theoretical basis of quantitative genetics and the consequences of Mendelian inheritance. Lectures will develop the concepts intended to estimate quantitative genetic differences and basis for phenotypic variation.


207. Quantitative Genetics and Animal Breeding Theory (3) II. Abplanalp (Avian Sciences) Lecture—2 hours; laboratory—2 hours. Prerequisite: Statistics 105A, 105B or 130A, 130B. Quantitative genetic theory, relating to inbreeding and crosses breeding systems, selection for cross performance, major quantitative traits, control of populations, and applied to the planning of breeding programs.

208. Estimation of Genetic Parameters (3) II. Kennedy Lecture—3 hours. Prerequisite: course 107 and Animal Science 205; courses 204 and 108 recommended. General methods for the estimation of components of variance and covariance and their application to the estimation of heritability, repeatability and genetic correlations are considered. Specific emphasis is given to procedures applicable to livestock populations under selection. Offered in even-numbered years.

250. Animal Improvement in an International Context (4) III. Bradford Lecture—3 hours; seminar—1 hour. Prerequisite: completion of at least one year of graduate study; including upper division or graduate courses in livestock production and animal breeding. Emphasis on utilization, conservation and exchange of animal germ plasm resources; exploitation of heterosis; improvement schemes in the absence of central data processing; population structure and rate of improvement; roles of governments; group breeding schemes; research needs. (SU grading only.) Offered in odd-numbered years.

256. Group Study (1-5) II, III, IV. The Staff (Bradford or others in charge) Prerequisite: consent of instructor. Lectures and discussions of advanced topics in animal genetics. (SU grading only.)

257. Research in Animal Genetics (1-12) II, III, IV. The Staff (Bradford in charge) (SU grading only.)

Animal Nutrition

See Nutrition

Animal Physiology

(College of Agricultural and Environmental Sciences)

Dorothy E. Woolley, Ph.D., Chairperson of the Department
Department Office, 192 Briggs Hall (752-2023)

Faculty

R. Leeland Baldwin, Ph.D., Professor (Animal Science)
Marylyn S. Barkley, Ph.D., Assistant Professor
James M. Boda, Ph.D., Professor
Ray E. Burger, Ph.D., Professor
Harry W. Coolin, Jr., Ph.D., Professor
Perry T. Coupes, Ph.D., Professor (Animal Science)
J. Warren Evans, Ph.D., Associate Professor (Animal Science)
Jack S. Goldberg, Ph.D., Assistant Professor
John M. Horowitz, Jr., Ph.D., Professor
Barbara A. Horwitz, Ph.D., Professor
Frederick W. Lorenz, Ph.D., Professor Emeritus
Verne E. Mendel, Ph.D., Professor (Animal Science)
Gary P. Mobber, Ph.D., Associate Professor (Animal Science)
Frank X. Ogasawara, Ph.D., Professor (Avian Sciences)
Edward A. Rhode, Ph.D., Professor
Arnold J. Sillman, Ph.D., Associate Professor
Arthur H. Smith, Ph.D., Professor
W. Jeffrey Winder, Ph.D., Assistant Professor
Barry W. Wilson, Ph.D., Professor (Avian Sciences)
Charles M. Winget, Ph.D., Lecturer
Dorothy E. Woolley, Ph.D., Professor

Courses. See course listing under Physiology (Animal), page 273.

Animal Science

(College of Agricultural and Environmental Sciences)

R. Leeland Baldwin, Jr., Ph.D., Chairperson of the Department
Department Office, 130 Animal Science (752-1250)

Faculty

Gary B. Anderson, Ph.D., Associate Professor
Robert A. Cotton, Ph.D., Professor
R. Leeland Baldwin, Jr., Ph.D., Professor
Donald L. Bath, Ph.D., Lecturer
Paul R. Bowser, Ph.D., Lecturer
G. Eric Bradford, Ph.D., Professor
Anthony C. Bywater, Ph.D., Assistant Professor
Christopher C. Carpentier, Ph.D., Assistant Professor
Floyd D. Carroll, Ph.D., Professor Emeritus
Ernest S. Chang, Ph.D., Assistant Professor
Walls H. Clark, Jr., Ph.D., Professor
Douglas E. Conklin, Ph.D., Lecturer
Perry T. Coupes, Ph.D., Professor
Edward J. DePeters, Ph.D., Assistant Professor
Serge Doroshow, Ph.D., Associate Professor
J. Warren Evans, Ph.D., Professor
Gay A. E. Gall, Ph.D., Professor
William N. Garrett, Ph.D., Professor
Paul W. Gregory, Sc.D., Professor Emeritus
Dennis Hedgecock, Ph.D., Lecturer
Hubert Hefeman, Jr., Ph.D., Professor
J. L. Hull, M.S., Lecturer
Brian W. Kennedy, Ph.D., Associate Professor
Robert C. Laben, Ph.D., Professor
Oskar L. Lang, O.S.B., M.D., Assistant Professor
Glen P. Logdren, Ph.D., Professor Emeritus
Joan M. Macy, Ph.D., Assistant Professor
Verne E. Mendel, Ph.D., Professor (Animal Science, Animal Physiology)
James H. Meyer, Ph.D., Professor
Gary P. Mobber, Ph.D., Associate Professor
James G. Morris, Ph.D., Professor
Edward O. Price, Ph.D., Professor
Michael J. Prokop, Ph.D., Assistant Professor
David W. Robinson, Ph.D., Professor
Wade C. Rolins, Ph.D., Professor Emeritus
Nathan E. Smith, Ph.D., Assistant Professor
Donald T. Torelli, Ph.D., Lecturer
William C. Weir, Ph.D., Professor (Animal Science, Nutrition)
The Major Program
Animal Science is the study of domestic animal resource utilization through the integration of natural and social sciences such as genetics, biochemistry, nutrition, and economics. Emphasis may be placed on scientific, production, and management aspects of dairy or livestock production, aquaculture, or animals for work, recreation, or laboratory purposes.

This major leads to career opportunities in the areas of production animal agriculture, management and sales in the service industries; agricultural extension, consulting, teaching, journalism or laboratory pre-veterinary medicine and preparation for graduate school. Completion of other professional schools or graduate study may be achieved by careful planning in the major.

Animal Science

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.)

UNITS
Preparatory Subject Matter 43-44
Genetics including: Genetics 120, Animal Genetics 120 6
Bacteriology (including Bacteriology 203-204) 6

Physiology 110, 112, 121, or 123 7

Animal Science, a minimum of 28 28

Broad Subject Matter 40-42

Written and oral expression (see College Information, page 70) 8
Additional social sciences and humanities 12

Unrestricted Electives 30-42

Selected by the student according to individual interests and objectives. Advisers will provide lists of recommended courses and will assist in the selection thereon.

Total Units for the Major 180

Major Adviser. R.C. Laben.

Departmental Advising Center, 162 Animal Science Building. Students must secure their academic adviser through this office upon entering the major.

Graduate Study. The Department of Animal Science offers a program of study and research leading to the M.S. and Ph.D. Detailed information may be obtained by contacting the graduate adviser. See also page 99.

Graduate Adviser. H. Heitman.

Related Courses. See Food Science and Technology 120.

Courses in Animal Science

Lower Division Courses

1. Domestic Animals and Man (3) I, II, IIA.

Lecture—2 hours. Prerequisite: an understanding of animal domestication and factors affecting their characteristics and distribution. Animal use by man for food, fiber, drugs, research and recreation; and the role of society in shaping animal use. Laboratory exercises with beef and dairy cattle, poultry, sheep, swine, laboratory animals, fish, and horses.

2. Introductory Animal Science (3) III. Anderson

Lecture—2 hours. Prerequisites: course 1 and Biological Sciences 1 recommended. Growth, reproduction, lactation, inheritance, nutrition, and disease control in domestic animals. The application of sciences to animal production. 22A-22B. Animal Judging (2-2) I, II. The Staff Laboratory—6 hours. Prerequisites: course 1 or 2 recommended. Evaluation of type as presently applied to livestock shows, horse shows, and fairs. 22A-22B. Animal Judging (2-2) I, II. The Staff Laboratory—6 hours. Weekend field trips. Prerequisite: course 1. The student will be given an understanding of the individual and group classes of animals, the legal requirements of the states, and the specific and accurate description. Course is required for intercollegiate judging competition. (P/NP grading only.)

3. Introductory Aquaculture (3) III. Clark

Lecture—2 hours. Prerequisite: Biological Sciences 1. Aquatic animal production with particular reference to growth, reproduction, inheritance, nutrition and disease.

27. Quantitative Skills for Animal Science (3) I

Lecture—2 hours. Prerequisite: Concurrent mathematics courses for two years of high school algebra. Course 1 or the equivalent (may be taken concurrently) recommended. To introduce application of mathematics to animal science problems. Basic mathematical and statistical methods. Laboratory will involve student in solving actual problems using computer. This course will be prerequisite for Animal Science 127.

31A. Perspectives in Animal Science (1) I

Bywater

Lecture—1 hour. Consideration of the broad scope of opportunities in Animal Science and related fields and assessment of basic components that constitute a successful career. Of special interest to students new to the campus. (P/NP grading only.)

31B. Current Topics in Animal Science (1) I

Bywater

Lecture—1 hour. OCCASIONAL occurrence. Lectures, assigned reading and discussion of topics of current concern in the broad area of animal science. Topics may include land utilization, livestock poultry and game production; nutritional, genetic, physiological and health management. (P/NP grading only.)

31C. Prospects in Animal Science (1) III

The Staff

Lecture—1 hour. OCCASIONAL occurrence. Examination of factors which may influence future relationships between man and other animals, competition for food, space and environment, animal and animal product analysis. (P/NP grading only.)


Bywater

Lecture—1 hour. Discussion—1 hour. Discussion—3 hours. The application of the principles of elementary biology, the art and science of animal husbandry, and animal production. The role of animal science in the farm community. (P/NP grading only.)


Bywater

Lecture—1 hour. Discussion—1 hour. Discussion—3 hours. The application of the principles of elementary biology, the art and science of animal husbandry, and animal production. The role of animal science in the farm community. (P/NP grading only.)

96. Internship in Animal Science (1-12) I, II, III

The Staff (Department Chairperson in charge)

Laboratory—3-18 hours. Prerequisite: consent of instructor. Work-experience opportunity, on and off campus, in dairy, livestock, and aquaculture production, research and management. Participation in the operation of a farm or industry. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III

The Staff (Department Chairperson in charge)

Prerequisite: permission of instructor. Problems in animal biology, nutrition, breeding, and physiology of livestock. (P/NP grading only.)

Upper Division Courses

104. Principles of Domestic Animal Behavior (3) I

Price

Lecture—3 hours. Prerequisite: Biological Sciences 2 or Zoology 2 or the equivalent. To examine the basic principles of animal behavior as applied to domesticated species. Emphasis will be placed on the complex behavioral development and social behavior. Explanations of behavior are presented in terms of both psychological and physiological mechanisms influencing behavior will be discussed.

105. Behavioral Adaptations of Domestic Animals (2) II

Price

Lecture—2 hours. Prerequisite: course 104 or the equivalent. To provide in an in-depth examination of the behavior of domestic animals and the role of behavior in management.

106. Behavioral Adaptations of Domestic Animals Laboratory (2) II

Price

Laboratory—3 hours. Prerequisites: course 1 or 2. Conception of behavior, its expression and role in domesticated species. Methods of data collection and analysis will be discussed.

111. Meets and Meat Animal Evaluation (2)

Carr

Lecture—4 hours. Prerequisite: course 2. Conception of live meat animal conformation and degree of finish with carcass traits, yield of red meat, criteria for grading carcass quality and indicating carcass marketability.

114. Dairy Cattle Production (3) I

Lamb, Kennedy

Lecture—3 hours. Laboratory—3 hours. Prerequisite: Animal Genetics 107. Recommended: Nutrition 110 or 113, 114. Application of the sciences of nutrition, physiology, and genetics to the development of efficient management programs for beef, dairy, and swine production. Selection, feeding, and environmental influences on production, growth and deaths and differences among these species affecting management practices. Methods of improving carcass and meat quality.

117. Physiological Aspects of Animal Production in Tropi- cal and Arid Areas (3) I

Moore

Lecture—3 hours. Prerequisite: a course in nutrition. Physiology and animal production of animals from domesticated and wild species in tropical and arid environments, with emphasis upon the effects of the climatic and nutritional environment on basic physiological mechanisms as they relate to the efficiency of animal production.

118A. Range Livestock Production (3)

Carr, Tollren

Lecture—3 hours. Prerequisite: Nutrition 103 or 110; courses 1, 2, 9 and Animal Genetics 106 recommended. Application of scientific knowledge to the improvement and production of sheep and goats. Reproduction including artificial insemination; breeding plans; management; supplementary feeding; marketing.

118B. Intensive Livestock Production (3) I

Heitman

Lecture—3 hours. Prerequisite: Nutrition 103 or 110; courses 1, 2, 9, 118A. Genetics 106 recommended. Principles involved in feeding, dairy, and swine operations. Growing and fattening; lactation; feeding practices; methods of evaluating body composition of meat animals; housing and equipment; waste disposal.

119. Theory and Practice of Aquaculture (15) I

Chang

Lecture—4 hours. Discussion—1 hour. Laboratory—30 hours. Prerequisite: upper division standing in a biological discipline with background in physiology, genetics and biochemistry, introductory aquaculture course (e.g. Zoology 124, 125, 131, 132). Credit available in Animal Science Advising Center. In-depth study at the Bodega Marine Laboratory, integrating trends and history of aquaculture with experimental principles from genetics, nutrition, pathology, physiology and related fields as applied to practical aspects involved with culture of aquatic species with food production potential.

123. Animal Growth (4) I

Garratt, Ashmore, Gall

Lecture—2 hours; special reports and discussions—2 hours. Prerequisite: upper division course in genetics, physiology and nutrition, and equivalent background knowledge. Basic and practical aspects of prenatal, postnatal and adult growth of animals focusing on nutritional, physiological, and genetic effects and interrelationships. An unconventional approach will integrate knowledge from the several disciplines on the major factors regulating and influencing growth.

124. Lactation (4) II

Baldwin, Laten

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physiology 110 and Nutrition 114 or the equivalent background
Graduate Courses  
205. Computer Analysis of Biological Data (3) (L) Kennedy  
Lecture—3 hours. Prerequisites: Agricultural Science and Management 150. The use of matrix algebra, regression and least squares programs to manipulate and analyze balanced and unbalanced biological data. Lectures will be concerned with the analytical procedures used in the programs as well as interpretation of computer output.  

207. Supervised Teaching in Animal Science (2, 3) (L)  
Lecture—3 hours. Seminar—1 hour. Reports and discussion of topics of interest in genetics, nutrition, and physiology as they apply to animal science. (SU grading only.)  

227. Animal Science Laboratory (4) (L) Ashmore  
Lecture—2 hours. Laboratory—4 hours. Prerequisites: Zoology 100, Wildlife and Fisheries Biology 120, 121; or consent of instructor. The application of laboratory techniques related to reproduction, breeding efficiency and fertility of animals commonly used in aquaculture.  

131. Reproduction and Early Development in Aquatic Animals (4) (L) Kennedy  
Lecture—3 hours; laboratory—3 hours. Prerequisites: Zoology 100, Wildlife and Fisheries Biology 120, 121; or consent of instructor. Mechanisms of reproduction, development, and growth of invertebrates and vertebrates. (SU grading only.)  

140. Management of Laboratory Animals (3) (L) Moberg  
Lecture—2 hours; laboratory—3 hours. Prerequisite: Genetics 120 or Animal Genetics 106. Nutrition 103 or 110. Physiology 110, 115, 116. Concepts of basic nutrition, physiology, and genetics to maintenance of experimental animals. Management procedures will be examined in view of experimental needs, government regulations, and animal health.  

141. Management of Nonhuman Primates (3) (L) Moberg  
Lecture—2 hours; laboratory—3 hours. Prerequisite: Physiology 110 and consent of instructor. Examination of current housing practices used to maintain primates in zoos, breeding colonies, and laboratories. The application of concepts of basic sciences to problems in reproduction, behavior, environmental stress, and health will be discussed. (SU grading only.)  

190. Proseminar in Animal Science (1) (L) The Staff  
Seminar—1 hour. Prerequisite: senior standing in Animal Science or consent of instructor. Reports and discussion of recent literature in Animal Science. (SU grading only.)  

192. Internship in Animal Science (1-12) (I, II, III) The Staff  
(Department Chairperson in charge) Laboratory—5-36 hours. Prerequisites: completion of 84 units and consent of instructor. Work experience in off-campus laboratories. Internship experience is available in nutrition, reproduction, management or any other area related to animal science. (SU grading only.)  

197. Tutorial in Animal Science (1-2) (I, II, III) The Staff  
(Baldwin in charge) Prerequisite: Animal Science or related major; advanced standing, consent of instructor. Tutoring of students in lower division animal science courses; weekly conferences with instructors in charge of courses; written critiques of teaching procedures. May be repeated once for credit. (P/NP grading only.)  

198. Directed Group Study (1-6) (I, II, III) The Staff (Baldwin in charge)  
Prerequisite: consent of instructor. Selected topics related to the animal sciences. (P/NP grading only.)  

199. Special Study for Advanced Undergraduates (1-5) (I, II, III) The Staff (Baldwin in charge)  
Prerequisite: consent of instructor. Problems in animal biology related to nutrition, breeding and physiology of large domestic livestock. (P/NP grading only.)  

NOTE: For key to footnote symbols, see page 130.
Teaching Credential Subject Representative
— See page 105 for the Teacher Education Program.

Graduate Study. The department offers a program of study leading to the M.A., M.S., and Ph.D. degrees in Anthropology. Further information regarding graduate study may be obtained at the department office and at the Graduate Division.

Graduate Advisers. C.F. Wall.

Related Courses. See Native American Studies 20.

Courses in Anthropology

Lower Division Courses

1. Physical Anthropology (4) I, McKhann; II, Rodman; III, Smith

Lecture—3 hours; discussion—1 hour. Introduction to human evolution. The processes and course of human evolution; man's place in nature and the study of primates, the biological variability of living man and the genetic back- ground.

2. Cultural Anthropology (4) I, Davis; II, Davis; III, Curley

Lecture—3 hours; discussion—1 hour. Diversity of cultures considered from the aspects of language, economics, kinship, art, magic, and religion; culture change.

3. Introduction to Archaeology (4) I, True

Lecture—3 hours; discussion—1 hour. Development of archaeology as an anthropological study; objectives and methods.

4. Introduction to Linguistic Anthropology (4) II, Wall

Lecture—3 hours; discussion—1 hour. Language in its interrelationships with biology, culture, and society.

5. Proseminar in Biological Anthropology (4) III, Seminars paper. Prerequisite: course 1 and consent of instructor. Course primarily for majors. In- tegration of related disciplines in the study of biological anthropology. Research and discussion projects. Principal emphasis on the evolution of man's adaptations to the environment. (P/NP grading only.)

13. Quantitative Method in Anthropology (4) II, Baumphoff

Lecture—3 hours; discussion—1 hour.

98. Directed Group Study (1-5) I, II, III, The Staff (Chair- person in charge)

Primarily intended for division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III, The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Principles of Human Ecology (4) II, Davis

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1 or 102 and Sociology 1 or Anthropology 2 recommended. An examination of the critical variables in the processes that relate man to his environment. Emphasis on the biological, cultural, social, and psychological forces which encourage stability or change in human ecological relationships. (Same course as Environmental Studies 101.)

102. Theory in Social and Cultural Anthropology (4) I, Boyd

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. An introduction to varieties of explanation in anthropology; discussion of controversy surround- ing questions of cultural relativism, areas of choice, and selection of facts in the construction of anthropological theory.

103A. Archaeological Theory and Method (4) II, True

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3, and 13 Theory and method of prehistoric archaeology.

103C. New World Prehistory: The First Arrivals (4) III, True

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Early man in the New World. Cultural adaptation and development of early hunting and gathering peoples in North and South America.

102D. New World Prehistory: Archaeological Adaptations in New World Prehistory (4) I, II, Baumphoff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. The cultural and social aspects of adaptation; first contact with Europeans; and the survival of Native American populations and cultures in the Americas.

105E. New World Prehistory: Formative Lifeways in North and South America (4) Ill, Baumphoff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. The emergence of agriculture, hunting and gathering subsistence to sedentary farming in the American South- west, Mississippi Valley, and Andean South America.

105F. New World Prehistory: The High Cultures: Meso- americans and Andean South America (4) III, Baumphoff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Urban developments and the rise of civilization in Mexico and Peru.

104. Race and Sex: Race Mixture and Mixed Populations (4) I, Forbes

Lecture—3 hours; discussion—1 hour. A study of the phe- nomena of race mixture (miscegenation), intermarriage, and mixed (hybrid) human populations. Emphasis will be placed upon the social and cultural effects of a mixture and of the interaction of racism and sexual behavior.

105A. Indians of North America (4) III, Forbes

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Exploring the development of cultural phenomena among the Indians of North America: origins, languages, civilizations, and history.

105B. Indians of South America (4) III, Forbes

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. The development of cultural phenomena among the Indians of South America: origins, languages, civilizations, and history.

106. Native Peoples of California and the Great Basin (4) I, Forbes

Lecture—3 hours; discussion—1 hour. An introduction to the traditional and recent cultures of the American Indian peoples of the California-Great Basin area. Considerable emphasis will be placed upon the changes in those cultures taking place during the past 400 years.

107A. Old World Prehistory (4) II, I Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. The beginning of development of cultural phenomena during the Pleistocene epoch. A critical and comprehensive survey of known cultural phenomena beginning some 2 million years ago and extending through the termination of the last glacial period. Will include material from Africa, Asia, and Europe.

107B. Old World Prehistory (4) II, Baumphoff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. The development of civilization. Bronze and iron age cultures in Africa, Asia, and Europe. A survey of the archaeological evidence underlying currently accepted models relating to urban developments and the growth of civilization.

108. Native Americans in Contemporary Society (4) I, Forbes

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. An introduction to the sociocultural development of American Indian populations in modern times with emphasis upon North America. Attention will be given to contemporary Indian affairs and problems as well as to the background for present conditions.

108. Phonetics (4) I, Wall

Lecture—3 hours; discussion—1 hour. Thorough ground- ing in articulatory phonetics with some attention to the fundamentals of acoustic phonetics. (Same course as Linguistics 108.)

110. Elementary Linguistic Analysis (4) I, Smidt

Lecture—3 hours; discussion—1 hour. Prerequisite: course 108. An introduction to linguistic theory, morpho- phonemics, morphemics, and tactics. (Same course as Linguistics 110.)

110. Intermediate Linguistic Analysis (4) I, Smidt

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Continuation of work in phonemics, morphomorphemics, morphemics, and tactics. (Same course as Linguistics 110.)

112. Comparative Linguistics (4) I, Smidt

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Linguistic prehistory, historical linguistics, and recon- struction. (Same course as Linguistics 112.)

114. The Ethnography of Speaking (4) I, Wall

Lecture—3 hours; discussion—1 hour. Prerequisite: course 112. Guidelines for the proper conduct of ethnographic research, standards for documenting ethnographic literature.

118. Ethnoecosystems (4) I, Wall

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or the equivalent. An examination of the uses of linguistic, cognitive, psychological, and mathematical analyses in the study of meaning of folk classification systems. Emphasis will be placed upon the development of skills in the collec- tion and analysis of data.

119A. Psychological Anthropology (4) I, Joseph

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. The individual in primitive societies. Methods and procedures for exploring the role of the individual and the individual. Explorations of evolutionary and adap- tational approaches to problems posed in the study of the individual in past and primitive societies.

119B. Psychological Anthropology (4) II, Joseph

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. The individual in complex societies. Methods and theories in the study of culture, society and the individual. Explorations of evolutionary and adap- tational approaches to problems posed in the study of the individual in past and primitive societies.

120. Language and Culture (4) III, Wall

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 4. The process of language and the development of systems of classification; linguistic aspects of culture and society.

121. Folklore (4) III, Crowley

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or literary preparation acceptable to instructor. Theory and method in the study of folktales, myths, legends, proverbs, riddles, songs, and other forms of verbal tradition.

122. Economic Anthropology (4) I, Davis

Lecture—3 hours; discussion—1 hour. Prerequisite: con- sent of instructor. Economic behavior in nonindustrial societies, its social and cultural setting and its modern changes.

123. Political Anthropology (4) II, I Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Individuals in political systems and organizational, and decision-making approaches to primiti- ve, tribal, and peasant political organization. Some atten- tion will be given to political modernization within the setting of the colonial situation.

124. Religion in Society and Culture (4) I, Curley

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of religions of non-literate societies. Survey of shamanism, magic and witchcraft, rituals and symbols, and religious movements. Extensive discussion of ethnographic exam- ples and analyses of social functions of religious Institutions.

125. Comparative Educational Anthropology (4) III, Flack

Lecture—3 hours; discussion—1 hour. A comparative analysis of educational systems in terms of their back- ground and communication of basic cultural values. Examina- tion of content, mode of instruction, and social relationships with educational organizations in several different cultures.

126. Anthropology of Development (4) III, Boyd

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of theories of social and economic change. Sociocultural changes created by technological innovation. Application of anthropological theory to case studies of rural economy and society.

127. Urban Anthropology (4) II, Joseph

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of approaches to urban living; political structures, organization of labor, class rela- tions, and world views. The sociocultural problems of a changing urban society.
128. Kinship and Social Organization (4) III. Davis Lecture—3 hours; discussion—1 hour. Prerequisite course 2. The role of kinship in the social fabric of social organization with primary emphasis on typology and classification of family and kinship systems.

130. Sex Roles: An Anthropological Perspective (4) II. Joste Lecture—3 hours; discussion—1 hour. Prerequisite course 2. The role of sex in the social fabric of social organization with primary emphasis on typology and classification of family and kinship systems.

135. Peoples and Cultures of Southeast Asia (4) III. Davis Lecture—3 hours; discussion—1 hour. Prerequisite course 2 or consent of instructor. Survey of different cultures of Southeast Asia, with emphasis on cultural diversity and social organization with primary emphasis on typology and classification of family and kinship systems.

143. Contemporary Societies of South America (4) III. Overle Lecture—2 hours; discussion—1 hour. Prerequisite course 2. An introduction to the history and contemporary structure of South American society, social, economic, and political patterns found in the region, and patterns of national integration and conflict.

146. Ethnology of Europe (4) III. McHenry Lecture—2 hours; discussion—1 hour. Prerequisite course 2. An introduction to the history and contemporary structure of European society, social, economic, and political patterns found in the region, and patterns of national integration and conflict.

147B. Peoples of the Pacific (4) II. Boyd Lecture—3 hours; discussion—1 hour. Prerequisite course 2 or consent of instructor. The effects of European colonization on the Pacific, with emphasis on the development of culture and social organization.

148. Peoples of the Middle East (4) II. Joseph Lecture—3 hours; discussion—1 hour. Prerequisite course 2 or consent of instructor. Survey of the Arab peoples of the eastern Mediterranean, with emphasis on their social and cultural organization.

148B. Peoples of the Middle East (4) II. Joseph Lecture—3 hours; discussion—1 hour. Prerequisite course 2 or consent of instructor. Survey of the Arab peoples of North Africa. Topics include class relations, kinship organization, sex roles, religious behavior, ethnic identity, systems of political, intricate kinship organization, and social change.

150. Primatology Laboratory (3) III. Lecture—1 hour; laboratory—5 hours. Prerequisite course 2. An introduction to the study of non-human primates.

151. Human Evolution and Fossil Man (4) II. McHenry Lecture—3 hours; discussion—1 hour. Prerequisite course 2. An introduction to the study of human evolution and fossil man, with emphasis on the fossil record and the evolution of human ancestors.

154. Primate Behavior and Ecology (4) I. Rodman Lecture—3 hours; discussion—1 hour. Prerequisite course 1. An introduction to the study of primate behavior and ecology, with emphasis on the evolution of social behavior.


156. Human Osteology (4) III. McHenry Lecture—2 hours; laboratory—4 hours. Prerequisite course 2. An introduction to the study of human osteology, with emphasis on the evolution of human behavior.

157. Anthropological Genetics (4) III. Smith Lecture—3 hours; discussion—1 hour. Prerequisite course 153B. An introduction to the study of human genetics and population genetics, with emphasis on the evolution of human behavior.

160. Peasant Society and Culture (4) II. Overle Lecture—3 hours; discussion—1 hour. Prerequisite course 2. An introduction to the study of peasant societies and cultures.

163. Anthropology of Complex Societies (4) II. Overle Lecture—3 hours; discussion—1 hour. Prerequisite course 2. An introduction to the study of complex societies and cultures.

165. Field Course in Archaeological Method (3) III. True Laboratory—8 hours. Prerequisite course 3. An introduction to the methods of archaeological fieldwork.

197. Tutoring in Anthropology (1-5) I, II. The Staff (True in charge) Tutoring—5 hours. Prerequisite: credit with consent of instructor. Limited enrollment.

198. Directed Group Study (1-5) I, II, III. The Staff (True in charge) Directed study—3 hours. Prerequisite: consent of instructor. Group discussions of selected anthropological topics.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (True in charge) Special study—3 hours. Prerequisite: consent of instructor. Directed study of selected anthropological topics.

Graduate Courses


202. History and Theory of Physical Anthropology (4) II. The Staff (True in charge) Seminar—3 hours. An introduction to the history and theory of physical anthropology.

204. Contemporary Issues in Anthropological Theory (4) II. The Staff (True in charge) Seminar—3 hours. A survey of current issues in anthropology.


210. Aesthetics of Culture Structure (4) II. Joseph Seminar—3 hours; term paper. Prerequisite: graduate standing. An introduction to the structure of cultural systems.

211. Advanced Topics in Ecological Urbanism (4) II. Overle Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing. An introduction to urban ecological systems.

212. Special Study for Honors Students (1-5) I, II, III. The Staff (True in charge) Special study—3 hours. Prerequisite: credit with consent of instructor. Limited enrollment.


218. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (True in charge) Special study—3 hours. Prerequisite: consent of instructor. Directed study of selected anthropological topics.

219. Anthropology (4) I. The Staff (True in charge) An introduction to the methods of anthropology.

221. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (True in charge) Special study—3 hours. Prerequisite: consent of instructor. Directed study of selected anthropological topics.

224. Special Study for Honors Students (1-5) I, II, III. The Staff (True in charge) Special study—3 hours. Prerequisite: credit with consent of instructor. Limited enrollment.

225. Field Course in Archaeological Method (3) III. True Laboratory—8 hours. Prerequisite course 3. An introduction to the methods of archaeological fieldwork.


227. History and Theory of Physical Anthropology (4) II. The Staff (True in charge) Seminar—3 hours. An introduction to the history and theory of physical anthropology.

228. Contemporary Issues in Anthropological Theory (4) II. The Staff (True in charge) Seminar—3 hours. A survey of current issues in anthropology.

230. The Aesthetics of Culture Structure (4) II. Joseph Seminar—3 hours; term paper. Prerequisite: graduate standing. An introduction to the structure of cultural systems.

231. Advanced Topics in Ecological Urbanism (4) II. Overle Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing. An introduction to urban ecological systems.

232. Special Study for Honors Students (1-5) I, II, III. The Staff (True in charge) Special study—3 hours. Prerequisite: credit with consent of instructor. Limited enrollment.

234. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (True in charge) Special study—3 hours. Prerequisite: consent of instructor. Directed study of selected anthropological topics.
Applied Behavioral Sciences

220. Field Course in Linguistics (4) III. Omsted Seminar—2 hours; laboratory—2 hours. Prerequisite: courses 110, 111. Techniques of eliciting, recording, and analyzing: work with a native speaker.

221. Rural Transformation in Postcolonial Societies (4) II. Seminar—3 hours. Prerequisite: courses 223, 285, or consent of instructor. Problems of rural transformation arising out of political and economic interaction between national elites and rural and local populations under varying conditions of induced change in postcolonial societies. Attention will be given to the implications of this interaction for rapid economic growth. May be repeated for credit.

222. Problems in Urban Anthropology (4) I. Joseph Seminar—3 hours. Prerequisite: graduate status or consent of instructor. Study of selected critical problems in urban anthropology. Each quarter focuses on some of the following topics: race, ethnicity, religion, politics, kinship, community, sex-roles, communication, ideology, consciousness in urban context. May be repeated for credit.

223. Economic Anthropology (4) III. Davis Seminar—3 hours. Prerequisite: course 122 or consent of instructor. Selected current methodological and theoretical problems in the analysis of nonindustrial economic systems.

224. Problems in Comparative Religion (4) II. Curley Seminar—3 hours. Advanced study of critical problems in the anthropological study of religion.


246. Ethnology of Northern and Central Asia (4) II. Omsted Seminar—2 hours. An intensive course in the ethnology of a reading knowledge of the major languages and cultures of the area. Taught in English.

252. Human Evolution Seminar (4) III. McHenry Seminar—3 hours. Prerequisite: course 152 or the equivalent. Consent of instructor. Study of selected topics in the field of human evolution, and the primary and secondary sources dealing with the ethnography and ethnology of the peoples of Europe. Emphasis upon folk, peasant, and minority groups.


254. Primate Behavior (4) III. Rodman Seminar—3 hours. Prerequisite: course 154B or the equivalent. Analysis of primate behavior, with particular emphasis on preparation for field studies.

255. Concepts and Problems in Applied Anthropology (4) II. Seminar—3 hours. Prerequisite: consent of instructor. Advanced topics in applied culture change; problems of planning and evaluation; uses of anthropological theory and data in professional fields such as agriculture, public health, administration, and international technical assistance.

280. Ethnographic Theory and Method (4) II. Forbes Seminar—3 hours. A discussion of the anthropological method as a form of disciplined observation. Emphasis is placed on both the social structure and the relationships between the interests and activities of the anthropologist and the society under study.

292. Seminar in Anthropological Linguistics (4) II. Wait Seminar—3 hours.

296. Group Study (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

290. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Applied Behavioral Sciences

(College of Agricultural and Environmental Sciences)

Marc Pilisuk, Ph.D., Chairperson of the Department
Department Office, 106 AOB-4 (752-0770)

Faculty

J. Howard Adams, Ph.D., Associate Professor
Edwin B. Almg, Ph.D., Assistant Professor
Louise M. Bachtold, Ed.D., Professor
Keith Barton, Ph.D., Associate Professor
Richard Barteaux, M.S.S., Associate Professor
Edward J. Blakely, Ed.D., Professor
Brenda K. Bryant, Ph.D., Associate Professor
Gin Burch, Ed.D., Lecturer Emeritus
Frances Butler, M.A., Professor
Laura J. Christiansen, M.A., Lecturer
Susan Crockenberg, Ph.D., Associate Professor
Noreen G. Dowling, Ph.D., Lecturer
Jack D. Forbes, Ph.D., Professor (Applied Behavioral Sciences, Anthropology)
Isao Fujimoto, M.A., Lecturer
Barbara G. Goldman, Ph.D., Lecturer and Supervisor of Teacher Education
Dolph E. Godt, Ph.D., Associate Professor
James Greshop, Ph.D., Lecturer
Lawrence V. Harper, Ph.D., Professor
Glenn R. Hawkes, Ph.D., Professor
Sarah A. Hutchison, M.Ed., Lecturer
J. Leonard Joy, Ph.D., Visiting Professor
Elwood M. Juergenson, Ph.D., Professor Emeritus
George Kowada, Ph.D., Associate Professor
Rosemanie Kraft, Ph.D., Assistant Professor
Gongyi Lai, M.A., Acting Associate Professor
James G. Leising, Ph.D., Lecturer and Supervisor of Teacher Education
Peter C.Y. Leung, M.S., Lecturer
George C. Longfhill, M.F.A., Associate Professor
David B. Lynn, Ph.D., Professor
E. Dean MacCannell, Ph.D., Associate Professor
Helge B. Olsen, Senior Lecturer
Marc Pilisuk, Ph.D., Professor
Mary C. Ragan, Ph.D., Associate Professor
David Risinger, M.A., Lecturer
Katherine W. Rossbach, M.A., Professor Emeritus
JoAnn A. Stabb, M.A., Lecturer
Orville E. Thompson, Ph.D., Professor
Jane N. Weikar, M.A., Lecturer
Miriam J. Wells, Ph.D., Assistant Professor
Euny E. Werner, Ph.D., Professor

The Major Program

Applied Behavioral Sciences focuses on human and community development and prepares you for creative work in helping others improve their social and physical environments. The study of human social behavior is a study of both what people do together with study of the processes and strategies of social change. Knowledge of the behavioral and environmental sciences is integrated with development of the skills necessary to using this knowledge in solving social problems. The curriculum is intended primarily if your career goals are oriented toward public, community, and institutional involvement. Examples of employment opportunities in a wide variety of settings include community development, community education, institutional development, and inter-group relations. The breadth subject matter is designed to provide foundation of knowledge in the natural and social sciences and the humanities and to develop skills of inquiry and creative endeavor. You and your advisor select course sequences in Applied Behavioral Sciences and other areas that are most appropriate to your educational and career goals. The Applied Behavioral Sciences Major is a student-designed program.

Applied Behavioral Sciences

B.S. Major Requirements:

Total Units for the Major

180

Breadth Subject Matter

A list of suggested courses in each of the study areas, (a) through (e), may be obtained from the Advising Office, 119 AOB-4.

Other Requirements

Admission: devision in consultation with an advisor, a statement of academic and career objectives and a plan for attaining stated goals.

Graduation: minimum of 12 units in each of the following areas:

(a) Inquiry: intellectual skills of inquiry and critical analysis.
(b) Environmental studies: understanding the dynamics of interaction of people and their environment.
(c) Personal and social behavior: understanding the dynamics of human relationships extending from the individual to the international level.
(d) Creative expressions: exploration and development of the student's own creative powers, intellectual and aesthetic,
(e) Basic communication: skill in oral and written communication.

Restricted Electives

40

Courses in Applied Behavioral Sciences

Lower Division Courses

17. Population Problems: Issues in Human Ecology (2) \ Fuji moto, II. Howard (Wildlife and Fisheries Biology)

Lecture—2 hours. An interdisciplinary orientation to the critical issues of human ecology and the numerous crises that bear upon the world community. Special emphasis is placed on the interrelationships of the natural ecosystem, population growth, and control, availability of resources, social development, and economic stability. (PRN grading only)

18. Scientific Myth and Social Bias (3) III. Dowling

Lecture—2 hours: discussion—1 hour. Assumptions and biases in different fields of knowledge, taboo topics, and the nature of evidence in the public and academic communities, fit between University education and issues of society.

19. The Community (3) I. MacCannell

Lecture—2 hours: discussion—1 hour. Exploration of ways in which people come together, and how this is reflected in the expression of community, examination of the dynamics of community change.

47. Orientation to Community Resources (2) II, III. The Staff (Place in charge)

Field trip—3 days; seminar—three 2-hour sessions. (Course given between quarters). Prerequisite: consent of instructor. Field trip to educational, social, and welfare
agencies in California. Observation and discussion with staff members of different agencies which serve the needs of families and children. Advance reservations required. (P(NP grading only.)

92. Internship (1-72) I, II, III. The Staff (Pilish in charge) Field placement—3-36 hours. Prerequisite consent of instructor: Supervised internship, off and on campus. In community and institutional settings. (P(NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Pilish in charge) (P(NP grading only.)

Upper Division Courses

151. Community Research and Analysis (4) I, II. Fujimoto Lecture—4 hours. Prerequisite: course 151 recommended. Introduction to principles and strategies of building institutions so communities can help effect change. Examination of styles of citizen participation and control and the various roles of change agents in working with communities for their own development.

152. Community Development (4) II. Fujimoto Lecture—4 hours. Prerequisite: course 151 recommended. Theories on the emergence and structure of contemporary communities. Ethnographic, power structure and comparative approaches to community studies. Ways to incorporate research into programs for community change and development.

153. Community Organizations, Institutions and Resources (6) II. The Staff (Pilish in charge) Lecture—4 hours. Prerequisite: course 151 or 152. Analysis of resources of organizations, institutions, agencies, and groups in the community, and how effects the development process.

154. Theories in Community Change (4) II. MacCarnell Lecture—6 hours. Prerequisite: course 151, plus one other course in Applied Behavioral Sciences. Consideration of the concept and theories of the social change process pertinent to community development.

155. Communication Skills for Community Development (4) III. Pilish Lecture—4 hours. Prerequisite: course 151 or 152. Communication skills and techniques in community development programs, to include group process and human relations methods useful in community development.

158A. Field Experience in Community Development (12) III. Fujimoto Prerequisite: course 153 or consent of instructor. Field assignment-internship with community and grassroots groups, analysis of resources and alternatives for resolution of community development needs.

158B. Field Problems (3) III. Fujimoto Seminar—3 hours. Prerequisite: course 158A and consent of instructor. Independent study, implementing and evaluating field research and problems.

160A. Institutional Research Methods in Applied Behavioral Sciences (4) II. MacCarnell Lecture—4 hours. Prerequisite: upper division status; courses 162 and 163 highly recommended. Application of behavioral science research methodology to multidisciplinary problems of living organizations. Students taking this course may not receive credit for Native American Studies 140.

166B. Research Design and Analysis of Institutions (4) II. Regan Lecture 4 hours discussion—1 hour. Prerequisite: course 150A and either Education 114, Statistics 13, or consent of instructor. Applied behavioral science research design and analysis for organization. Methods of data analysis, tests of significance, and use of computer in data processing.

162. People, Work and Technology (4) I. Wells Lecture—3 hours discussion—1 hour. Use of human resources in all types of work. Emphasis is on the motivation to work, structure of organizations; and the impact of technology on human beings in work situations. The transition from college to the work force is considered.

163. Behavior of Community Organizations (4) II. Regan Lecture—4 hours. Prerequisite: course 162 or consent of instructor. How community organizations function and how members of organizations interact to each other, the organization, and the people who are clients of the organization. Effects of leadership, motivation, group dynamics, communications, and power are considered.

164. Theories in Institutional Change (4) II. Regan Lecture—4 hours discussion—2 hours. Prerequisite: course 162. The institution as an open system which changes in response to the internal and external environ-
ment. Emphasis on structural, technological and humanistic approaches to change and development.

171. Housing (4) III. Wells Lecture—4 hours. Exploration of the shelter aspects of family environment. Study of technological, social, economic, and aesthetic factors affecting the nature and organization of family and community housing.

172. Social Inequality: Issues and Innovations (4) I. Wells Lecture—4 hours. Prerequisite: upper division standing. Units of sociology or anthropology or combination. Study of the phenomenon of inequality in the U.S. Various approaches to inequality will be examined, including structural and historical explanations, prejudice and discrimination, the "culture of poverty," and arguments concerning race, sex, and religion.

173. The Continuing Learner (4) III. Dowling Lecture—4 hours. Prerequisite: upper division standing. Theories of adult learning and teaching emphasizing the role of adult education in the community. Designing of adult education programs.


175. Education in the Community (4) I. Greeshop Lecture—4 hours. Prerequisite: upper division standing. Philosophical consideration of the function of education in the community. Relationships of community and non-formal education to formal education, and schooling to individual, community and national development. Study of planning process and role of education in institutional and social settings.

176. Comparative Ethnicity (4) III. Wells Lecture—4 hours. Prerequisite: upper division standing. 8 units of sociology or anthropology or combination. Exploration of the role of ethnicity in shaping social systems and interaction. Examination of analytical approaches to issues arising from the study of ethnicity, through utilization of data from a range of different societies.

177. Social Aspects of Aging (4) III. Burch, Hawkes Lecture-discussion—4 hours. Prerequisite: Human Development 100C or Psychology 115 recommended. Major characteristics, needs and interests of older people in contemporary America. Emphasis on social problems and community approaches to their solution.

190. Proseminar in Applied Behavioral Sciences (1) I, II, III. Regan Seminar—1 hour. Prerequisite: consent of instructor. Discussion of selected critical issues in the applied behavioral sciences. Required of seniors in the Applied Behavioral Sciences major. May be repeated for credit. (P(NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Pilish in charge) Field placement: 5-36 hours. Prerequisite: completion of 64 units and consent of instructor. Supervising internship, off and on campus. In community and institutional settings. (P(NP grading only.)

196. Senior Project in Applied Behavioral Sciences (1-5), II, III. The Staff (Pilish in charge) Prerequisite: major in Applied Behavioral Sciences and consent of instructor. Guided research leading to completion of senior thesis. May be repeated for credit. (P(NP grading only.)

197T. Tutoring in Applied Behavioral Sciences (I-T5), I, II, III. The Staff (Pilish in charge) Prerequisite: consent of instructor. Leading of small voluntary discussion groups. (P(NP grading only.)

197CT Community Tutoring in Applied Behavioral Sciences (1-5), I, II, III. The Staff (Pilish in charge) Prerequisite: consent of instructor. Supervised tutoring in the community. (P(NP grading only.)

198T. Directed Group Study Study (1-5) I, II, III. The Staff (Pilish in charge) (P(NP grading only.)

199. Special Study for Advanced Undergraduates (1-5), I, II, III. The Staff (Pilish in charge) (P(NP grading only.)

Graduate Courses

201. Planning Processes in Applied Behavioral Sciences (4) I, Thompson Lecture—3 hours supervised practice in planning—3 hours Prerequisite: course 162. Systematic approach to planning, including new concepts, theories, and methods for planning with application to educational institutions, agencies and the community at large.

202. Systems Approach for Organizational Change (4) II. Regan Lecture—3 hours supervised practice in an institution studying the process of change—3 hours. Prerequisite: course 201. Study of institutional processes, resource allocations, communication networks, program priorities and destructive mechanisms needed for change.

203. Evaluation and Decision Making (3) III. Goldman Lecture—3 hours. Supervised practice in evaluation and decision making—3 hours. Prerequisite: course 202. The study of decision-making behavior, theoretical formulations of evaluation and decision making, value conflicts, multiple information requirements at different organizational levels, research techniques and the role of evaluation in programs.

240. Community Development: Research and Analysis (4) I. MacCarnell Seminar—4 hours. Prerequisite: course 16A or Sociology 46A or the equivalent and a course in statistics. Methods of analyzing institutional, community, and regional social structure, as preparation for planned research. Research design and the management of large-scale data files.

241. Community Development: Intervention Strategies (4) II. Rochlin (Agricultural Economics) Seminar—4 hours. Prerequisite: course 240 and Agricultural Economics 100A. Economic theory and intervention strategies affecting nonmetropolitan communities. Human resources, community services and infrastructure, industrialization and technological change, policies and plans for mobilizing resources for community development.

242. Community Development: Program Management (4) III. The Staff (Pilish in charge) Seminar—4 hours. Prerequisite: course 241. Planning, organizing, financing and administration of social change projects or programs at the community or city level.

250. Seminar (1-6) I, II, III. Thompson Seminar—1 hour. Analysis of research in applied behavioral sciences. (SU grading only.)

258. Group Study (1-5) I, II, III. The Staff (Pilish in charge) (P(NP grading only.)

299. Research (1-6) I, II, III. The Staff (Pilish in charge) (P(NP grading only.)

Aquaculture

See Animal Science

Art

(College of Letters and Science)

Richard D. Cramer, M.F.A., Chairperson of the Department

Department Office, 125 Art Building (752-0105)

Faculty

L. Price Amerson, Jr., Ph.D., Lecturer
Robert C. Arneson, M.F.A., Professor
Joseph A. Baird, Ph.D., Senior Lecturer
Richard D. Cramer, M.F.A., Professor
Daniel J. Crowley, Ph.D., Professor (Art/ Anthropology)
Roy R. DeForest, M.A., Professor
Mary H. Peng, Ph.D., Assistant Professor
Robert J. Grigg, Ph.D., Assistant Professor
William Henderson, M.F.A., Associate Professor
Harvey Himmelbarf, M.A., Associate Professor
Seymour Howard, Ph.D., Professor
Ralph M. Johnson, M.S., Professor
Manuel J. Neri, Professor
Roland C. Petersen, M.A., Professor
Jeffrey Ruda, Ph.D., Assistant Professor
Cornelia Schutz, M.F.A., Associate Professor
Daniel Shapiro, Professor
Wayne Thiebaud, M.A., Professor
Gamer H. Tullis, M.A., Assistant Professor

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The Major Programs

The Department of Art offers undergraduate majors in Art Studio and in the History of Art, each leading to the Bachelor of Arts degree. Both programs provide general education and preparation for further training. Some degree candidates work toward a teaching credential — some enter graduate programs here or elsewhere.

In general, members of the Studio faculty are active in research as painters, sculptors, ceramists, printmakers, photographers, and filmmakers; members of the History faculty are actively engaged in historical scholarship. Each of these activities is precisely absorbed with subject matters taught in the classroom, both undergraduate and graduate. Limited undergraduate offerings in museum methods and conservation are given; more extensive graduate work in these fields is anticipated.

Portfolios. Entering freshmen who have studied art in high school should apply for advanced standing by submitting examples of their work for faculty review. Lower division students at Davis and transfer students will be required to keep a continuing portfolio of their work which is subject to faculty perusal at such times as when the student is declaring the major, enrolling in overflow courses, requesting independent study courses, etc.

Transfer Students. Before enrolling in Art courses at Davis, ask your faculty advisor to evaluate transfer courses in art.

Art History

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art 1A, 1B, 1C, 1D</td>
<td>16</td>
</tr>
<tr>
<td>One course in drawing, graphics or painting</td>
<td></td>
</tr>
<tr>
<td>One course in sculpture or ceramics</td>
<td></td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>36</td>
</tr>
<tr>
<td>Four courses from Group C; History of Art; select 2 courses each from two separate periods (e.g., 154A, 154B and 178B, 178C)</td>
<td></td>
</tr>
<tr>
<td>Five additional courses from Group C; History of Art; or D, Special Study Courses</td>
<td></td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>60</td>
</tr>
</tbody>
</table>

Recommended

See recommended courses following the Art Studio major requirements below.

Art Studio

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three courses from Art 2, 3, 4, 5, 16; see prerequisites required for upper division courses</td>
<td></td>
</tr>
<tr>
<td>Two courses (a) Art 1A, 1B, 1C, 1D</td>
<td>8</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>36</td>
</tr>
<tr>
<td>Six courses, under three different artists, from Group A, Practice of Art, or D, Special Study Courses</td>
<td></td>
</tr>
<tr>
<td>One course from Group B, Theory and Criticism</td>
<td></td>
</tr>
<tr>
<td>Two courses from Group C, History of Art</td>
<td></td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>56</td>
</tr>
</tbody>
</table>

Recommended

Both Art History and Art Studio Majors

(a) Students interested in drawing and painting should take Art 2, 3, 4 (course 4 is recommended); and
(b) students interested in sculpture should take Art 2, 3, 5 (course 4 is recommended); and
(c) students preparing for graduate work in any of the environmental design professions should take Art 2, 5, 16; 121A, 121B, 121C, 149, 188, 184.

Major Advisers. See the Class Schedule and Room Directory.

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Art History</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper division courses from Group C; History of Art (one lower division substitute course permissible)</td>
<td></td>
</tr>
<tr>
<td>One course must be chosen from each of four of the five following subject areas: (a) ancient; (b) medieval; (c) renaissance and baroque; (d) modern; (e) oriental art.</td>
<td></td>
</tr>
<tr>
<td>Art Studio</td>
<td>20</td>
</tr>
<tr>
<td>Upper division units chosen in consultation with a faculty adviser (one lower division substitute course permissible)</td>
<td></td>
</tr>
<tr>
<td>Required courses must be taken prior to enrollment in upper division courses. Independent study courses are not applicable.</td>
<td></td>
</tr>
</tbody>
</table>

Teaching Credential Subject Representative, Department Chairperson. See page 105 for the Teacher Education Program.

Graduate Study. The Department of Art offers programs of study and research leading to the M.F.A. degree in the practice of art and the M.A. degree in the history of art. Detailed information regarding graduate study may be obtained from the Announcement of the Graduate Division.

Courses in Art

Lower Division Courses

1A. Ancient Art (4) (I, II) Howard Lecture—3 hours, discussion—1 hour. Art of the pagan Mediterranean world from the prehistoric caves to the fall of the Roman Empire. Emphasis on the development of mythological and religious motifs. mud, 3D sculpture, prints, and frescoes. 18 credits.

1B. Medieval and Renaissance Art (4) (I, II) Grigg Lecture—3 hours, discussion—1 hour. Christian, Barbarian, Moslem, and classical traditions in European Art from the fourth through the sixteenth centuries.

1C. Baroque and Modern Art (4) (I, II) Lecture—3 hours, discussion—1 hour. Major styles and masters of the Western World after the Counter Reformation.

1D. Asian Art (4) (I, II) Fong Lecture—3 hours, discussion—1 hour. An introduction to the arts of Asia through a study of Oriental inlaid paintings and architecture, Buddhist sculpture, Indian temples, Chinese ceramics, Japanese prints, and art in Macau's China.

2. Drawing (4) (I, II, III) The Staff Laboratory—8 hours; to be arranged—4 hours. Form and composition in black and white.

3. Drawing (4) (I, II, III) The Staff Laboratory—8 hours; to be arranged—4 hours. Form and composition in black and white.

4. 3D Drawing (4) (I, II, III) The Staff Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 2. Form in composition using the human figure as subject.

5. Sculpture (4) (I, II, III) The Staff Laboratory—8 hours; to be arranged—4 hours. Form in space using wood and other media.

Introduction to Art: History and Appreciation (4) (I, II, III) The Staff Lecture—3 hours; term paper or gallery studies and review. Understanding and appreciation of painting, sculpture, architecture, and industrial art. Illustrated lectures. Intended for students not specializing in art. (P/NP grading only.)

11. Introduction to Art: Practice (4) (I, II, III) The Staff Lecture—2 hours; laboratory—4 hours. Projects. Individual explorations in various media. Intended for students not specializing in Art. Also open for credit to students who have had Art 2, 5, or 16.

16. Descriptive Drawing (4) (I, II, III) The Staff Laboratory—8 hours; to be arranged—4 hours. Objective drawing and study of objects and spaces.

20. Myths and Symbols in Chinese Art (4) (I, III) Fong Lecture—3 hours; discussion—1 hour. Heritage of China as seen in the artistic expressions of its mythologies and symbols.

101. Painting: Materials and Carriers (4) (I, II, Ill) The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Experimentation in media and their supports.

102. Painting (4) (I, II, III) The Staff Chairperson in charge Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 101 or consent of instructor. Advanced painting in various media including oil and polymers. May be repeated twice for credit.

103. Advanced Drawing (4) (I, II, III) The Staff Chairperson in charge Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 2, 3, 4, 6, or consent of instructor. Advanced drawing, composition and form in black and white and color.

104. Figure Painting (4) (I, II, III) The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 101 or consent of instructor. Advanced figure drawing; painting using the human figure as subject. May be repeated once for credit.

110. Photography (4) (I, II, III) Helmstark Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, or consent of instructor. Photography as an art form. Experiments with the camera and light sensitive materials.

111. Photography (4) (I, II, III) Helmstark Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 110 or consent of instructor. The art of camera and light sensitive materials: tonal control, multiple exposure, synthetic negatives, etc. May be repeated twice for credit.

112. Ceramics (4) (I, II, III) Amerson Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Ceramic forms and processes.

113. Ceramics (4) (I, II, III) Amerson Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 112 or consent of instructor. Ceramic color and glaze, kiln firing. May be repeated twice for credit.

115. Film-Making (4) (I, II) Henderson Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, or consent of instructor. Film-making as an art form: 8 and 16 mm. cameras and sound track.

116. Film-Making (4) (I, II) Henderson Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 115 or consent of instructor. The art of film-making: shooting, editing, and sound. Experience on the 16 mm. camera. May be repeated twice for credit.

121A. Architectural Design (4) (I, II, III) Craver Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 5, 16, or compensating backgrounds in design or engineering. Small buildings as an art form: visualized in cardboard, balsa, or plastic models.

121B. Architectural Design (4) (I, II, III) Craver Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 121A or consent of instructor. Small buildings as expressions of climate, site, structure, function, and culture, visualized in an architect's drawing.

121C. Architectural Design (4) (I, II, III) Craver Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 121B or consent of instructor. Buildings as interpretations of the influences of cultural, social, and aesthetic phenomena: drawings and models. May be repeated once for credit.

125. Printmaking: Relief (4) (I, II, III) Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Woodcut, linocut, metal-plate relief and experimental uses of other materials. May be repeated twice for credit.

126. Printmaking: Intaglio (4) (I, II, III) Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Metal plate
Asian American Studies: Atmospheric Science

254. Seminar in Ancient Art: Greece (4) II. Howard Seminar—3 hours. Selected areas of special study in Greek art from Hellenistic to later Hellenistic.

255. Seminar in Ancient Art: Rome (4) II. Howard Seminar—3 hours. Selected areas of special study in Roman art from Republican to late Imperial.

263. Seminar in Chinese Art (4) I. Fong Seminar—3 hours. paper. Selected areas of special study in Chinese Art.

276. Seminar in Medieval Art (4) II. Grigg Seminar—3 hours. Selected areas of special study in medieval art from Early Christian to late Gothic.

277. Seminar in Northern Renaissance Art (4) III. Grigg Seminar—3 hours. Selected areas of special study in Netherlandish and German art of the fifteenth and sixteenth centuries.

278. Seminar in Italian Renaissance Art (4) III. Seminar—3 hours. Selected areas of special study in Italian art from Inscricion to cinquecento.

279. Seminar in Baroque Art (4) III. Baird Seminar—3 hours. Selected areas of special study in Baroque art from late sixteenth to late eighteenth centuries.

283. Seminar in Modern European Art (4) III. Seminar—3 hours. Selected areas of special study in art since 1800 in Europe.

288. Seminar in American Art (4) III. Baird Seminar—3 hours. Selected areas of special study in art in the United States from colonial times to the present.

290. Seminar (4) I, II, III. The Staff (Graduate Adviser in charge) Seminar—3 hours. Original works produced for group discussion and criticism; associated topics of a contemporary and historical nature. May be repeated for credit.

291. Seminar: Critical Evaluation (1, 1) I, II, III. The Staff (Graduate Adviser in charge) Seminar—1 hour. May be repeated for credit. (SU grading only.)

292. Seminar: Comprehensive Qualifying (1, 1) I, II, III. The Staff (Graduate Adviser in charge) Seminar—1 hour. A further critical evaluation of the student's work to determine his eligibility to begin the Comprehensive Project. May be repeated for credit. (SU grading only.)

299. Individual Study (1-6) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

300. Comprehensive Project (9) I, II, III. The Staff (Graduate Adviser in charge) An original body of work accompanied by a catalog summarizing the student's aesthetic position. May be repeated for credit. (SU grading only.)

Professional Courses


403. Museum Training: Historic Materials and Techniques (4) II. The Staff Seminar—3 hours. Examination of works of art with emphasis on materials and methods of construction, wall paintings, panel paintings, paining on cloth, drawins, ceramics, metals, etc. Experimentation in constructing works of art from historical writings. Colloquial reading. Visits to museums.


Note: Various of the above courses are not offered each year; please check quarterly schedules.

Asian American Studies

Asian American Studies

(College of Agricultural and Environmental Sciences)

Faculty

See under Department of Applied Behavioral Sciences.

The Major Program

Concentration in Asian American Studies is available through the Applied Behavioral Sciences major (page 146). Related Courses

For other Asian languages, see Oriental Languages and Civilizations.

Courses in Asian American Studies

Lower Division Courses

1. Introduction to Asian American Studies (4) I, Amiroli, II, Kagwada Lecture-discussion—4 hours. Asian American experience, 1850 to the present with focus on Chinese, Japanese, and Filipino.

2. Contemporary Asian Experience in America (4) I, Kagwada Lecture-discussion—4 hours. Analysis of ethnicity, race, and culture as it relates to the identity and growth of the Asian American. (SU grading only.)

20. Asian Calligraphy (3) II. Leung Lecture—2 hours; laboratory—3 hours. Prerequisite: knowledge of Cantonese, Mandarin or Japanese helpful. Introduction to Asian calligraphy stressing the technique of writing.

92. Internship (1-12) I, II, III. The Staff (Pilsuk in charge) Field placement—3-36 hours. Prerequisite: consent of instructor. Supervised internship off- and on campus in Asian American community and institutional settings related to Asian American concerns. (P/NP grading only.)

Upper Division Courses

100. Asian American Communities (4) II. Kagwada Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2 or consent of instructor. Political and social status, occupation, income, education, health, housing, and civic culture of various Asian American communities in the United States; segregation and interrelations between geographical groups, relations between rich and poor, patriotism, exploitation; mobility within each ethnic group.

110. Institutional Racism and the Asian American (4) I, Kagwada Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2 or consent of instructor. Historical and contemporary effects of institutional patterns on Asian Americans.

111. Alienation and the Asian American (4) III, Kagwada Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2 or consent of instructor. An examination of self-awareness, alienation, and life perspective of Asians in America. Emphasis will be placed on the problems of identity formation of Asian Americans.

112. Asian American Women (4) II, III. The Staff Lecture—4 hours. Prerequisite: course 1 or 2. History and struggle of Asian women in America; critically analyze their media images and stereotypes; and discuss in-depth the role of Asian Women in the community movement for social change.

114. Speech Patterns of Asian Americans (4) III. Leung Lecture—4 hours. A general introduction to bilingualism as a social issue; survey of bilingual communities, problems of bilingual speakers, linguistic effects of bilingualism, particularly the effects of Asian languages in the speech patterns of Asian Americans. Offered in even-numbered years.

150A. Filipino Experience (4) I. Amiroli Lecture—3 hours; discussion—1 hour. Culture and history of the Philippines from pre-Hispanic to the present.

150B. Filipino Experience (4) II. Amiroli Lecture—3 hours; discussion—1 hour. Filipinos in America with emphasis on the changing structure of the community.

190. Internship (1-12) I, II, III. The Staff (Pilsuk in charge) Field placement—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Supervised internship off- and on campus in Asian American and institutional settings related to Asian American concerns. (P/NP grading only.)

190. Directed Group Study (1-5) I, II, III. The Staff (Kagwada in charge) Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Kagwada in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Courses in Cantonese

Lower Division Courses


4-5-6. Intermediate Cantonese (3-3-3) I-II-III. Leung Lecture—3 hours; recitation—1 hour. Prerequisite: course 3 or the equivalent. Continuation of course 1-2-3.

Asian Studies

See Asian American Studies (above); and East Asian Studies

Astronomy

See Physics

Atmospheric Science

Atmospheric Science

(College of Agricultural and Environmental Sciences)

Faculty

See under Department of Land, Air and Water Resources.

The Major Program

Atmospheric Science is the study of the physics of meteorological processes, including general circulation of the atmosphere and weather systems; mass and energy transfers at the planetary surface and within the atmosphere; solar and terrestrial radiation; turbulence and diffusion; atmospheric interaction with the biosphere; cloud physics and weather modification; air pollution meteorology; and developments in modern meteorological instrumentation. This field is based on applied mathematical physics, and is strongly relevant to environmental biology and human ecology. Numerous career opportunities exist in the federal and state governments, research and development...
Courses in Atmospheric Science

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 122 Hoagland Hall (752-1669).

Lower Division Courses

20. Introduction to Meteorology (3) I, Shaw
Lecture—3 hours. Prerequisite: an introductory course in calculus. Basic concepts of general meteorology: weather and weather elements, atmospheric circulation, clouds, precipitation, radiation, instruments, and observations. Meteorological weather maps: synoptic charts and the general circulation of the atmosphere and in particular its atmospheric phenomena.

20L. Lab to Introduction to Meteorology Laboratory (1) I., Shaw
Laboratory—3 hours. Prerequisite: course 20 (previously taken concurrently). Introduction to meteorological instruments and observations; weather station visits; weather maps and charts; special films on weather modification, air pollution, and atmospheric circulation; physical experiments illustrating atmospheric phenomena.

92. Atmospheric Science Internship (1-12) II, III. The Staff (Department Chairperson in charge)
Laboratory—36 hours. Prerequisite: lower division standing and consent of instructor. Available for continuing students: part-time or full-time experience on campus in resource sciences. Internship supervised by a member of the faculty. (P/N grading only.)

96. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor; restricted to lower division students. Group study of selected topics. (P/N grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/N grading only.)

Upper Division Courses

106. Microclimate of Agricultural Systems (3) J., Harfield
Lecture—3 hours. Prerequisite: upper division standing in biological or physical sciences. Energy balance, air and soil temperatures, water and nutrient use, carbon dioxide exchange patterns within the microclimate structure. Microclimate modification by windbreaks, frost protection and other methods of energy management.

110A. Weather Analysis and Forecasting (4) II, Wagner
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 20, 20L, 120, 121A, 121B (concurrently); knowledge of Fortran (Engineering 5). Examination of thermodynamic variables and processes, kinematics and dynamics as an integral part of the dynamic theory of weather systems. Graphical analytical techniques, including vertical cross sections, thermodynamic diagrams and pressure surface analysis, for study of weather systems.

110B. Weather Analysis and Forecasting (4) I, Carroll
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 110A. Application of dynamic theory to weather systems. Operational forecasting techniques including interpretation of numerical forecasts, local detailed forecasting, tropical meteorology, satellite meteorology and numerical analysis of meteorological data.

120. Atmospheric Thermodynamics and Statics (3) I, Weare
Lecture—3 hours. Prerequisite: Mathematics 22C, Physics 8C, course 20 (may be taken concurrently). The atmosphere at rest: atmospheric composition and structure, thermodynamics of atmospheric gases, thermal properties of dry and moist air, hydrostatic equilibrium and stability criteria, and thermodynamic diagrams in meteorology.

121A. Atmospheric Dynamics (3) I. Myrup
Lecture—3 hours. Prerequisite: course 120. The atmosphere in motion: equations of motion for rotating atmospheres; pressure and density fields and their relations to atmospheric circulations; wave motion in the atmosphere. The physical basis of modern numerical method in meteorology.

121B. Atmospheric Dynamics (3) III. Myrup
Lecture—3 hours. Prerequisite: course 121A. The dynamics of fluid motion in geophysical and laboratory systems: Rossby waves; Helmholtz wave, the effect of Coriolis force on boundary layers; thermal winds; the Kelvin and Rossby wave; the Rayleigh problem; perhension convection; convective plumes; cumulus models.

132. Micrometeorology (4) I, Shaw
Lecture—3 hours; laboratory—6 hours. Prerequisite: Mathematics 16B. Physical processes in the atmosphere near the ground: laminar and turbulent flow; transfer of heat, mass, and momentum across the surface-atmosphere interface. Diffusion and turbulent transfer creating wind, temperature and mass profiles near the surface.

124. Meteorological Instruments and Observations (3) II, The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 20 or the equivalent. Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included.

125. Atmospheric Physics (3) II, Stage
Lecture—3 hours. Prerequisite: course 120. Study of physical processes in the atmosphere. Emphasis will be given to microphysics of cloud growth and atmospheric radiation and global energy budget.

128. Radiative Instrumentation and Measurements (3) III, III. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 125 or consent of instructor. Methods of measuring solar and terrestrial radiation, types and characteristics of specific instruments, errors of measurement, temporal and spectral response of instruments, results of measurements.

131. Air Pollution. Meteorology (3) III. Focchiari
Lecture—3 hours. Prerequisite: Physics 2C, Mathematics 16B, Chemistry 1B, or consent of instructor. Comprehensive overview of the relationship to meteorology of air pollution topics. Topics include: types and sources of pollutants; photochemistry; diffusion and transport, monitoring and air quality standards; inverter; weather modification; and air pollution climatology.

132. Biometeorology (4) I. Harfield
Lecture—3 hours; discussion—1 hour. Prerequisite: Biology 16, 16B, Mathematics 16B, Chemistry 1B, or consent of instructor. Comprehensive overview of the relationship to meteorology of air pollution topics. Topics include: types and sources of pollutants; photochemistry; diffusion and transport, monitoring and air quality standards; inverter; weather modification; and air pollution climatology.

150. Numerical Weather Prediction (4) I, Wagner
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 120, 121A, 121B, 128. Computer modeling capability or consent of instructor. Numerical weather prediction with the quasi-geostrophic system. Technical aspects of objective analysis, map projections and computational stability of prediction equations.

162. Atmospheric Science Internship (1-12) II, II, III. The Staff (Department Chairperson in charge)
Laboratory—36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience on campus in atmospheric science. Internship supervised by a member of the faculty. (P/N grading only.)

190. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: three upper division units in Atmospheric Science. (P/N grading only.)

199. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: three upper division units in Atmospheric Science and at least an overall B average. (P/N grading only.)

Graduate Courses

210. Atmospheric Physics (3) III, II, Weare
Lecture—3 hours. Prerequisite: course 125 and 121A (may be taken concurrently). Selective introduction to the physical processes within the atmosphere. Emphasize will be given to radiation transfer and remote sensing, global atmospheric chemistry, and the physical and dynamic processes in the upper atmosphere.

221. Advanced Atmospheric Dynamics (3) III
Lecture—3 hours. Prerequisite: courses 120, 121A, 121B, or the equivalent. The energetics of atmospheric flows will be a major topic. Particular emphasis will be placed on the interactions of various space and time scale phenomena on energy transfer and transformations. Offered in even-numbered years.

222. Radiation in Planetary Atmospheres (3) III
Lecture—3 hours. Prerequisite: course 125 or the equivalent. Theory and observations of radiation in planetary atmospheres. Absorption, transmission, scattering by atmospheric gases, aerosols, and clouds, gaseous emission; effects of surface reflection; radiative energy budget of the atmosphere and of the planet. (P/N grading only.)

233. Advanced Micrometeorology (9) I, Stage
Lecture—3 hours. Prerequisite: course 125 and 121B or the equivalent. Turbulent transfer. Emphasis on the measurement of the turbulent boundary layer. Stability parameters, airsea interaction; numerical boundary layer models.Micrometeorology of plant canopy and cloud droplet modification. Turbulent diffusion in the atmospheric boundary layer.
Avian Sciences

230. Atmospheric Turbulence (3) II. Shaw
Lecture—3 hours. Prerequisite: course 223 or the equiva-
 lent, Dynamics and energetics of turbulent motion; transi-
tion to turbulence, energy dissipation, kinetic energy and
thermal variance equations, convective and mechanical
 turbulence, integral methods, Statistical methods; probabil-
 ity density function, moments, spectral analysis. The
 Kolmogorov theory; spectrum, structure function and dif-
fusion predictions.

231. Advanced Air Pollution Meteorology (3) II. Carroll
Lecture—2 hours; discussion—1 hour. Prerequisite: course
129, 131 and Engineering 149. Course emphasizes
interaction between atmospheric processes and air pol-
 lutants, primarily: transport and diffusion of primary and
secondary pollutants; their effects on local radiation
budget, cloud and precipitation formation and secondary
pollutant formation.

233. Topics in Advanced Biometeorology (3) III. Haffield
Lecture—2 hours; discussion—1 hour. Prerequisite: course
133 or consent of instructor. Study of current topics in
biometeorology focusing on interactions of plants with
the weather. Biological energy budgets and adaptations to
changes in energy regime. Quantification of weather pa-
rameters for optimum biological response. Offered in odd-
numbered years.

240. General Circulation of the Atmosphere (3) III. Carroll
Lecture—3 hours. Prerequisite: courses 120, 121A, 121B.
Description of global angular momentum, mass and energy bal-
ances. An investigation of physical processes on which they
depend and relationships of these balances to weather and
climate.

241. Climate Dynamics (3) III. Weare
Lecture—3 hours. Prerequisite: courses 120, 121A, 121B or
the equivalent, Engineering—Applied Science 115 or the
equivalent computer programming experience; course 150
recommended. Dynamics of climatic variations. Global and
zonal average energy balance models. Parameterizations of
radiative transfer, convection, and ocean circulation. In-
troduction to primitive equation climate models. Offered in
even-numbered years.

250. Meso-Scale Meteorology (3) II. Wagner
Lecture—3 hours. Prerequisite: graduate standing, course
150, a course in partial differential equations, or consent of
instructor. The study of weather phenomena with horizontal
spatial dimensions between 2.5 and 2500 kilometers. Meth-
ods of observational study and numerical modeling of the
structure and temporal behavior of these weather sys-
tems. Offered in even-numbered years.

259. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: graduate standing in
Atmospheric Science or related field. Current develop-
ments in selected areas of atmospheric research. Topics
will vary according to student and faculty interests. (SU
grading only.)

268. Group Study (1-5) I, II, III. The Staff (Chairperson in
charge)
Prerequisite: graduate standing and consent of instructor.
(SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in
charge)
Prerequisite: graduate standing and consent of instructor.
(SU grading only.)

Faculty
Ursula K. Abbott, Ph.D., Professor
Hans (Johannas) Abplanalp, Ph.D., Professor
Ray E. Burger, Ph.D., Professor
Ralph A. Ernst, Ph.D., Lecturer
C. Richard Grau, Ph.D., Professor
Howard Kazman, Ph.D., Professor
Dorothy C. Lowry, M.A., Lecturer
Frank X. Oglesby, Ph.D., Professor
Leo C. Norris, Ph.D., Lecturer
Pra N. Vohra, Ph.D., Professor
S. Wesley W. Weathers, Ph.D., Professor Emeritus
Allen E. Woodard, M.S., Lecturer

The Major Program
Avian Sciences is the study of birds and the ways in
which they relate to and are useful to man. The major
provides a balanced program if your interest is in birds — including the study of avian wildlife and
their environments, production and marketing of
domestic birds and eggs, and basic and applied
laboratory research on birds — and a broad know-
ledge of biological science. You may seek a career
in health-oriented research, the teaching of biol-
ogy, gamebird production, domestic and foreign
agricultural and extension services, govern-
mental agencies, or a diversified and progres-
sive poultry industry. Th flexibility of the program
and the close personal interaction between stu-
dents, faculty, and specialists in the field permit
you to play a large role in selecting and design-
ing your own course work. You may specialize in a
bachelor's program that qualifies you for a particu-
lar job; or you may choose a program to meet oth-
er broader intellectual and cultural interests. Inde-
pendent study, undergraduate research, and work-
learn experiences are features emphasized in the
program.

Avian Sciences

B.S. Major Requirements:

For convenience in program planning, the usual
courses taken to satisfy the requirements are
shown in parentheses where possible. Equal or
more comprehensive courses are acceptable.

UNITS

Preparatory Subject Matter

Avian Sciences

1. Biological Sciences (Biological Sciences 116)
2. Bacteriology, 2 Animal Science 1, 2
3. Biology (Biology 1A and 1B, 1A and 1B)
4. General Chemistry (Chemistry 1A, 1B, 1A and 1B)
5. Physics (Physics 110)
6. Statistics (Statistics 13)
7. Statistics (Mathematics 13)
8. English and/or rhetoric
9. Social sciences and humanities electives

Restricted Electives

A. English and/or rhetoric
B. Social sciences and humanities electives
C. At least one course in a foreign language

Unrestricted Electives

Any course of 8 units or more

Total Units for the Major

120

Avian Medicine

See Epidemiology and Preventive Medicine

Avian Sciences

(College of Agricultural and Environmental Sciences)

F. Howard Kratzer, Ph.D., Chairperson of the Department
Department Office, 109 Amundson Hall

Major Adviser. F. X. Oglesby.

Graduate Study. Further training is available through graduate or professional programs in animal physiology, genetics, nutrition, or veterinary medicine. The M.S. degree is offered in Avian Sci-
ences. Detailed information on graduate study is available through the graduate adviser, or obtain the Announcement of the Graduate Division (See also page 99.

Graduate Adviser. A. E. Woodard.

Related Courses. See Agricultural Economics 130, Food Science and Technology 120, 121, Inter-
national Agricultural Development 102; Nutrition 123; Physiology 103, 117, 17L, Zoology 100, 102.

Courses in Avian Sciences

Lower Division Courses

11. Applied Avian Biology (3) I. Oglesby
Lecture—3 hours. A survey of principles and practices in-
volved in poultry production. Designed for students not special-
izing in avian sciences.

11L. Laboratory in Applied Avian Biology (3) I. Oglesby
Lecture—1 hour, laboratory—3 hours. Prerequisite: course
11 (may be taken concurrently) or consent of instructor.

11L. Laboratory in Avian Biology

12. Survey of Poultry and Allied Industries (3) II. Ogles-
bar, Carroll
Lecture—2 hours. Offered in even-numbered years. An
overview of the world poultry industry, including
breeding, nutrition, production, diseases, and
marketing.

13. Birds, Man, and the Environment (3) III. Grau, B. W.
Wilson
Lecture—2 hours. A study of the relationship between
birds and their environments, with a focus on
habitat, behavior, and conservation.

13L. Birds, Man, and the Environment: Laboratory (1) III. Grau
Laboratory—3 hours. Demonstrations and field trips for stu-
dents enrolled concurrently in course 13.

15. Biology of Birds of Prey (3) III. Weathers
Lecture—3 hours. A study of the biology and behavior
of birds of prey, with a focus on avian ecology and
conservation.

19. Internship in the Avian Sciences (1-2) I, II. The Staff
(Chairperson in charge)
Laboratory—3 to 12 hours. Prerequisite: successful
performance in a previous course. The student
works in a laboratory setting under the supervision
of an experienced scientist.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff
(Chairperson in charge)
Individual study under the supervision of the chairperson.

Upper Division Courses

100. The Biology of Birds (3) III. Weathers
Lecture—2 hours; discussion—1 hour. Prerequisite: back-
ground in general biology required. The birds of
North America, with emphasis on the biology of
those related to the study of birds. Includes a study
of avian structure, function, behavior, and ecology.

100L. Special Study in Birds Laboratory (1) I. Weathers
Laboratory—3 hours. Prerequisite: course 100 (concur-
rently). Laboratory exercises in field methods, includ-
ing identification, research, and field work.

102. Fertility and Hatchability in Birds (3) III. Abbott
Lecture—2 hours. A study of the factors affecting
fertility and hatchability in birds, with a focus on
avian reproductive biology.

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Bacteriology

A. B. Major Requirements:

Preparatory Subject Matter

Bacteriology 2 or 102 3

Biological Sciences 1 4

Chemistry 1A, 1B, 1C, 5, 6A, 6B 25

Statistics 3 4

Mathematics 16A-16B or 21A-21B 6-6

Physics 6

Recommended: Physics 2A, 2B, 2C.

Depth Subject Matter

Bacteriology 120, 130A, 130B 106, 106L, 1328, 1350, 150, 177, 177L 13-14

Biochemistry 101A, 101B, 101L 11

Genetics 100A-100B or 120 4-6

Additional units from Bacteriology 120, 120L, 120D, 130B, 130L, 1328, 150, 177, 177L, 13-14

Bacteriology

B.S. Major Requirements:

Preparatory Subject Matter

Bacteriology 2 or 102 3

Biological Sciences 1 4

Chemistry 1A, 1B, 1C 5

Statistics 3 4

Mathematics 16A, 16B, 16C or 21A, 21B, 21C 9-12

Physics 2A, 2B, 2C 9

Depth Subject Matter

Bacteriology 120, 130A, 130B, 130L, 130D, 130F, 1328, 1350, 150, 177, 177L 13-14

Biochemistry 101A, 101B, 101L 11

Chemistry 107A, 107B, 128A, 128B, 128C 129A 17

Genetics 100A-100B or 120 4-6

Bacteriology 128 3-4

Bacteriology 120, 120L, 120D, 120F, 128, 130B, 130L, 1328, 150, 177, 177L, 13-14

Recommended: Chemistry 106, a course in computer programming.

Total Units for the Major 103-111

Bacteriology

B.S. Major Requirements:

Preparatory Subject Matter

Bacteriology 2 or 102 3

Biological Sciences 1 4

Chemistry 1A, 1B, 1C 5

Statistics 3 4

Mathematics 16A, 16B, 16C or 21A, 21B, 21C 9-12

Physics 2A, 2B, 2C 9

Depth Subject Matter

Bacteriology 120, 130A, 130B, 130L, 130D, 130F, 1328, 1350, 150, 177, 177L 13-14

Biochemistry 101A, 101B, 101L 11

Genetics 100A-100B or 120 4-6

Bacteriology 128 3-4

Additional requirements as described on page 70.

College of Letters and Science students: Refer to page 100 for a description of requirements to be completed in addition to the major.

Major Advisers


Breadth Subject Matter

College of Agricultural and Environmental Sciences students 24

English and/or rhetoric 8

Social sciences and/or humanities 16

Additional requirements as described on page 70.

Teaching Credential Subject Representative

W. P. Segel. See page 105 for the Teacher Education Program.

Graduate Study

The Graduate Group in Microbiology offers programs of study and research leading to the M.A. and Ph.D. degrees in general microbiology, including bacteriology. The offerings of the Department of Bacteriology are augmented by courses and faculty of the Departments of Biochemistry and Biophysics, Botany, Food Science and Technology, Genetics, Virology, and the Schools of Medicine and of Veterinary Medicine. For current information regarding graduate studies in microbiology, address the Chairperson, Graduate Group in Microbiology, Department of Bacteriology.
Courses in Bacteriology

Lower Division Courses

2. General Bacteriology (3) I. Starr; II. Merr, Segal, III. Segel
I. Lecture—3 hours. Prerequisite: Biological Sciences 1. The biology of bacteria with some of its applications.

3. Bacteriological Laboratory Techniques (1) I, II, III. Segel Laboratory—3 hours. Prerequisite: Biological Sciences 1. Design and preparation of laboratory techniques in bacteriology, with major responsibility for organizing and accomplishing work restin with students. (P/NP grading only.)

96. Directed Group Study (1-5) I, II, III. The Staff (Manning in charge) Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

Upper Division Courses

NOTE: Bacteriology 105 and 106 are designed for declared majors in Bacteriology and allied fields. Bacteriology 102 is primarily designed for Biological Sciences majors and other upper division and graduate students.

101. Microbiology and Society (4) I. Starr Lecture—3 hours. Laboratory—1 hour. Prerequisite: upper division standing and consent of instructor. Introductory courses in biology and chemistry recommended. Microbes and society. Special attention to human welfare and experience. Nature and classification of microbes. Ways in which microbes affect, and how to control the process of fermentation, industrial, historical, cultural, ethical, legal, economic, and political aspects. Limit enrollment.

102. General Bacteriology (4) I. Kustu, Baumann Lecture—4 hours. Prerequisite: Biological Sciences 1 and Chemistry 8B. Mathematics 16A recommended. Biology of bacteria and bacterial viruses. Survey course dealing with the physiology, genetics, and taxonomy of bacteria and their relation to man. Students who have had course 2 may receive only 2 units of credit for this course.

105. Bacterial Diversity: Morphology, Systematics, Habitats (3) I. Eu-Whee Lecture—3 hours. Laboratory—6 hours. Prerequisite: course 2 or 102, and 3, Chemistry 8B (or 128A and 128B). Major bacterial groups, with particular emphasis on morphology and natural history. Isolation of bacteria from various habitats by enrichment culture techniques.

106. Bacterial Diversity: Metabolism Physiology (3) II. Baumann Lecture—3 hours. Prerequisite: course 105, Biochemistry 101B (may be taken concurrently). Practical experience in isolation and characterization of prokaryotes using a number of different analytical methods. Offered in even-numbered years.

120. Microbial Ecology (3) III. Meeks Lecture—3 hours. Prerequisite: course 105. Biochemistry 101A. Interactions between non-pathogenic microorganisms and their environment, emphasizing physiological and metabolic characteristics of various groups and their adaptation to and modification of specific habitats.

125. Microbial Ecology Laboratory (2) II. Meeks Laboratory—6 hours: one optional overnight week-end field trip. Prerequisite: course 120 (may be taken concurrently); consent of instructor. Study of prokaryotic microorganisms from laboratory cultures and the diversity of prokaryotes. Emphasis on content of organized experiments on ecologically important microbial activities. For remaining one-half, research projects will be done on student selected specific habitats of microorganisms. Limited enrollment.

130A. Bacterial Physiology and Genetics (3) II. Ingram Lecture—3 hours. Prerequisite: course 102, Biochemistry 101B (may be taken concurrently); Genetics 100A, 16B. The physiology and regulation of bacterial growth including the effect of the environment. Mapping techniques and the use of mutants in problem solving.


130L. Bacterial Physiology Laboratory (3) II. Arzt Laboratory—6 hours. Prerequisite: courses 2, 130A. Physiology and genetics of bacteria and bacterial viruses. Isolation and characterization of mutant strains. Mapping of mutations by conjugation and transduction. Studies on control of enzyme synthesis by induction. Expression and regulatory mechanisms.

150. Eukaryotic Prokaryotes: Yeasts (3) I. Pratt Lecture—3 hours. Prerequisite: course 2; Biochemistry 101A recommended. Diversity among eukaryotic protists with special emphasis on yeasts and yeast-like fungi and their relationships to the higher fungi. Selected fungi pathogenic to man.

150L. Laboratory in Eukaryote Prokaryotology: Yeasts (3) II. Pratt Laboratory—3 hours. Prerequisite: courses 3, 150 (may be taken concurrently). Observation of morphology of cells and spores and selected saccharomyces and related fungi. Isolation and identification of selected yeasts from natural habitats. Nutritional experiments.

177. Metabolism of Anaerobic Bacteria (2) II. Macy (Animal Science) Lecture—3 hours. Prerequisite: course 2 or 102. Biochemistry 101B (may be taken concurrently). Various groups of anaerobic and facultatively anaerobic bacteria. Consideration of their natural environments and their metabolic characteristics, with emphasis on energy yielding catabolic pathways.

177L. Laboratory in Metabolism of Anaerobic Bacteria (2) II. Macy (Animal Science) Laboratory—6 hours. Prerequisite: courses 3, 177 (may be taken concurrently). Isolation of anaerobic bacteria from a number of different natural environments; experiments dealing with certain characteristic physiological and metabolic aspects of anaerobic bacteria. Offered in odd-numbered years.

182. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—3-36 hours. Technical and/or professional experience on or off campus. Supervised by a member of the Bacteriology Department faculty. (P/NP grading only.)

177T. Tutoring in Bacteriology (1-5) I, II, III. The Staff (Ingraham in charge) Tutoring—1-15 hours. Prerequisite: course 3, and 18 upper division units in Bacteriology. Consent of instructor. Pass/fail grading only. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Ingraham in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

206A-206B-206C. Microbiology for First-Year Graduate Students (3-3-3) I-III. The Staff (Manning in charge) Lecture—3 hours, laboratory—1 hour. First-year graduate standing with interest in Bacteriology. A survey of general microbiology at the graduate level.

205. Bacterial Diversity, Ecology and Systematics (4) I. Starr Lecture—discussion—2 hours, laboratory—3 hours; term projects and papers. Prerequisite: consent of instructor. Intensive study of selected morphologically unusual bacteria, including those from polar regions and extreme habitats. Diversification elements of prokaryotes. Organismic associations. Principles and procedures of bacterial taxonomy.

210. Bacterial Physiology (2) III. Ingram Lecture—2 hours. Prerequisite: course 130B, Biochemistry 101B. Selected topics in bacterial physiology. Offered in even-numbered years.

256. Yeasts and Related Organisms (5) I. Pratt, Miller Lecture—3 hours; laboratory—6 hours. Prerequisite: consent of instructor. Morphology, development, classification, and distribution of yeasts, relation to other fungi; growth requirements; physiological activities. Offered in odd-numbered years.

260. Bacterial Genetic Regulatory Mechanisms (3) II. Arzt Lecture—discussion—3 hours. Prerequisite: general knowledge of nucleic acid biochemistry and bacterial genetics. Analysis of the molecular level of genetic regulation in selected bacterial systems. Specific systems discussed will include the following types of regulation: control of transcription initiation and termination; translational controls; DNA modification effects; azotobacteria control circuits in bacterial virus; supercoils. Offered in even-numbered years.

270. Advanced Animal Virology (3) III. Manning Lecture—3 hours. Prerequisite: consent of instructor. Selected advanced topics on biological and biochemical properties of animal viruses. May be repeated for credit.


291. Selected Topics in Bacteriology (1) I, II, III. Meeks, Wheels Seminar—1 hour. Current progress in bacteriology and cellular and molecular biology. (SU grading only.)

292. Seminar in Bacterial Physiology, Genetics and Virology (1) I, II, III. Baumann Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in bacterial physiology, genetics, and virology with presentations by individual students. (SU grading only.)

296. Seminar in Animal Virology (1) I, II. Manning Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current topics in animal virology. (SU grading only.) (Same course as Veterinary Microbiology 292.)

298. Group Study (1-5) I, II, III. The Staff (Manning in charge) Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Manning in charge) Prerequisite: consent of instructor. (SU grading only.)

Behavioral Biology

See Medicine

Biochemistry

(College of Agricultural and Environmental Sciences)

The Major Program

The Biochemistry major is suitable if you plan to pursue a professional career in biochemistry, to do graduate work in biochemistry or another biological science, or if you intend to apply to schools of medicine, dentistry, medical technology, or veterinary medicine. Students majoring in Biochemistry in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

Choice of College. The Bachelor of Science degree is offered in both the College of Agricultural and Environmental Sciences and College of Letters and Science.
Students working toward the bachelor’s degree in Biochemistry may petition to receive credit towards the College of Letters and Science 64 upper division unit requirement for certain organic chemistry courses taken at other institutions which are judged equivalent to upper division courses offered at UC Davis. Further information can be obtained from the Division of Biological Sciences Office, 171 Mrak Hall.

Biochemistry

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>UNITs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
</tr>
<tr>
<td>Biological sciences: Biological Sciences</td>
</tr>
<tr>
<td>Chemistry 1A-1B-1C, 4A-4B-4C</td>
</tr>
<tr>
<td>(students may start with Chemistry 4A and continue with 1B-1C but not vice versa)</td>
</tr>
<tr>
<td>Mathematics 16A-16B-16C or 21A-21B-21C and one additional course in statistics (e.g., Statistics 13, 102, or 130A)</td>
</tr>
<tr>
<td>Physics</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
</tr>
<tr>
<td>Biochemistry 101A-101B, 101L</td>
</tr>
<tr>
<td>Genetics 100A-100B or 120</td>
</tr>
<tr>
<td>Organic chemistry Chemistry 128A</td>
</tr>
<tr>
<td>Physical chemistry: Chemistry 107A-107B-108 or 110A-110B-110C</td>
</tr>
<tr>
<td>Breadth Subject Matter</td>
</tr>
<tr>
<td>College of Agricultural and Environmental Sciences</td>
</tr>
<tr>
<td>English 1, 2, 2D, or 100, plus 4 additional units from the above or from English 3, 104, French 1, 3, Comparative Literature 1, 2, 3, Philosophy 5 or 10</td>
</tr>
<tr>
<td>Social sciences and humanities (including foreign languages and additional English and rhetoric courses)</td>
</tr>
<tr>
<td>College of Letters and Science students: Refer to page 93 for a description of requirements to be completed in addition to the major.</td>
</tr>
<tr>
<td>Restricted Electives</td>
</tr>
<tr>
<td>Upper division courses in biochemistry and related areas, to include at least three courses from Biochemistry 122, 133, 142, and at least one additional course in biochemistry or laboratory course in a biological science.</td>
</tr>
<tr>
<td>No more than 3 units of courses numbered 192, 197, 198 or 199 may be used (check with advisor). Recommended: Biochemistry 190 and one upper division chemistry course.</td>
</tr>
<tr>
<td>Unrestricted Electives (including 199, etc.)</td>
</tr>
<tr>
<td>Total Units for the Major</td>
</tr>
</tbody>
</table>

Major Adviser: I. H. Segel (Biochemistry and Biophysics)

Graduate Study. See page 99 and under Biochemistry (A Graduate Group), below.

Courses. See under Biochemistry and Biophysics.

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Biochemistry (A Graduate Group)

Mark G. McNamee, Ph.D., Chairperson of the Group

Biochemistry Office, 149 Briggs Hall (752-3611)

Graduate Study. The Graduate Group in Biochemistry offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding graduate study, address the chairperson of the group.

Graduate Advisers. See Class Schedule and Room Directory.

Courses in Biochemistry

Graduate Courses

200. Seminar (1-2) I, II, III. The Staff Seminar — 1 hour. Prerequisite: consent of instructor. (SU grading only.)

208. Research (1-12) I, II, III. The Staff (SU grading only.)

Biochemistry and Biophysics

(College of Agricultural and Environmental Sciences)

Jack Priss, Ph.D., Chairperson of the Department

Department Office, 149 Briggs Hall (752-3611)

Faculty

George E. Bruning, Ph.D., Professor
Sterling Chaykin, Ph.D., Professor
Eric C. Conn, Ph.D., Professor
Richard S. Criddle, Ph.D., Professor
Michael E. Dahms, Ph.D., Associate Professor
Roy H. Dol, Ph.D., Professor
Marilynn E. Etzler, Ph.D., Professor
Jerry L. Hedrick, Ph.D., Professor
Lloyd L. Ingram, Ph.D., Associate Professor
Mark G. McNamee, Ph.D., Associate Professor
Jack Preiss, Ph.D., Professor
Irwin H. Segel, Ph.D., Professor
Larry R. Sprechman, Ph.D., Lecturer
Paul K. Stumpf, Ph.D., Professor
Merna R. Villarejo, Ph.D., Assistant Professor

Major Programs and Graduate Study. See the major in Biochemistry (page 154); and for graduate study see page 99, and under Biochemistry (A Graduate Group), this page.

Related Courses. See Food Science and Technology 210, 250, 251.

Courses in Biochemistry and Biophysics

Questions pertaining to the following courses should be directed to the instructor or to the Division of Biological Sciences, 150 Mrak Hall.

Upper Division Courses

101A. General Biochemistry (3) I, II, III. Segel, Etzler, McNamee, Villarejo, Sprechman

Lecture — 3 hours. Prerequisite: Chemistry 88 or 128B. Introduction to the chemistry and metabolism of biologically important compounds; dynamic aspects of biochemistry with examples from animals, plants and microorganisms.

101B. General Biochemistry (3) I, II, III. Stumpf, Do, Segel, Conn

Lecture — 3 hours. Prerequisite: course 101A, a continuation of 101A.

101L. General Biochemistry Laboratory (5) I, II, III. Criddle, Hedrick, Briggs, Bruning, Chaykin, Ingram, Sprechman, Do

Lecture — 2 hours; laboratory — 10 hours. Prerequisite: course 101B (may be taken concurrently). Chemistry 5. Introduction to laboratory methods and procedures employed in studying biochemical processes. Designed for students who require limited experience in the use of biochemical techniques as laboratory tools.

122. Plant Biochemistry (3) I, II, Conn, Stumpf

Lecture — 3 hours. Prerequisite: course 101B. The chemistry of important plant constituents and processes such as photosynthesis and respiration; carbohydrate, fatty, and nitrogen metabolism.

123. An Introduction to Enzymology (3) III. Whittaker (Food Science and Technology)

Lecture — 3 hours. Prerequisite: course 101B. Principles of physical, chemical and catalytic properties of enzymes and their utilization. Experimental determination and quantitative evaluation of influence of reaction conditions or activity are stressed. Specificity and mechanism of action illustrated by consideration of selected enzymes.

132. Enzymology Laboratory (3) III. Whittaker (Food Science and Technology)

Lecture — 1 hour; laboratory — 3 hours. Prerequisite: course 101B. Enzymes: principles of their structure and function. Laboratory procedures involved in separation and study of enzymes.

133. Behavior and Analysis of Enzyme Systems (3) III. Segel

Lecture — 3 hours. Prerequisite: courses 101A and 101B. Introduction to enzyme kinetics and varieties of enzyme behavior, with emphasis on metabolic regulation. Topics include steady-state kinetics, patterns of feedback inhibition, control by enzyme activation and inactivation, multisubunit systems, enzyme assays, and membrane transport.

134. Structure-Function Relations of Proteins (3). Hedrick, Villarejo

Lecture — 3 hours. Prerequisite: courses 101A, 101B; and 101L (may be taken concurrently). Correlation of structure and biological function. Molecular models of enzymes which explain their physiological functioning. Physical and chemical methods used in determining protein structure. Function as modulated by kinetic and binding models and is affected by physiological considerations.

153. Biosynthesis of Informational Macromolecules, Metabolism and Regulation (3) II. Dahms

Lecture — 3 hours. Prerequisite: course 101B. Genetics 100A. Chromosome structure and function in prokaryotic and eukaryotic systems. Mechanisms of nucleic acid and protein synthesis with special emphasis on regulation; Regulation at multicellular level; development, immune system and carcinogenesis.

190. Undergraduate Seminar in Biochemistry (1) I, II, III. The Staff

Seminar — 1 hour. Prerequisite: courses 101A, 101B (may be taken concurrently). Discussion of the historical development of modern biochemistry.

192. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge)

Laboratory — 3-6 hours. Prerequisite: consent of instructor. Technical and/or practical experience on and off campus, supervised by a member of the Biochemistry and Biophysics faculty. (P/NP grading only.)

197. Tutoring in Biochemistry (1-5) I, II, III. The Staff (Chairperson in charge)

Discussion — 4-5 hours. Prerequisite: upper division standing and consent of instructor. To assist the instructor by tutoring students in one of the department’s regular courses. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201A. Physical and Chemical Biochemistry (4) I. Bruning, Ingram

Lecture — 4 hours. Prerequisite: course 101B. Chemistry 107B-108 or 110C, 120C. Biochemical thermodynamics and chemical and physical properties of biomacromolecules, including enzyme kinetics and methods for determining size and shape of macromolecules. 155
201B. Metabolism and Bioenergetics (3). Chaykin. Lecture—3 hours. Prerequisite: course 201A. Intermediary metabolism of amino acids, nucleotides, lipids and carbohydrates; biological oxidation reduction reactions; photosynthesis and oxidative phosphorylation; role of vitamins in metabolism; catalytic strategies of biosynthesis and bio-degradation.

201C. Molecular Biology (3). III. Hershey, Cribble, Dahmus, Dri. Lecture—3 hours. Prerequisite: course 201B. Structure and organization of DNA and chromatin; DNA replication; repair and recombination; gene expression and RNA processing; protein biosynthesis and turnover; transcriptional and post-transcriptional control mechanisms; examples of the above from viruses, bacteria, and eukaryotic cells and viruses.

201D. Integration of Metabolism and Regulatory Phenomena (3). III. Press, Friedland, Whang. Lecture—2 hours. Prerequisite: course 201B with consent of instructor. Comprehensive discussion of various regulatory phenomena that occur in the control of metabolism; e.g., regulation at enzyme level; integration of metabolic pathways from the whole animal view including homoeostasis, hormonal influences, turnover of enzymes, comparative aspects of metabolism and regulation of amino acid and lipid metabolism in mammals.

201E. Cellular Biochemistry (3). McNamara. Lecture—3 hours. Prerequisite: course 201A. Structure and function of cell membranes and cell surface components with an emphasis on the physical chemical principles involved in cell growth, cell development and cell-cell interactions. Biochemical aspects of some differentiated systems, such as the immune systems.

202A-202B. Advanced Biochemistry Laboratory (6-6). II. III. The Staff. Lecture—1 hour; laboratory—12 hours. Prerequisite: core 201A and consent of instructor. Methods and techniques used in biochemical research. Critical evaluation of experimental design and data analysis. (SU grading only.)

203. Carbohydrates (3). III. Press. Lecture—2 hours. Prerequisite: course 201B. Chemistry, metabolism, and biological functions of the various classes of carbohydrates and their polymers. Biosynthesis of sugars and complex sugars and polysaccharides. Offered in even-numbered years.

204. Nucleic Acids (3). III. Buerger, Dahmus, Dri. Lecture—2 hours. Prerequisite: course 201B or consent of instructor. Physical and biological properties of nucleic acids; biosynthetic pathways; metabolism and structure of bases, nucleotides, and their occurrence and distribution. Relation of structure and function of RNA and DNA to heredity, coding, and protein synthesis. Offered in odd-numbered years.

205. Biochemical Mechanisms (3). III. Ingraham. Lecture—2 hours. Prerequisite: course 101B or consent of instructor; Chemistry 110C, 131. Bond structure of biochemistry, interpretation of modern papers in inorganic chemical principles to the study of the mechanisms of biochemical reactions.

206. Physical Biochemistry of Macromolecules (3). II. Cridde, Dri. Lecture—2 hours. Prerequisite: course 201C or consent of instructor; Chemistry 110C. Application of modern physical concepts and experimental methods to the problems of large molecules of biological interest. Offered in even-numbered years.

207. Lipids (3). I, Ilnu. Lecture—2 hours. Prerequisite: course 201C or consent of instructor. Discussion of chemistry, metabolism and experimental methodology unique to fatty acids, triglycerides, phospholipids, plasmalogens, tocopherols, carotenoids and steroids. Offered in even-numbered years.

208. Membrane Biochemistry (3). II. McNamara, Cridde. Lecture—3 hours. Prerequisite: courses 101B and 201C or consent of instructor. Membranes will be described mainly in terms of their chemical composition and physical structure. Methods for analyzing membrane structure and function will then be considered. Finally, many of the biological functions of membranes will be analyzed. Offered in odd-numbered years.

210. Protein Biochemistry (3). II. Lecture—3 hours. Prerequisite: course 201C. Chemical, physical, and biological properties of amino acids, peptides, and proteins. The biological aspects include protein function, biosynthesis and biodegradative pathways, and nutritional requirements for amino acids.

212. Chemical Modifications of Proteins (3). III. Feeney (Food Science and Technology). Lecture—3 hours. Prerequisite: course 108B. Chemistry 128C. Chemical approaches for studying proteins, emphasizing the use of chemical modifications as a tool in the study of proteins. Conformation of proteins, interactions with other proteins, and relating the structure of proteins to their functions.

213. Principles of Comparative Biochemistry (3). I. Benieiek (School of Medicine). Feeney (Food Science and Technology). Lecture—3 hours. Prerequisite: course 210C or consent of instructor. An advanced treatment of comparative biochemistry. Evolution of living systems, their structures, and functions on a molecular basis, biochemical unity and diversity, protein structures and organized enzyme systems. Comparison of biochemical processes related to physiology, metabolism, and excretion. Offered in odd-numbered years. (Same course as Biological Chemistry 213.)

215. Kinetics of Biological Systems (3). III. Ingraham. Lecture—2 hours. Prerequisite: course 108B. Fortran IV (may be taken concurrently). Kinetic behavior of multivariant biological systems; mathematical methods and analysis of typical data with emphasis on computer use. In particular, the kinetics of multivariant catalysts, pre-steady state systems, perturbed systems, and reactions in a metabolic sequence. Offered in even-numbered years.

225. Science, the Scientist, and Society (2). II. Hedrick. Discussion—2 hours. Prerequisite: two years of graduate work and consent of instructor. Readings and discussions on the attitudes and values of scientists about themselves, science, and society. Science, art, and creativity; scientific explanation of order; responsibility of the scientist; basic versus applied research; ecology, anti-science. Offered in even-numbered years.


040. Selected Topics in Biochemistry (3). II. The Staff. Seminar—1 hour. Prerequisite: course 210C or consent of instructor. (SU grading only.)

050. Biochemical Literature (1). I, I, III, The Staff. Seminar—1 hour. Prerequisite: course 210C or consent of instructor. Critical evaluation and discussion of current biochemical literature. Selected papers will be presented and discussed in detail. (SU grading only.)

060. Advanced Research Conference (1). II, III, The Staff. Seminar—1 hour. Prerequisite: course 210C or consent of instructor. Preparation and critical discussions of research activities of various members of local biochemical community; primarily designed for graduate students. (SU grading only.)

091. Current Progress in Biochemistry (1). I, I, III, The Staff. Seminar—1 hour. Prerequisite: course 210C or consent of instructor. Seminar presented by guest lecturers on subiect of their own current research activities. (SU grading only.)

098. Group Study (1-5). I, II, III. The Staff. Prerequisite: consent of instructor. Classified group study of special topics in biochemistry. (SU grading only.)

099. Research (1-12). I, II, III. The Staff. (SU grading only.)

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**Biological Chemistry**

**See Medicine**

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**Biological Sciences**

**Programs of Study**

The Division of Biological Sciences is an interdisciplinary unit which coordinates the teaching and research of the departments of Animal Physiology, Bacteriology, Biochemistry, Botany, Genetics, and Zoology. Seven majors are offered within the Division leading to a B.S. degree in disciplines of the six above-named departments, and in Biological Sciences. The major programs are described under the respective departmental listings, except for majors in Biological Sciences (outlined below).

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**Biological Sciences Major Programs**

The major programs in Biological Sciences provide an opportunity for broader study of basic biology than is possible with most departmental majors. The programs provide suitable undergraduate preparation for a wide variety of careers, including teaching, biological research, work with various governmental agencies or with private companies, and all the health sciences. Students interested in a career involving considerable personal interactions, such as some of the health science areas, may be best served by the Bachelor of Arts program; for those interested in a more laboratory-oriented area, the Bachelor of Science program is more suitable.

Students majoring in Biological Sciences in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis, and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

**Choice of College**

The Bachelor of Arts degree is offered only in the College of Letters and Science. The Bachelor of Science degree is offered in both the College of Letters and Science and the College of Agricultural and Environmental Sciences.

**Biological Sciences**

**A.B. Major Requirements:**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subj Matter</td>
<td>42-48</td>
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<tr>
<td>Bacteriology 2 or 102</td>
<td>4-5</td>
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<tr>
<td>Botany 2</td>
<td>5</td>
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<tr>
<td>Zoology 2-4L</td>
<td>6</td>
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<tr>
<td>Chemistry 1A, 1B</td>
<td>10</td>
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<tr>
<td>Chemistry 8A-8B or 128A-128B</td>
<td>12-16</td>
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<tr>
<td>Mathematics and Statistics for Upper Division Majors</td>
<td>6</td>
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<tr>
<td>Recommended: Chemistry 1C, Physics 2A, 2B, 2C</td>
<td></td>
</tr>
</tbody>
</table>

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Course List for Group Requirement
(a) Organismal Biology: Botany 105, 150; Biological Sciences 162; Botany 102, 150, 107, 108, 111, 116, 118, 119; Entomology 101A, 101B, 103, Veterinary Microbiology 127; Zoology 100, 105, 106, 112A, 112B, 133A, 133B, 136, 137.
(b) Population Biology and Ecology: Anthropology 15A/4A; Botany 117, 141, Evolutionary and Comparative Studies 100, 121; Genetics 105, Geology 116, 150C; Wildlife and Fisheries Biology 110, 111, Zoology 125.
(c) Evolutionary Biology: Anthropology 151, 152, Botany 140; Genetics 103, Geology 107; Plant Science 103; Zoology 148.
(d) Physiology: Botany 130A/30B; Botany 111A-111B; Physiology 110; Plant Pathology 130; Zoology 142, 143, 144. Bachelor of Arts majors may satisfy the Physiology group requirement by Biochemistry 101/101A-101B.
(e) Molecular and Cell Biology: Biochemistry 133, 143, 153; Botany 130; Genetics 102; Medical Microbiology 107; Physiology 109A, 109B; Veterinary Microbiology 126; Zoology 121A, 121B, 166.

Other Courses
A list of courses which will be accepted in satisfaction of the upper division major requirement, without petitioning, is available in the Division of Biological Sciences Office, Room 150, Manr Hall.

There is a limitation of variable-unit courses which may be counted towards the major: 2 units of 197; 4 to 6 units of 199 (including the unit of 199B).

Major Advisers. Contact Division Office for advisor assignments.

Minor Program Requirements:
The minor in Biological Sciences is designed to acquaint students with the range and variety of modeling in biology, including work in two of the three areas: animal biology, plant biology, and microbiology, and in four of the following five subdivisions: organismal biology, ecology, evolution, physiology, and cell and molecular biology. The list of required courses is restricted to those which are acceptable for the minor program in Biological Sciences but which do not require extensive upper division preparatory work; substitutions of more advanced courses can be made, if appropriate, with the approval of an adviser for the minor.

Information on completion of the minor program can be obtained from the Division of Biological Sciences Office. (Note: this program is only available to students in the College of Letters and Science.)

Breadth Subject Matter:
Course List for Group Requirement
(b) Microbiology: Biology—upper division courses except Bacteriology 101; Biological Sciences 162; Botany 102, 105, 108, 111, 116, 117, 118, 119, 120, 121, 124, 140, 141, 142, 190, Environmental Horticulture 105, Plant Science 101, 103; Range Management 100; Resource Sciences 110.

Note: Botany 114, 116, or 119 may be used for either Bacteriology or microbiology (not both).

NOTE: For key to footnote symbols, see page 130.

Courses in two of the three areas: Animal Biology, Microbiology, and Plant Biology. An extensive list of courses which will satisfy area requirements can be found under the Biological Sciences major program description above. (Courses can be used to simultaneously satisfy both the area and group requirements.)

Group Requirements
At least one course or course sequence must be selected from among the following five groups:
a) Organismal biology: Botany 105, 150; Botany 102, 105, 108, 116, 117, 118, 119, 120, 122, 140, 141, 142, 190; Environmental Horticulture 105; Plant Science 101, 103; Range Management 100; Resource Sciences 110.
b) Evolution: Anthropology 151, 152, Botany 140; Genetics 103, Geology 107, Zoology 125.
c) Ecology: Botany 130A; Botany 111A-111B; Physiology 110
(d) Cell and molecular biology: Biochemistry 101A/101B; Botany 130; Physiology 109A-109B
Teaching Credential Subject Representative: Associate Dean (Biological Sciences). See page 105 for the Teacher Education Program.

Courses in Biological Sciences

Lower Division Courses
1. Principles of Biology (5) M, Murphy (Botany); II, Pratt (Bacteriology); III, Walle (Zoology). Lecture—4 hours; OR lecture—2 hours plus laboratory—2 hours. Prerequisite: Chemistry 1B. An interdisciplinary course designed for majors in the biological sciences. The emphasis is on the unity of basic biological principles as related to cell structure and function, reproduction, genetics, evolution, and ecology.
2. General Biology (4) Metcalf (Zoology); II, Kettleippe (Botany). Lecture—3 hours; discussion—1 hour. Consideration of the major features and principles of biology, with emphasis on biological processes and special reference to evolution, heredity, and the bearing of biology on human life. (Prerequisite: Chemistry 1B.)
3. Human Sexuality (2) Hildebrand (Zoology). Lecture—2 hours. Vocabulary, structure and function of genital system; sexual responses; reproduction; fertilization; birth control; pregnancy and childbirth; sex in religion and law; sex education; homosexuality; masturbation; establishing and maintaining intimacy; intimate communications; attitudes and values; sexual dysfunction; homosexuality; overview. (Prerequisite: junior standing.)
4. Biologia of Cancer (3) II. Lecture—3 hours. Prerequisite: either course 1 or 10, or Genetics 10, or Physiology 10 required. Interdisciplinary course offers an introduction to the biological, clinical, and psycho-social aspects of cancer. Course also provides basic understanding of biological principles and facts about the disease process. Designed for students with little scientific background.
5. Directed Group Study (1-5) II, III, Staff. (Prerequisite: consent of instructor. For primarily for lower division students. (IP grading only.)

Upper Division Courses
115. Problems in Marine Biology (15) III. Phillips (Zoology). Full-time study at Soltice Marine Laboratory. Prerequisite: consent of instructor based on adequate preparation for topic under consideration. I.e., appropriate laboratory courses in invertebrate zoology (usually Zoology 112A or 112B). Prerequisite: Genetics 100A and 100B recommended. An integrative presentation of the nature of animal, bacterial, and plant viruses, including their structure, replication, and genetics.
197. Teaching in Biological Sciences (1-5) III, II. Staff. (Prerequisite: upper division standing with major in a Biological Sciences. Assisting in courses under the direction of the faculty. (IP grading only.)
198. Directed Group Study (1-5) II, III, Staff. (Prerequisite: consent of instructor. (IP grading only.)

Graduate Courses
210. Effective Teaching of College Biology (3) III. Fisher. Informal lecture-discussion 3 hours. Teaching function of an academic career: objectives, nature, and methods of effective teaching; design of curricula and courses; lecturing and leading discussions; examinations and grading; evaluation; counseling; innovation. (S/U grading only.)
211. Designing Instruction in the Biological Sciences (2) III, III. Fisher. Lecture—2 hours; laboratory—4 hours. Prerequisite: graduate standing. Students will each develop a unit of biological science instruction (such as a lecture, laboratory experiment, syllabus, text chapter, audiovisual module.) Will consider goals, objectives, selection of appropriate pedagogical strategies, methods, and source materials; organization; development; and evaluation. (IP grading only.)
256. Group Study (1-5) II, III, Staff. (Prerequisite: consent of instructor. Division of Biological Sciences staff members may offer group study courses under this number.)
Biomedical Engineering; Botany

Biomedical Engineering (A Graduate Group)

James F. Shackelford, Ph.D., Chairperson of the Group
Group Office, 2020 Bainer Hall
(Mechanical Engineering), (752-0580/2942)

Faculty
Robert E. Miller, Ph.D. (Human Physiology)
Richard F. Walters, Ph.D., Associate Professor
(Human Physiology)
Warden Waring, Ph.D., Professor
(Physical Medicine and Rehabilitation, Human Physiology)

Graduate Study: The Graduate Group in Biomedical Engineering offers a program of study and research leading to the Ph.D. degree. For detailed information regarding graduate study in biomedical engineering: see the chairperson or advisor of the group.

Graduate Adviser: R.E. Curry (Human Physiology)

Courses in Biomedical Engineering

Graduate Courses
252. Advanced Information Systems (3) I, II. Walters
Lecture—2 hours; laboratory—2 hours. Prerequisite: enrollment in initial phases of data preparation, editing and sorting; Community Health 151 or the equivalent; must be able to perform at graduate level. To increase through examples, interpreting and discussing the meaning of the data, the components of information systems, including hardware, software, economics and people, and to prepare students to apply this understanding in the solution of specific problems in the creation, design and implementation of information systems. (Same course as Community Health 252.)

390. Seminar (2) II, II, III. The Staff (Chairperson in charge) Seminar—3 hours. Special topics in biomedical research and applications. Includes such topics as instrumentation, simulation and modeling, physiological and computer applications, artificial organs and assistive devices. (SAV grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SAV grading only.)

Botany (College of Letters and Science)

Kenneth Wells, Ph.D., Chairperson of the Department
David E. Bayer, Ph.D., Vice Chairperson, Agricultural Botany
Department Office, 143 Robbins Hall (752-9617)

Faculty
Frederick T. Addicott, Ph.D., Professor Emeritus
Floyd M. Ashton, Ph.D., Professor
Daniel A. Axelrod, Ph.D., Professor Emeritus
Michael G. Barbour, Ph.D., Professor
David E. Bayer, Ph.D., Professor
Bruce A. Bonner, Ph.D., Associate Professor
Paul A. Castelfranco, Ph.D., Professor
Alton S. Crafts, Ph.D., LL.D., Professor Emeritus

Herbert B. Currier, Ph.D., Professor Emeritus
James A. Doyle, Ph.D., Associate Professor
Emuel Epstein, Ph.D., Professor (Botany, Plant Nutrition)
Richard H. Fink, Ph.D., Associate Professor
Ernest M. Gifford, Jr., Ph.D., Professor
Hendrik J. Ketelapper, Ph.D., Professor
Donald W. Kyhos, Ph.D., Professor
Norma J. Lung, Ph.D., Professor
Francis T. Lichtner, Ph.D., Assistant Professor
William J. Lucas, Ph.D., Assistant Professor
Jack Major, Ph.D., Professor
Terence M. Murphy, Ph.D., Associate Professor
Robert F. Norris, Ph.D., Associate Professor
Robert W. Pearcey, Ph.D., Associate Professor
Steven R. Rakusevich, Ph.D., Associate Professor
Thomas L. Ros, Ph.D., Associate Professor
Alan J. Stember, Ph.D., Assistant Professor
C. Ralph Stocking, Ph.D., Professor Emeritus
Robert M. Thornton, Ph.D., Associate Professor
John M. Tucker, Ph.D., Professor
Grady L. Webster, Ph.D., Professor
T. Elliott Weier, Ph.D., Professor Emeritus
Kenneth Wells, Ph.D., Professor

The Major Programs

Study leading to Bachelor of Arts or Bachelor of Science degrees in Botany covers several specialized areas: anatomy (internal plant structure), cytology (cellular structure and function), morphology (external plant form), physiology (plant function), taxonomy (plant classification), ecology (plant and environmental relationships), paleobotany (fossil plants), and studies of specific plant groups such as physiology (algal) and mycology (fungi). In addition, the department is a center for the study of weed science and herbicide physiology.

Botanists may teach, conduct research, or perform administrative duties. Many botanists perform public service jobs, such as in conservation organizations. Plant scientists who have specialized in one of the applied botanical areas, such as forestry or horticulture, are usually involved in administration and/or research. Most botanists are employed by educational institutions, governmental agencies and industrial firms. The U.S. Department of Agriculture and many companies employ many botanists. Some find employment with the pharmaceutical, petroleum or chemical industries, seed companies, fruit growers and food companies. Because of the need for the control and management of our environment, the necessity for trained environmentalists and ecologists will probably continue to increase.

Students who wish a less-intensive program in botany than that offered by the two Bachelor of Science major options, but that acquaints a student with plant life and its importance, should elect the Bachelor of Arts major program.

Students majoring in Botany in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

Choice of College: The Bachelor of Arts degree is offered only in the College of Letters and Science. The Bachelor of Science degree is offered in both the College of Letters and Science and the College of Agricultural and Environmental Sciences.

Botany

A.B. Major Requirements

Preparatory Subject Matter

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<tbody>
<tr>
<td>Biological Sciences</td>
<td>34-38</td>
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</table>

Recommended

Botany 199 (3-5 units); German, French, or Russian; English 5 or Mathematics 29.

B.S. Major Requirements:

Option I: For those who plan an advanced study in some areas of botany or a related discipline, (b) to obtain a general second- or third-year major in a field of study for which advanced study is a prerequisite, or (c) to train for a position requiring a detailed knowledge of plants.

Preparatory Subject Matter

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<tr>
<td>Botany 2</td>
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<tr>
<td>Chemistry 1A, 1B, 1A, 1B, 8B</td>
<td>16</td>
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<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
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<tr>
<td>Zoology 2-8L or Botany 2 or 102, 3</td>
<td>4-6</td>
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Depth Subject Matter

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<td>Botany 102 or 108, 109, 111A, 111B, 111</td>
<td>28-29</td>
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<tr>
<td>Genetics 120</td>
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<tr>
<td>Additional upper division Botany or related science courses</td>
<td>8-9</td>
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</table>

Total Units for the Major

74-78

Recommended

Botany 116, 119, Chemistry 1C. For students with interests in specialized areas of botany (e.g., agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.) certain substitutions, including courses in other departments, may be allowed on prior consultation with a botany major advisor.

B.S. Major Requirements:

Option II: For those who plan advanced study in physiology and/or biochemistry of plants.

Preparatory Subject Matter

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<th>Subject Matter</th>
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<td>Biological Sciences</td>
<td>5</td>
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<tr>
<td>Botany 2</td>
<td>5</td>
</tr>
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<td>Chemistry 1A, 1B, 1A, 1B, 4A-4B, 4C</td>
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<td>Chemistry 8A-8B or 129A-129B-129C</td>
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<td>Mathematics 16A-16B</td>
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<td>Zoology 2-8L or Botany 2 or 102, 3</td>
<td>4-6</td>
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<td>Botany 114, 115, 117, 118, 718, 719</td>
<td>37</td>
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</table>

Total Units for the Major

101-110

Recommended

Botany 199 (3-5 units); German, French, or Russian. For students with interests in specialized areas of botany (e.g., agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.), certain substitutions, including courses in other departments, may be allowed on prior consultation with a botany major advisor.

Option III: For those who plan advanced study in physiology and/or biochemistry of plants.

Preparatory Subject Matter

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<td>Chemistry 8A-8B or 129A-129B-129C</td>
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<td>Mathematics 16A-16B-16C</td>
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<td>Physics 2A-2B-2C and 3A-3B-3C</td>
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<td>Botany 105, 111A, 111B, 111L</td>
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<td>Genetics 120</td>
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<tr>
<td>Chemistry 107A, 107B</td>
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</table>

One course each in these of the following four areas is recommended:

(a) Taxonomy and evolution: Botany 102, 106
(b) Morphology and cytology: Botany 110, 130-130L, 140
(c) Physiology and ecology: Botany 114, 115, 118
(d) Ecology: Botany 117

Total Units for the Major

106-121

Recommended

Botany 199 (3-5 units); German, French, or Russian; English 5 or Mathematics 29.
Botany: Chemistry

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge).
Laboratory—36 hours. Prerequisite: upper division standing; consent of instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Botany Department. Tent. faculty. (P/N/P grade only.)

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Chairperson in charge).
Prerequisite: open only to majors of senior standing on honor list. Independent study subjects under the direction of a member or members of the staff. Completion will involve writing of a senior thesis (P/N/P grade only.)

197T. Tutoring in Botany (1-5) I, II, III. The Staff.
Prerequisite: division standing and consent of instructor. Designed for undergraduate students who desire teaching experience. Student contact will be primarily in laboratory and discussion sections. (P/N/P grade only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge).
Prerequisite: consent of instructor. (P/N grade only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge).
Prerequisite: consent of instructor. (P/N/P grade only.)

Graduate Courses

202. Plant Ecolology (3) III. Peavy.
Lecture—3 hours. Prerequisite: courses 111A, 111B, 117, and consent of instructor. Study of the mechanisms of physiological ecology of plants in relation to their environment.

203. Ecolology and Methods (3) III. Peavy.
Lecture—1 hour; laboratory—4 hours; project; one Saturday field trip to be arranged. Prerequisite: courses 111A, 111B, and 117, and consent of instructor. A laboratory and lecture course covering basic concepts underlying the research methods and instrumentation useful in plant ecolology.

205A. Advanced Plant Physiology (3) I. Lucas.
Lecture—3 hours. Prerequisite: course 110B. Chemistry 107A or consent of instructor. Cellular physiology, plant water relations, translocation and membrane transport.

205B. Advanced Plant Physiology (3) III. Castelfranco.
Lecture—3 hours; laboratory—4 hours; project. Prerequisite course 110B. Biochemistry 101B. Photosynthesis, respiration, and general plant metabolism.

205C. Advanced Plant Physiology (3) III. Bonner.
Lecture—3 hours. Prerequisite course 110B. Biochemistry 101A; courses 205A and 205B. Biochemistry 101B recommended. Internal and environmental regulation of plant growth and development.

206A. Advanced Plant Physiology Laboratory (3) I. Lucas.
Laboratory—6 hours; term paper. Prerequisite: course 205A (may be taken concurrently). Laboratory procedures in plant physiology. Experiments designed to illustrate subject matter of course 205A.

206B. Advanced Plant Physiology Laboratory (3) III. Castelfranco.
Laboratory—9 hours. Prerequisite: course 205B (may be taken concurrently). Prerequisites course 110B. Laboratory procedures in plant physiology. Experiments selected to follow subject matter sequence of course 205B.

206C. Advanced Plant Physiology Laboratory (3) III. Bonner.
Laboratory—6 hours. Prerequisite course 205C (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject matter sequence of course 205C.

212. Physiology of Herbical Action (3) III. Ashton.
Lecture—3 hours. Prerequisite: courses 111B, 122. Study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the fate of herbicides in plants.

215. Light and Plant Growth (3) I, II. Bonner.

Seminar-discussion—3 hours. Prerequisite: course 117 and permission of instructor. Major subheads treated are: 1) historical concepts of the plant community and of hierarchical groupings of communities; and 2) a review of sampling and analytical methods employed in the description of measurements of plant communities.

220. Plant Morphogenesis (3) II. Root.
Lecture—3 hours. Prerequisite: course 105 or 116. Survey of morphogenesis in the study of growth and the development of form, with special reference to higher plants, and some emphasis on experimental approaches.

220L. Plant Morphogenesis Laboratory (3) II. Root.
Laboratory—4 hours. Prerequisite: course 220 (may be taken concurrently) and consent of instructor. Procedures principally experimental, used to study the development of plant form.

221. Special Topics in Plant Physiology (2) I, II. Keatlepper; III. Castelfranco.
Seminar—2 hours. Analysis in depth of recent advances in plant physiology. Lectures and discussions by research specialists. Term paper integrating and analyzing lectures. May be repeated for credit. (S/U grading only.)

221L. Biological Electron Microscopy (1) I. Falk.
Lecture—1 hour. Prerequisite: consent of instructor. An introduction to biological microscopy. Areas covered are: electron optics, electron specimen interactions, and vacuum systems.

231L. Biological Electron Microscopy Laboratory (3) II. Falk.
Laboratory—8 hours. Prerequisite: consent of instructor, course 201 (may be taken concurrently). An introduction to biological electron microscopy. Areas covered are: specimen preparation and microscope operation. Limited enrollment.

245L. Pollination Ecology (4) III. Hopf (Entomology).
Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite consent of instructor. Theory of ecological relationships between plants and their pollinators with emphasis on insect pollination. Review of adaptations of both flowers and insects, and survey of the coevolution of pollinator relationships. Offered in even-numbered years. (Same course as Entomology 245.)

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 108; Genetics 103 recommended. Principles of plant taxonomy: phylogenetic vs. phenetic classification; examples of the way in which various disciplines - anatomy, embryology, biochemistry, etc., elucidate proxemics of taxonomic relationships, mainly of genera and higher categories.

255A. Experimental Plant Taxonomy (2) II. Kyhos.
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 106; course 117 and Genetics 103 recommended. Application of experimental techniques to the elucidation of taxonomic problems and evolutionary relationships in higher plants.

255B. Experimental Plant Taxonomy (2) II. Kyhos.
Lecture—1 hour; laboratory—2 hours. Prerequisite course 255A. A continuation of course 255A. Study of variation in natural population in relation to taxonomy; the application of population sampling, cytogenetics, transport studies, etc., to the solution of taxonomic problems and the clarification of relationships.

257. Plant Autecology (3) I. Major.
Lecture—3 hours; laboratory—2 hours. Prerequisite: course 117, Statistics 13. Evaluation of biotic and abiotic environmental factors in the distribution of plant species.

258. Plant Synecology (3) III. Major.
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 108, 117; Soil Science 120 recommended. Theories and techniques involved in the study of structure, composition, boundaries, and classification of vegetation, with particular emphasis on California plant communities.

Seminar—1 hour. (S/U grading only.)

Seminar—1 hour. Review of current literature in botanical disciplines. Disciplines and special subjects to be announced each year. Students present and analyze assigned topics. May be repeated for credit. (S/U grading only.)

265. Seminar in Mycology (1) I. Butler (Plant Pathology); III. Wells.
Seminar—1 hour. Review and evaluation of current literature and research in mycology. (S/U grading only.) (Same course as Plant Pathology 265.)

279T. Tutoring in Botany (1-5) I, II, III. The Staff.
Prerequisite: graduated standing and consent of instructor. Designed for graduate students who desire teaching experience, but are not teaching assistants. (S/U grading only.)

298. Group Study (1-5), I, II, III. The Staff (Chairperson in charge).
Prerequisite: consent of instructor. (S/U grading only.)

Cantonese
See Asian American Studies

Chemistry

(Course of Letters and Science)
Peter A. Rock, Ph.D., Chairperson of the Department
Richard E. Kepner, Ph.D., Vice-Chairperson of the Department
Department Office, 106 Chemistry Building
(752-0563/0553)

Faculty
Thomas L. Allen, Ph.D., Professor
Lawrence J. Andrews, Ph.D., Professor
Alan L. Balch, Ph.D., Professor
Albert T. Bottini, Ph.D., Professor
Theodore G. Brown, Ph.D., Assistant Visiting Professor
Robert B. Brinton, Ph.D., Professor Emeritus
David A. Case, Assistant Professor
Joyce T. Doi, Ph.D., Lecturer
William H. Fink, Ph.D., Associate Professor
Edwin C. Friedrich, Ph.D., Professor
Seyvati S. Friedrich, Ph.D., Lecturer
Hakon Hope, Cand. real. Professor
Raymond M. Keefer, Ph.D., Professor
Joel E. Keizer, Ph.D., Professor
Richard E. Kepner, Ph.D., Professor
Mark J. Kurfth, Ph.D., Assistant Professor
Gerd N. LaMar, Ph.D., Professor
August H. Maki, Ph.D., Professor
Gerald B. Matson, Ph.D., Assistant Adjunct Professor
Donald A. McManus, Ph.D., Professor
Claude F. Muench, Ph.D., Associate Professor
R. Bryan Miller, Ph.D., Associate Professor
W. Kenneth Musker, Ph.D., Professor
Charles P. Nash, Ph.D., Professor
Edgar P. Painter, Ph.D., Professor Emeritus
Harold G. Reiber, Ph.D., Professor Emeritus
Peter A. Rock, Ph.D., Professor
John W. Root, Ph.D., Professor
Robert N. Rosenfield, Ph.D., Assistant Professor
Cari W. Schmid, Ph.D., Associate Professor
Neil E. Schore, Ph.D., Assistant Professor
Kevin M. Smith, Ph.D., Professor
Leo H. Sommer, Ph.D., Professor
James H. Swinehart, Ph.D., Professor
Dino S. Tinti, Ph.D., Associate Professor
Nancy S. True, Ph.D., Assistant Professor
David H. Volcan, Ph.D., Professor
George S. Zweifel, Sc.D., Professor

The Major Programs
The goal of a bachelor's program in chemistry is to give a broad introduction to the principles of the field and to provide enough of the factual knowledge so that the student may quickly learn the specific chemistry applicable to the field in which the student chooses to work. Two programs in chemistry are available, one leading to the Bachelor of Arts and the other to the Bachelor of Science.
Students who are interested in chemistry as a profession would normally elect the program leading to the B.S. degree, which is accredited by the American Chemical Society. The curriculum leading to an A.B. degree offers a less intensive program in chemistry and is appropriate for a student with a strong interest in chemistry, who also has another goal such as a professional school preparation or secondary school teaching. Students who plan to pursue graduate work in chemistry or related fields are strongly advised to obtain a thorough grounding in the knowledge of German or Russian. High school students should note that the preparation for either the A.B. or the B.S. degree is simplified if their high school programs include chemistry and four years of mathematics. Degree candidates in chemistry will receive upper division credit for those lower division chemistry courses accepted in lieu of upper division courses required for the major.

Career Alternatives. Chemistry graduates with bachelor's degrees are employed extensively throughout industry in production supervision, quality control, technical marketing, and other areas of applied chemistry. Some of the firms employing these graduates are in the food and beverage processing industries, the petroleum industry, paper and textile production and processing, the chemical industry, pharmaceuticals, and the printing and graphic arts. An advanced degree is usually required for a career in research or education.

Chemistry

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>1A. General Chemistry</td>
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<tr>
<td>1B. General Chemistry</td>
<td>3</td>
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<tr>
<td>1C. General Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>1D. General Chemistry</td>
<td>3</td>
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<td>1E. General Chemistry</td>
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Upper Division Courses:

<table>
<thead>
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<th>Course</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>2A. Physical Chemistry for the Life Sciences</td>
<td>3</td>
</tr>
<tr>
<td>2B. Physical Chemistry for the Life Sciences</td>
<td>3</td>
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Chemistry

B.S. Major Requirements:

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<th>Course</th>
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<tbody>
<tr>
<td>2A. Physical Chemistry for the Life Sciences</td>
<td>3</td>
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<tr>
<td>2B. Physical Chemistry for the Life Sciences</td>
<td>3</td>
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Upper Division Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A. Physical Chemistry for the Life Sciences</td>
<td>3</td>
</tr>
<tr>
<td>3B. Physical Chemistry for the Life Sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

NOTE: For key to footnote symbols, see page 130.
Chemistry, Classics

120C. Organic Chemistry (3) I, II, III, Schone, III, Sommer
Lecture—3 hours. Prerequisite: course 120B, chemistry majors should enroll in course 129C concurrently. Continuation of course 128B with emphasis on enolates, carbocations, and nucleophilic additions and the chemistry of amines, amides, alcohols, esters, and sugars; selected biologically important compounds.

129A. Organic Chemistry Laboratory (2) I, II, III, Schone, II, Brotielli, III, Friedrich
Laboratory—1 hour; lecture—3 hours. Prerequisite: course 129C or 129D and a chemistry major. Inorganic chemistry: principles of inorganic chemistry; introduction to quantum mechanics; equilibrium; and purification of organic compounds. Only one unit credit allowed students having had course 128B.

129B. Organic Chemistry Laboratory (2) I, II, III, Schone, II, Duk
Laboratory—6 hours. Prerequisite: courses 128B (may be taken concurrently) and 129A. Continuation of course 129A. Emphasis on methods used for synthesis and isolation of organic compounds.

129C. Organic Chemistry Laboratory (2) I, II, III, Schone, II, Duk
Laboratory—2 hours. Prerequisite: course 129C (may be taken concurrently) and 129B. Continuation of course 129B.

130. Qualitative Organic Chemistry (4) II, Miller
Lecture—1 hour; laboratory—9 hours. Prerequisite: course 129C or 129D. The application of physical and chemical techniques to the qualitative identification of organic compounds.

Lecture—4 hours; laboratory—4 hours. Prerequisite: course 129C or 129D. Laboratory: development of laboratory methods to apply synthetic organic reactions to problems in organic chemistry.

140. Synthetic Methods (4) III
Lecture—1 hour; laboratory—9 hours. Prerequisite: courses 129A and 129B. An integrated inorganic-organic course in the preparation, purification and characterization of multifunctional organic, organometallic, and transition metal compounds using a wide range of methods.

150. Chemistry of Natural Products (3) I, Smith
Lecture—3 hours. Prerequisite: course 129C. Chemistry of terpenes, steroids, acetylenes, amino acids, carbohydrates, structures, reactions, synthesis, and total synthesis.

194H. Undergraduate Research (2-5) I, II, III, III, Staff (Chairperson in charge)
Prerequisite: course 110C (may be taken concurrently) and hours status. Original research and a written report of the investigation. Unit value to be determined by instructor supervising research. May be repeated for credit for a total of 12 units. (P/NP grading only.)

197. Projects in Chemical Education (1-4) I, II, III, III, Staff (Chairperson in charge)
Discussion and laboratory. Prerequisite: consent of instructor. Participation may include development of laboratory experiments, lecture demonstrations, auto-tutorial modules, or assistance with laboratory sessions. May be repeated for credit for a total of 12 units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III, Staff (Chairperson in charge)
Prerequisite: consent of instructor, based upon adequate preparation in chemistry, mathematics and physics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, Staff (Chairperson in charge)
Prerequisite: consent of instructor, based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only.)

Graduate Courses

210A. Advanced Physical Chemistry: Thermodynamics (4), Paine
Lecture—3 hours; discussion—1 hour or paper at discretion of instructor. Prerequisite: consent of instructor. Applications and applications of statistical mechanics; ensemble theory; statistical thermodynamics of gases, solids, liquids, and solutions; surface effects; chemical equilibria; molecular structure; statistical mechanics, electrical, and magnetic fields. The Third Law. Applications to biological problems.

210B. Advanced Physical Chemistry: Quantum Chemistry (4), I, Case
Lecture—3 hours; discussion—1 hour or paper at discretion of instructor. Prerequisite: consent of instructor. Principles of quantum chemistry and their applications to atomic and molecular structure and spectroscopy, and to chemical bonding.

210C. Advanced Physical Chemistry: Kinetics (4) III, Nast
Lecture—3 hours; discussion—1 hour or paper at discretion of instructor. Prerequisite: consent of instructor. Kinetics of chemical reactions; fundamentals of chemical reaction kinetics; rates and mechanisms of unimolecular and bimolecular reactions; introduction to equilibrium, reaction mechanisms, and free energy. (P/NP grading only.)

212. Spectroscopy of Organic Compounds (4) III, Friedrich
Lecture—4 hours. Use of spectroscopy in organic chemistry for the identification of compounds and the investigation of stereochemical and reaction mechanism phenomena.

212A-H. Organic Chemistry (3) II, III, Staff
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course.

225. Principles of Transition Metal Chemistry (3) I, Baich
Lecture—3 hours. Prerequisite: course 124 or the equivalent. Electronic structures, bonding, and reactivity of transition metal compounds.

227A-F. Special Topics in Inorganic Chemistry (3) I, II, III, Staff
Lecture—3 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented special topics courses in inorganic chemistry.

230A-J. Special Topics in Physical Chemistry (3) I, II, III, Staff
Lecture—3 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented special topics courses in physical chemistry. Topics will vary each time the course is offered.

231. Physical Organic Chemistry (4) I, Rosenfield
Lecture—4 hours. Modern concepts of substitution, elimination, and addition reactions, re-arrangements, and stereochemistry.

232. Seminar (1) I, II, III, Baich, Schone, Tint
Seminar—1 hour. Prerequisite: consent of instructor. (SU grading only.)

233. Introduction to Chemistry Research (1) I, II, III, Staff (Graduate Advisers in charge)
Discussion—2 hours. Designed for incoming graduate students preparing for higher degrees in chemistry. Group and individual discussion of research activities in the Department and research topic selection. (SU grading only.)

239. Group Study (1-5) I, II, III, Staff (Chairperson in charge)
Research (1-12) I, II, III, Staff (Chairperson in charge)
The laboratory is open to qualified graduate students who wish to pursue original investigation. Students wishing to enroll should communicate with the department well in advance of the quarter in which the work is to be undertaken. (SU grading only.)

Classics

Classics (College of Letters and Science)
Department Office (Spanish and Classics), 622 Sproul Hall (782-0838)

Faculty
Richard E. Grimm, Ph.D., Associate Professor
Lynn E. Roller, Ph.D., Assistant Professor
Wesley E. Thompson, Ph.D., Professor
David A. Traill, Ph.D., Associate Professor

The Major Programs
The Classics Department offers three major programs: Latin, Greek, and Classical Civilization. The major programs in Greek and Latin consist of the detailed study of the great works of Greek or Latin literature in the original language, including epic, lyric, drama, philosophy, history, and oratory. Both majors emphasize the study of language and literature. The major program in Classical Civilization offers an interdisciplinary approach to the ancient world. Students choosing this major supplement a core of courses in Greek or Latin (or both) with courses in ancient art, archaeology, history, philosophy, etc. All three majors provide the opportunity to study in depth a civilization that has profoundly influenced the western world.

The programs in Latin and Greek and, with careful planning, the program in Classical Civilization offer excellent preparation for graduate study in classics, ancient history, comparative literature, and archaeology. In addition, the major in Greek provides suitable background for divinity school or for graduate work in philosophy.

The majors in Latin and Classical Civilization may lead to careers in teaching (Latin, history, general humanities) or museum work (Classical Civilization). All three majors can lead to careers in librarianship, journalism, and civil service. The professional schools, particularly law schools, have traditionally looked with favor on highly qualified students with training in Latin or Greek.

Classical Civilization

A. B. Major Requirements:

<table>
<thead>
<tr>
<th>Units</th>
<th>Preparatory Subject Matter</th>
<th>Depth Subject Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-24</td>
<td>Greek 1, 2, 3 or Latin 1, 2, 3 or the equivalent.</td>
<td>12-15</td>
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<td></td>
<td>Three courses from the following, including at least one from Group (a)</td>
<td>60</td>
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<tr>
<td></td>
<td>(a) Classics 174, 17B, 17C, 20</td>
<td>28</td>
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<tr>
<td></td>
<td>(b) Classics 44, 40, 41</td>
<td>28</td>
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</table>

Depth Subject Matter: 40

Three upper division courses in Latin or Greek.

At least 28 units from the following, with or without emphasis in a single area. Chosen in consultation with a major adviser.

<table>
<thead>
<tr>
<th>Units</th>
<th>Language and Culture</th>
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<tbody>
<tr>
<td>28</td>
<td>Language and culture</td>
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<tr>
<td></td>
<td>upper division courses in Latin and Greek</td>
<td>61-64</td>
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<td></td>
<td>Classics 130B, 141, 142</td>
<td>61-64</td>
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<td></td>
<td>History 111A, 111B, 111C, 102A</td>
<td>61-64</td>
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<td>Religious Studies 102</td>
<td>61-64</td>
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<td></td>
<td>Art, Archaeology, and Drama</td>
<td>61-64</td>
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<td>Classics 174, 175</td>
<td>61-64</td>
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<td>Art 154A, 154B, 154C, 155</td>
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<td>Dramatic Art 156</td>
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<td>Philosophy and Political Theory</td>
<td>61-64</td>
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<td></td>
<td>Classics 150</td>
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<td>Political Science 118A</td>
<td>61-64</td>
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<tr>
<td></td>
<td>Rhetoric 110</td>
<td>61-64</td>
</tr>
</tbody>
</table>

Recommended
Art 1A: History 2; Philosophy 21; Comparative Literature 1; Religious Studies 40.
archaeological evidence will be supplemented by selected readings from Petronius’ Satyricon and other ancient authors.

36. The Latin Element in Current English (3) III. Thompson, Grimm Lecture—3 hours. Prerequisite: a knowledge of Latin is not required. The study of the derivation and usage of English words of Latin origin: analysis into their component elements directed toward understanding of form and meaning.

37. The Greek Element in Current English (3) III. Thompson, Troll Lecture—3 hours. Prerequisite: knowledge of Greek is not required. Study of the derivation and usage of English words of Greek origin: analysis into their component elements directed toward understanding of form and meaning.


41. Greek Tragedy (3) III. Grimm Lecture—3 hours. Reading in translation of selected plays of Aeschylus, Sophocles, and Euripides. Lectures on the development and influence of Athenian tragedy.

Upper Division Courses

138B. Greek Literature in Translation (3) II. Thompson Lecture—3 hours. Development of historical writing in Greece: Herodotus, Thucydides, and selections from the minor historians. Offered in even-numbered years.

141. Greek and Roman Comedy (4) II. Grimm Lecture—3 hours; conference—1 hour. Reading in Aristophanes, Xenophon, Plautus, and Terence; lectures on the development of ancient comedy. Offered in odd-numbered years.

142. Greek and Roman Novel (4) II. Trall Lecture—3 hours. Examination of the ancient Greek romances and their development into the grotesque realism of Petronius’ Satyricon and the religious mysticism of Apuleius’ The Golden Ass.

150. Athenian Political and Social Institutions (3) II. Thompson Lecture—2 hours; discussion—1 hour. Politics and government, marriage and kinship, religious societies, and the demographic and economic basis of Athenian democracy. Offered in odd-numbered years.

174. Ancient Greek Sanctuaries (4) III. Roller Lecture—discussion—4 hours. Prerequisite: course 17B or consent of instructor. The history, cults, and monuments of Olympia, Delphi, and other sanctuaries. Study reports on major monuments. Offered in even-numbered years.

175. Topography and Monuments of Ancient Athens (3) III. Roller Lecture—discussion—4 hours. Prerequisite: course 17A or consent of instructor. The history of Athens as an urban center from the Bronze Age through the late Roman period. Student reports on major monuments with emphasis placed on restoration, chronology, and the relating of documentary to excavational evidence. Offered in odd-numbered years.

197C. Community Tutoring in Classical Languages (1-5) II, III, IV. Grimm Prerequisite consent of instructor. Supervised instructional work in Greek or Latin in nearby schools qualified students in department. May be repeated for credit up to 5 units. (P/N grading only.)

Graduate Courses

201. Introduction to Classical Philology (4) I. Thompson Seminar—3 hours. Survey of major contemporary areas of classical scholarship with special attention devoted to current problems in literary and textual criticism.


203. Vergil (4) III. Thompson Seminar—3 hours. Reading of selected books of the Aeneid, Georgics, and works of Horace. Emphasis will be placed on the study of Vergilian poetic language.

254. Greek and Roman Comedy (4) I. Thompson Seminar—3 hours. Critical examination of the works of Plautus, Terence, and other comedians in the Greek tradition. Offered for credit.

268. Greek Historiography (4) III. Thompson Seminar—3 hours. Development of historiography in Greece. May be repeated for credit.

207. Greek Drama (4) II. Ill. Thompson Seminar—3 hours. Literary and philological analysis of the plays of Euripides, Sophocles, or Aeschylus. May be repeated for credit.

Greek

Lower Division Courses

1. Elementary Greek (5) II. The Staff Lecture—4 hours. Students who have successfully completed Greek 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/N grading basis only. Although a passing grade will be conferred to the student's P/N option, no petition is required. All other students will receive a letter grade unless a P/N petition is filed.

2. Elementary Greek (5) II. The Staff Lecture—4 hours. Prerequisite: course 1. A continuation of course 1.

3. Elementary Greek (5) III. The Staff Lecture—4 hours. Prerequisite: course 2. A continuation of course 2.

4. Directed Group Study (1-5) II, III, IV. The Staff Prerequisite: consent of instructor. Group study of selected topics. Primarily for lower division students. (P/N grading only.)

Upper Division Courses

100. Attic Oration (4) II. Thompson Lecture—3 hours. Prerequisite: course 3.

101. Plato (4) I. Thompson Lecture—3 hours. Prerequisite: course 3.

102. Euripides (4) II. Grimm Lecture—3 hours. Prerequisite: course 101.

103A. Homer: Iliad (4) II. The Staff Recitation—3 hours. Term paper. Prerequisite: course 3.

103B. Homer: Odyssey (4) II. The Staff Recitation—3 hours. Term paper. Prerequisite: course 3.

104. Menander (4) II. Thompson Lecture—3 hours. Term paper. Prerequisite: course 3.

105. Demosthenes (4) II. Thompson Lecture—3 hours. Term paper. Prerequisite: course 3.

111. Sophocles (4) III. Grimm Lecture—3 hours. Prerequisite: course 103. Offered in odd-numbered years.

112. Aristophanes (4) III. Grimm Lecture—3 hours. Prerequisite: course 103. Offered in even-numbered years.

113. Thucydides (4) I. Thompson Lecture—3 hours. Prerequisite: course 103. Offered in even-numbered years.

114. Lyric Poetry (4) II. Thompson Lecture—3 hours. Prerequisite: course 103. Offered in even-numbered years.

115. Aeschylus (4) II. Grimm Lecture—3 hours. Prerequisite: course 103. Offered in odd-numbered years.

116. Herodotus (4) I. Thompson Lecture—3 hours. Prerequisite: course 103. Offered in odd-numbered years.

196. Directed Group Study (1-5) II, III, IV. The Staff (Chairperson in charge) (P/N grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Thompson in charge) (P/N grading only)

Latin

Lower Division Courses

1. Elementary Latin (4) I. The Staff Lecture—4 hours. Students who have successfully completed Latin 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/N grading basis only. Although a passing grade will be conferred to the student’s P/N option, no petition is required. All other students will receive a letter grade unless a P/N petition is filed.

2. Elementary Latin (5) II. Troll Lecture—5 hours. Intensive course designed primarily for graduate students and advanced undergraduates wishing to acquire rapidly a rudimentary knowledge of Latin. Covers the same material as Latin 1 and 2.
Course in Clinical Pathology

Clinical Pathology

School of Veterinary Medicine

Jiro J. Kaneko, D.V.M., Ph.D., Chairperson of the Department

Department Office, 1319 Haring Hall (752-0153)

Faculty

Edward J. Carroll, Ph.D., Lecturer
Bernard F. Feldman, D.V.M., Ph.D., Assistant Professor
Nemi C. Jain, M.V.S.C., Ph.D., Professor
Donald E. Jasper, D.V.M., Ph.D., Professor
Jiro J. Kaneko, D.V.M., Ph.D., Professor
Oscar W. Schalm, D.V.M., Ph.D., Professor

Josef G. Zink, D.V.M., Ph.D., Assistant Professor

Course in Clinical Pathology

Upper Division Courses

101. Comparative Hematology (2) I. Kaneko, Jain, Zink, Feldman

Lecture—2 hours. Prerequisite: 101. Biochemistry 110A or 101B. or consent of instructor. Principles, interpretation and applications of clinical hematology: comparative blood cell morphology and function.

101L. Comparative Hematology Laboratory (2) I. Kaneko, Jain, Feldman

Laboratory—6 hours. Prerequisite: course 101 (should be taken concurrently) and consent of instructor. Introduction to laboratory methods and procedures of clinical hematology. Limited enrollment.

702. Clinical Biochemistry (3) I. Kaneko

Lecture—2 hours, laboratory—2 hours. Prerequisite: Physiology 112, 113; Physiological Sciences 101A-101B or 101A-101B, or consent of instructor. Prerequisites and methods of clinical biochemistry: determination and interpretation of the biochemical constituents of the blood, urine and other body fluids.

179. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

(SU grading only.)

Graduate Course

204. Normal and Abnormal Bone Marrow Cytology (1) I. Feldman, Zink

Lecture—1 hour. Laboratory—2 hours. Prerequisite: Veterinary Medicine 135 or course 101. Normal and abnormal behavior of hematopoietic cells followed by a study of the cytology of blood and bone marrow in selected diseases of domestic animals including infections, anemias, myeloproliferative disorders and leukemias.

205. Physiology and Pathology of Leukocytes (3) II. Jain

Lecture—2 hours. Prerequisite: course 101, Biochemistry 101A-101B. or consent of instructor. Metabolism, structure, genetics, and function of different leukocytes; physiological and patho-

hemological aspects of leukocytes; blood cell antigens and antibodies; disease processes; inflation and immunologic processes. Offered in even-numbered years.

206. Immunopathology (2) I, II. Carroll, J. Lewis (Medicine)

Lecture—2 hours. Prerequisite: course 101, Veterinary Microbiology 128, or consent of instructor. Immunologic aspects of hematology; blood cell antigens and antibodies; disease processes; inflammation and immunologic processes. Offered in even-numbered years.

215. The Bovine Mammary Glands in Health and Disease (1) I. Jasper, Cancri

Lecture—1 hour. Prerequisite: consent of instructor. Relationship of mastitis and milk quality: infectious diseases and the influence of environment, milking machines and management on mastitis; pathogenesis of mastitis; cellular and humoral defense mechanisms; mastitis diagnosis and control.

226. Seminar in Clinical Pathology (1) I, II, III. The Staff (Chairperson in charge)

(SU grading only.)
shown in parentheses. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteriology</td>
<td>3</td>
</tr>
<tr>
<td>Biology (Biology Sciences 1)</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry, general and organic (Chemistry 1A, 1B, 8A, 8B)</td>
<td>16</td>
</tr>
<tr>
<td>Computer logic or programming (Computer Technology 31 or Mathematics 19)</td>
<td>1-3</td>
</tr>
<tr>
<td>Cultural science (Anthropology 2)</td>
<td>4</td>
</tr>
<tr>
<td>Cultural food habits (Nutrition 20)</td>
<td>4</td>
</tr>
<tr>
<td>Oral and written expression (see College requirements, page 70)</td>
<td>8</td>
</tr>
<tr>
<td>Social research methods (Society 46A or Psychology 41)</td>
<td>4</td>
</tr>
<tr>
<td>Social statistics (Economics 12, Sociology 46B, or Statistics 13)</td>
<td>4-5</td>
</tr>
</tbody>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry 101A-101B or Physiological Sciences 101-101B</td>
<td>6-7</td>
</tr>
<tr>
<td>Food Science and Technology 100A, 100B</td>
<td>10</td>
</tr>
<tr>
<td>Physiology 110, 110L</td>
<td>7</td>
</tr>
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</table>

Option Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Anthropology 101, 126</td>
<td>8</td>
</tr>
<tr>
<td>Anthropology 141 or Geography 170</td>
<td>4</td>
</tr>
<tr>
<td>Foreign Language (French 1 and 2, German 1 and 2, or Spanish 1 and 2)</td>
<td>12</td>
</tr>
<tr>
<td>Geography 175</td>
<td>4</td>
</tr>
<tr>
<td>Restricted electives (selected with consultation of adviser)</td>
<td>20</td>
</tr>
</tbody>
</table>

Behavioral-Psychological Option

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education 110 or Psychology 130</td>
<td>4</td>
</tr>
<tr>
<td>Human Development 100A, 100B, 100C</td>
<td>12</td>
</tr>
<tr>
<td>Psychology 1, 108, 145</td>
<td>13</td>
</tr>
<tr>
<td>Restricted electives (selected with consultation of adviser)</td>
<td>20</td>
</tr>
</tbody>
</table>

Comparative Literature

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Economics 100A, 100B</td>
<td>6</td>
</tr>
<tr>
<td>Consumer Economics 141, 142</td>
<td>8</td>
</tr>
<tr>
<td>Economics 1A, 1B</td>
<td>10</td>
</tr>
<tr>
<td>Mathematics 16A, 16B</td>
<td>6</td>
</tr>
<tr>
<td>Restricted electives (selected with consultation of adviser)</td>
<td>20</td>
</tr>
</tbody>
</table>

Restrictive Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Units for Degree</td>
<td>180</td>
</tr>
</tbody>
</table>

Major Adviser. L. E. Givetti (Nutrition).

Graduate Study. See page 99 and the Announcement of the Graduate Division.

Comparative Literature

(division of Letters and Science)

Manfred Kusch, Ph.D., Program Director
Program Office, 912 Spruill Hall (752-1219)

Committee in Charge

Manfred Kusch, Ph.D., (French). Committee Chairperson, Fall-Winter Quarters

NOTE: For key to footnote symbols, see page 130.

Roland W. Hoermann, Ph.D. (Comparative Literature, German), Committee Chairperson, Spring Quarter
Ruby Cohn, Ph.D. (Comparative Literature, Dramatic Art)
Alfonso De Pretto, Dottore in Lettere (Italian)
Winfried Schleiner, Ph.D. (English)
Robert M. Torrance, Ph.D. (Comparative Literature, Fall Quarter)
Hugo J. Verani, Ph.D. (Spanish)

Faculty

Richard N. Cee, Ph.D., Professor (French)
Ruby Cohn, Ph.D., Professor (Comparative Literature, Dramatic Art)
Roland W. Hoermann, Ph.D., Associate Professor (Comparative Literature, German)
Manfred Kusch, Ph.D., Associate Professor (French)
Peter M. Schaeffer, Ph.D., Associate Professor (German)
Robert M. Torrance, Ph.D., Associate Professor
Matthi G. Ury, Ph.D., Associate Professor (Comparative Literature, Religious Studies)
Karl F. Zender, Ph.D., Assistant Professor

The Major Program

Few people would think of studying only English physics, German biology, French painting, or Spanish music. Yet most literature majors study books originally written in a single language. Comparative Literature, on the other hand, encourages students to read, to think about, and to compare books from different countries and from different parts of the world — from Italy and Russia as well as England and the United States, and from Asia and Latin America as well as North America and Europe.

Comparative Literature thus enlarges students' horizons by bridging the divisions between national cultures instead of concentrating on a single tradition. Both the major and minor programs allow students to combine courses in one or more national literature departments together with courses in Comparative Literature. Students who enjoy reading books, exploring ideas, and learning about different civilizations will find Comparative Literature a stimulating field of study.

The introductory course sequence, "Great Books of Western Civilization," provides both an overview of European literary culture from ancient times to the present and an intensive practical knowledge in analytical thought and English composition. All readings in undergraduate Comparative Literature courses are in English, but majors take upper division courses in at least one foreign literature in the original language. No foreign language is required for the minor.

Students majoring in Comparative Literature choose a first and second literature of concentration, one of which may be English. After the introductory sequence, each student's major coursework is divided between courses in the two literatures of concentration and Comparative Literature courses. These Comparative Literature courses encourage students to take a broad view of a historical period, a theme, a genre, or a literary movement. The wide variety of options in the program permits great flexibility and encourages interdisciplinary connections between literature and philosophy, psychology, history, and the arts. Each student's plan of study must be approved by an adviser at the beginning and end of each academic year.

Career Alternatives: Careers directly related to Comparative Literature include teaching, journalism, publishing, and translation. Most Comparative Literature majors, however, are preparing for other careers that will employ the skills they have learned in the process of acquiring a stimulating and enriching education. The major in Comparative Literature gains useful experience in one or more foreign languages, in careful analytical thinking, and in precise use of the English language. Because many professional schools consider a literature major an excellent background for their graduate disciplines, Comparative Literature provides valuable preparation (along with supplementary courses outside the major) for careers in business, government, medicine, or law.

Comparative Literature

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>12-42</td>
</tr>
<tr>
<td>Comparative Literature 1, 2, 3</td>
<td>12</td>
</tr>
<tr>
<td>Foreign language: sufficient preparation to ensure satisfactory performance in the upper division level</td>
<td>0-30</td>
</tr>
</tbody>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seven upper division courses (in original languages, one of which may be English) distributed between the first and second literatures of concentration with the approval of the adviser</td>
<td>28</td>
</tr>
<tr>
<td>Comparative Literature 141</td>
<td>4</td>
</tr>
<tr>
<td>Two additional upper division Comparative Literature courses, preferably including one in a major literary period or movement</td>
<td>8</td>
</tr>
</tbody>
</table>

Total Units for the Major

152-82

Recommended

Art 10; Dramatic Art 20; Classics 10, 40, 41; History 4A, 4B, 4C. Philosophy 6.

Minor Program Requirements:

The minor in Comparative Literature involves students to combine courses in Comparative Literature with courses in one or two national literatures, including English and foreign literatures in translation. There is no language requirement for the minor.

Comparative Literature

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparative Literature 1, 2, or 3</td>
<td>4</td>
</tr>
<tr>
<td>Two upper division Comparative Literature courses (Comparative Literature 141) strongly recommended</td>
<td>8</td>
</tr>
<tr>
<td>Three upper division courses in one or two national literatures (including English)</td>
<td>12</td>
</tr>
</tbody>
</table>

Courses in Comparative Literature

Lower Division Courses

1. Great Books of Western Civilization: From Myth to Faith (4)
2. Literature: Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Alliteration requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from The Epic of Gilgamesh to St. Augustine's Confessions.

Graduate Study. Comparative Literature offers programs of study and research leading to the M.A. and Ph.D degrees. Detailed information may be obtained from the Graduate Adviser.

Graduate Adviser. R. Cohn.
49. Freshman Seminar: General Topics in Comparative Literature (2). The Staff (Director in charge)
Seminar—2 hours; discussion—1 hour; term paper. An introductory study dealing with topics such as Utopia, childhood and adolescence, sense and nonsense, and the voyage as recurrent theme in literature. (P/NP grading only.)

53A-C. Literature of the Eastern World (3) I, II, III. Ury
Lecture—1 hour; discussion—2 hours; term paper. A survey of literature written in various languages and literatures of the Eastern world, including China, Japan, Korea, India, and the Middle East.

54. The Short Story and Novella (4) I, II. The Staff (Director in charge)
Lecture—2 hours; discussion—1 hour; term paper. An introduction to the short story and novella as literary forms.

56. Mythology and Prehistory (3) I, II. Hoermann
Lecture—2 hours; discussion—1 hour. An introduction to the comparative study of myths and legends, including those of Greece and Rome, with readings from Near Eastern, Indian, and Japanese literatures.

57. Literature of the Fantastic and Supernatural (3) I, II. Hoermann
Lecture—2 hours; discussion—1 hour. An introduction to the fantastic and supernatural literature of the world.

58. Utopias and Their Transformations (3) I, II. Hoermann
Lecture—2 hours; discussion—1 hour. An exploration of utopian literature, focusing on its transformation over time.

10A-H. Masterpieces of World Literature (2, 3) I, II, III, The Staff (Director in charge)
Lecture-discussion—one-hour session. A representative selection of classical works chosen to acquaint the student with the major trends in the literature of various countries.

13. Dramatic Literature (4) III. Cohn
Lecture—2 hours; discussion—1 hour; term paper. An introduction to the dramatic form, focusing on various playwrights and their works.

15. The Spiritual Quest (3) I. Torrance
Lecture—2 hours; discussion—1 hour. An exploration of the spiritual quest in literature, focusing on the search for meaning and purpose.

20. Man and the Natural World (4) III. Torrance
Lecture—2 hours; discussion—1 hour; term paper. An examination of the relationship between humans and nature as represented in literature.

40. Introduction to Comparative Literature (4) I, II. The Staff (Director in charge)
Lecture—2 hours; discussion—1 hour; term paper. An introduction to the comparative study of different languages and literatures.

163. Biography and Autobiography (4) III. Cohn
Lecture—2 hours; discussion—1 hour; term paper. Portrayals of famous figures in literature and biographical accounts of significant literary figures.

164. The Middle Ages (4) I. Torrance
Lecture—2 hours; discussion—1 hour; term paper. Readings in medieval literature, focusing on the development of religious and courtly literature.

165. The Renaissance (4) II. Torrance
Lecture—2 hours; discussion—1 hour; term paper. Readings in the Renaissance, focusing on the development of humanism and the scientific revolution.

166. The Enlightenment (4) I. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the Enlightenment, focusing on the development of rationalism and the scientific method.

167. The Romantic Period (4) II. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the Romantic period, focusing on the development of individualism and the subjective experience.

168. The Novel (4) I. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the novel, focusing on the development of the novel form and its evolution over time.

169. The Theatre (4) II. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the theatre, focusing on the development of the theatre as an art form.

170. The Short Story and Novella (4) I. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the short story and novella, focusing on the development of these forms as literary genres.

171. Poetry (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in poetry, focusing on the development of various poetic forms and their evolution over time.

172. The Novel (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the novel, focusing on the development of the novel form and its evolution over time.

173. The Theatre (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the theatre, focusing on the development of the theatre as an art form.

174. The Short Story and Novella (4) I. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the short story and novella, focusing on the development of these forms as literary genres.

175. Poetry (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in poetry, focusing on the development of various poetic forms and their evolution over time.

176. The Novel (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the novel, focusing on the development of the novel form and its evolution over time.

177. The Theatre (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the theatre, focusing on the development of the theatre as an art form.

178. The Short Story and Novella (4) I. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the short story and novella, focusing on the development of these forms as literary genres.

179. Poetry (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in poetry, focusing on the development of various poetic forms and their evolution over time.

180. The Novel (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the novel, focusing on the development of the novel form and its evolution over time.

181. The Theatre (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the theatre, focusing on the development of the theatre as an art form.

182. The Short Story and Novella (4) I. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the short story and novella, focusing on the development of these forms as literary genres.

183. Poetry (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in poetry, focusing on the development of various poetic forms and their evolution over time.

184. The Novel (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the novel, focusing on the development of the novel form and its evolution over time.

185. The Theatre (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the theatre, focusing on the development of the theatre as an art form.

186. The Short Story and Novella (4) I. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the short story and novella, focusing on the development of these forms as literary genres.

187. Poetry (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in poetry, focusing on the development of various poetic forms and their evolution over time.

188. The Novel (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the novel, focusing on the development of the novel form and its evolution over time.

189. The Theatre (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the theatre, focusing on the development of the theatre as an art form.

190. The Short Story and Novella (4) I. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in the short story and novella, focusing on the development of these forms as literary genres.

191. Poetry (4) III. Kusch
Lecture—2 hours; discussion—1 hour; term paper. Readings in poetry, focusing on the development of various poetic forms and their evolution over time.
Consumer Economics: Consumer Food Science; Consumer Science

Microbiology with laboratory (Bacteriology 2, 3) 4
Physiology (116) 5
Statistics (Agricultural Science and Management 150) 4
Written and oral expression (see College requirement) 8

Depth Subject Matter 47
Community nutrition (Nutrition 118) 3
Consumer economics (Consumer Economics 141, 142) 8
Food Science and Technology including 100A, 100B, 101A, 101B, 107, Nutrition 20 or 120, and one additional course each in food chemistry, food microbiology, and food processing 26
Human nutrition with laboratory (Nutrition 110, 111, 111L) 10

Breadth Subject Matter 24
Principles of economics (Economics 1A-1B) 5
Consumer behavior (Consumer Sciences 100) 3
At least one course from two different areas: agricultural economics, applied behavioral sciences, consumer sciences, cultural anthropology, psychology, or sociology. Remainder in social sciences and humanities electives 11

Restricted Electives 29
Four major courses selected in accordance with student's educational goal with approval of adviser 20

Total Units for the Major 180

Recommended
It is recommended that students interested in graduate work take Chemistry 5, English 104, Mathematics 16A-16B-16C and Physics 2A-2B-2C.

Major Advisor. H. G. Schultz (Textiles and Clothing)

Graduate Study. Related graduate study and research leading to the M.S. degree in Food Science or Nutrition is available. See page 99 and the Announcement of the Graduate Division for details on graduate study.

Consumer Science

(Allege of Agricultural and Environmental Sciences)

Faculty
See under Division of Textiles and Clothing, and the Departments of Agricultural Economics and Food Science and Technology.

Major Programs and Graduate Study
Consumer Food Science (this page) and Home Economics (page 229) are related majors; for graduate study, see page 99.

Related Courses. See Consumer Economics, Food Science and Technology, Nutrition, and Textiles and Clothing.

Courses in Consumer Science
Questions pertaining to the following courses should be directed to the instructor or to the Division of Textiles and Clothing, 129 Evergreen Hall.

Courses in Consumer Economics

Questions pertaining to the following courses should be directed to the instructor or to the Department of Agricultural Economics, 105 Voorhies Hall.

Computing Science

See Engineering: Electrical and Computer Science, or Mathematics

Consumer Economics

(Allege of Agricultural and Environmental Sciences)

Faculty
See under Department of Agricultural Economics.

Major Program and Graduate Study
See the major in Development, Resource, and Consumer Economics (page 169); and see pages 99 and 135.

Related Courses. See Agricultural Economics.

Courses in Consumer Economics

Questions pertaining to the following courses should be directed to the instructor or to the Department of Agricultural Economics, 105 Voorhies Hall.

Upper Division Courses

141. Consumers and the Market (4) II, Lane, III, Kushman Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. The structure of the market and the effects of its performance on consumers. Agen- cies aiding and protecting consumers, sources of informa- tion available to consumers. Students who have had or are taking Agricultural Economics 100A, Economics 100, or the equivalent may receive only 3 units of credit, so must enroll in course 141M.

141M. Consumers and the Market (3) II, Lane, III, Kushman Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. The structure of the mar- ket and the effects of its performance on consumers. Agen- cies aiding and protecting consumers, sources of informa- tion available to consumers. Students who have had or are taking Agricultural Economics 100A, Economics 100, or the equivalent must enroll in this course (for 3 units) rather than course 141.


198. Directed Group Study (1-5) I, II, III, Th, Staff (Chairperson in charge) (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Graduate Courses

220. Economics of Consumer Policy (3) III. Shepard Lecture—3 hours. Prerequisite: one graduate course in economic theory and one course in econometrics or the equivalent. Policy criteria; sources of market failure; con- sumer policy alternatives; empirical evaluation of selected economic policies.

258. Economics of Consumption (3) III. Lecture—3 hours. Prerequisite: one graduate course in micro-economic theory. Advanced analysis of consumer behavior; application of economic theory to specific issues.


299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only)

Consumer Food Science

(Allege of Agricultural and Environmental Sciences)

The Major Program

The Consumer Food Science major emphasizes both the biological properties of foods and the socioeconomic and cultural aspects of foods as they relate to consumer acceptability and use. Students are provided with sufficient range in study of the biological, natural, and social sciences to prepare them for careers such as food product development, quality assurance, marketing and sen- sory analysis, extension service, creative writing, and community service. The major provides academic preparation for those who plan to pursue similar careers or to undertake graduate study in Food Science or Nutrition.

Consumer Food Science

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more compre- hensive courses are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter 60 UNITS

Biochemistry (Biochemistry 101A, 101B) 6
Biochemistry (Biochemistry 101A, 101B) 6
Biochemistry (Biochemistry 101A, 101B) 6
Chemistry, general and organic (Chemistry 1A-1B, 1C, 8A-8B) 21
Mathematics and physics (Mathematics 19, Physics 10) 7

NOTE: For key to footnote symbols, see page 130

Consumer Science

(Allege of Agricultural and Environmental Sciences)

Faculty
See under Division of Textiles and Clothing, and the Departments of Agricultural Economics and Food Science and Technology.

Major Programs and Graduate Study
Consumer Food Science (this page) and Home Economics (page 229) are related majors; for graduate study, see page 99.

Related Courses. See Consumer Economics, Food Science and Technology, Nutrition, and Textiles and Clothing.

Courses in Consumer Science

Questions pertaining to the following courses should be directed to the instructor or to the Division of Textiles and Clothing, 129 Evergreen Hall.

Lower Division Courses

47. Food Product Development Field Study (1) II. Schultz Discussion—three 5-hour sessions; field trip—2 days. To observe commercial aspects of the large-scale develop- ment, distribution and evaluation of food products intended
Consumer Technology

(Graduate Courses)

Consumer Technology

(Graduate Courses)

Consumer Technology

(Graduate Courses)

Consumer Technology

(Graduate Courses)

Consumer Technology

(Graduate Courses)

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Courses in Design

Questions pertaining to the following courses should be directed to the instructor or to the Department of Applied Behavioral Sciences, 119 AOS-4.

Lower Division Courses


134. Environmental Design (4) I., II., III., IV., V., VI., VII., VIII.

Study—8 hours. Prerequisite: courses 21, 130 recommended. Exploration of specific problems in interior form and exterior space design for the disabled, and contemporary urban problems.

153. Furniture Design (4) I., II., III.

Study—8 hours. Prerequisite: course 21; course 180A recommended. Development of furniture for interior and exterior spaces. Includes behavioral and physical requirements, cultural and historical expression, structural and aesthetic considerations.

40A. History of Design (3) I., II.

Study—12 hours. Prerequisite: course 1A (may be taken concurrently). The history of Western design from Ancient Egypt and the Middle East through the Aegian and Classical civilizations to the waning of the Middle Ages.

40B. History of Design (3) II.

Study—12 hours. Prerequisite: course 1B or consent of instructor. The history of Western design from the Renaissance through the Baroque, the Rococo and Neoclassicism of the eighteenth century, nineteenth century, Industrialization to the emergence of modernism.

41A. World Textiles: Far East and Pacific (4) I.

Study—12 hours. Prerequisite: course 1A. Exploration through lectures and visual material of the textiles of Japan, China, Korea, India, Indonesia, and the Pacific Islands with emphasis on the aesthetic and stylistic qualities of these cultures.

41B. World Textiles: Middle East, Europe and United States (4) II.

Study—12 hours. Prerequisite: course 1B. The history of costume and textiles in the Middle East, Europe, and the United States with emphasis on aesthetic and stylistic qualities. The influence of Eastern textiles on textiles of Europe and the United States.

143. History of Costume Design (4) I.

Study—12 hours. Prerequisite: course 1A. The history of costume design from the earliest times to the present with emphasis on both aesthetic and functional aspects.

144. History of Interior Design (3) III.

Study—12 hours. Prerequisite: course 2A or 2B. Exploration through visual material of the history of Western interior design from its beginnings in Ancient Egypt through the Classical, Medieval, and Renaissance worlds to modern times.

160-160B. Textile Design (4-4-4) A., B., C., D., E., F.

Study—8 hours. Prerequisite: courses 20A and 20B recommended. Exploration of the design and appreciation of hand printed textiles; emphasis on the unique qualities of the individual as producer.

170A-170B. Costume Design (4-4-4) I., II., III.

Study—12 hours. Prerequisite: courses 20A and 20B recommended. Studio projects in costume design; consideration of functional and aesthetic factors influencing the historical, contemporary, or invented image of man as expressed through costume.

180-180B. Interior Design (4-4-4) I., II., III.

Study—8 hours. Prerequisite: Design 21 recommended. Analysis, organization, and solution of interior design problems involving the social, cultural, economic, and aesthetic needs of man. Consideration of the interrelationship of interior design, architectural and landscape design.

190. Prosenium (2) III.

Study—2 hours. Prerequisite: Design major or consent of instructor. (P/N grading only.)

191A. Design Workshops in Design (4-12) I., II., III.

Study—12 hours. Prerequisite: Design 21 recommended. Analysis, organization, and solution of interior design problems involving the social, cultural, economic, and aesthetic needs of man. Consideration of the interrelationship of interior design, architectural and landscape design.

192. Internship (1-12) I., II., III.

Field placement—6-36 hours. Prerequisite: completion of 44 units and consent of instructor. Supervised internship off and on campus, in areas of Design including environmental, costume, textile, graphic, museum, display, and interior design. (P/N grading only.)

198. Directed Group Study (1-12) I., II., III.

Study—12 hours. Prerequisite: permission of instructor. (P/N grading only.)

199. Special Study of Advanced Undergraduates (1-5) I., II., III.

Study—12 hours. Prerequisite: permission of instructor. (P/N grading only.)

NOTE: For key to footnote symbols, see page 130

Design, Development, Resource, and Consumer Economics

(From College of Agricultural and Environmental Sciences)

The Major Program

The major in Development, Resource, and Consumer Economics prepares you for a career in one or more of the following areas: the economics of community, regional and international development; the economics of human resources; the economics of natural resources; and consumer economics. This major enables you to prepare for further studies at the graduate level as well as to pursue career opportunities in government agencies on all levels, non-profit organizations, social agencies, research organizations, and with firms employing economists with this background. New directions of economic application of the major, research topics, and problems are reflected in this major. Flexibility is provided by options which allow you to focus either on the natural and agricultural sciences or on the social sciences.

Development, Resource, and Consumer Economics

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>36-37</td>
</tr>
<tr>
<td>Written and oral expression (See College requirement, page 70)</td>
<td>8</td>
</tr>
<tr>
<td>American History and Institutions</td>
<td>10</td>
</tr>
<tr>
<td>Economic principles (Economics 1A-1B)</td>
<td>10</td>
</tr>
<tr>
<td>Statistics (Statistics 13, Economics 12)</td>
<td>6</td>
</tr>
<tr>
<td>additional mathematics, including calculus</td>
<td>6</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>32-33</td>
</tr>
<tr>
<td>Theory: Agricultural Economics 100A-100B</td>
<td>10</td>
</tr>
<tr>
<td>Economics 101</td>
<td>13</td>
</tr>
<tr>
<td>Statistics: choose two courses from Agricultural Economics 106A, 106B, 155</td>
<td>7-8</td>
</tr>
<tr>
<td>Policy and Planning: choose four courses from Agricultural Economics 148, Economics 125A, 125B, 130, 131, 150B</td>
<td>12</td>
</tr>
<tr>
<td>Applied Behavioral Sciences 151, 152, Political Science 100, 174, Environmental Studies 160, 162, 168A, 168B, or the equivalent</td>
<td>12</td>
</tr>
<tr>
<td>Breadth Subject Matter</td>
<td>32</td>
</tr>
<tr>
<td>Natural sciences (including mathematics beyond Preparatory Subject Matter above) and agricultural and environmental sciences (other than agricultural economics, consumer economics, and applied behavioral sciences)</td>
<td>12 units minimum</td>
</tr>
<tr>
<td>Social sciences (excluding economics), history, and philosophy</td>
<td>20 units minimum</td>
</tr>
</tbody>
</table>

*Students meeting the American History and Institutions requirement may substitute Social Science as interpreted under the Social Sciences Breadth Subject Matter requirement.

*Students graduating with this major are required to maintain at least a C average (2.0) in all upper division Agricultural Economics, Consumer Economics, and Economics courses taken at the University.
Dietetics; Dramatic Art

Restricted Electives ........................................... 24
Specialization requirement:
(a) Select one or more from the following in the designated area of specialization:

Developmental economics:
Agricultural Economics 106, 148:
Natural resource economics:
Agricultural Economics 106, 176;
Human resource economics:
Agricultural Economics 150;
Consumer economics:
Consumer Economics 141, 144;
(b) 4 units of Agricultural Economics 190A-190B (required of students seeking departmental honors at graduation) or 4 upper division units of restricted electives.

Unrestricted Electives ........................................... 54-56
Total Units for the Major .......................... 180

Breadth Subject Matter
Contact departmental advisors for up-to-date lists of courses which are acceptable for this requirement.

Major Adviser. B.S. Zoloth (Agricultural Economics)

Information Center for major is located at 105 Voorhis Hall.

Dietetics (College of Agricultural and Environmental Sciences)

The Major Program

The Dietetics major provides you with training in normal and therapeutic nutrition, biological and social sciences, food science, communication, and management. This major fulfills the academic requirements for admission into a dietetics internship or the equivalent which must be completed before qualifying for registration as a dietitian. Dietitians are sought for administrative, therapeutic, teaching, research, and public service positions in hospitals, schools, clinics, and other institutions.

You will be qualified for admission to graduate programs in dietetics, nutrition science, public health nutrition, and food service management. Clinical Dietetics, Community Nutrition, and Food Service Management are the three options available with the Dietetics major.

Dietetics

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter .................................. 42-50
Written and oral expression (English I and Rhetoric 1 or 3) ........................................... 8
Statistics (Statistics 13 or Economics 12) ..................................................... 4-6
Physics (Physics 1A-B or 2A-2B-C) or 10 or
Agricultural Engineering Technology 212 ......................................................... 4-9
Chemistry, general and organic (Chemistry 1A, 1B, 8A, 8B) ......................................................... 16
Biology (Biology 1 or 2) .......................................................... 5
Bacteriology with laboratory (Bacteriology 2, 3) ......................................................... 4
Computer logic or programming (Computer Technology 31 or Mathematics 19) ......................................................... 1-8

Additional Specialization (Optional)

Students wishing to complete an additional specialization in Dietetics may elect one of the series of courses indicated below. Students are not required to elect any of these courses.

Clinical Dietetics specialization, include the following courses:

Biochemistry laboratory (Biochemistry 101) ......................................................... 5
Chemistry, general and organic (Chemistry 1A, 1B, 8A, 8B) ......................................................... 16
Human Physiology (Medicine) .......................................................... 4
Community Nutrition specialization, include the following courses:

Nutrition 116A, 116BL, 118, 119 .......................................................... 10
Anthropology 2 .......................................................... 4
Sociology 3, 130, 143 .......................................................... 12
Food Service Management specialization, include the following courses:

Agricultural Economics 117 .......................................................... 4
Economics 19, 14A, 14B, and 160A .......................................................... 16

Major Adviser. J.S. Stern (Nutrition)

Graduate Study, See page 99.

Dramatic Art

(College of Letters and Sciences)

Robert A. Fahmer, Ph.D., Chairperson of the Department

Department Office, 222 Dramatic Art Building (752-0888)

Faculty

Gene A. Chesley, M.A., Lecturer
Rudy Cohn, Ph.D., Professor (Dramatic Art, Comparative Literature)
Everard d’Hamoncourt Ph.D., Professor
Robert A. Fahmer, Ph.D., Professor
Harry C. Johnson, M.A., Associate Professor
William E. Kies, D.F.A., Associate Professor
Phyllis J. Kress, M.F.A., Lecturer
Robert K. Saras, Ph.D., Professor
Theodore J. Shank, Ph.D., Professor
Daniel E. Snyder, Professor
Alan A. Stansbury, Ph.D., Professor
Darrel F. Winn, M.A., Lecturer

The Major Program

Dramatic Art, with its classroom courses in each of the scholarly and artistic areas of the discipline, and with its University Theatre Season and its Premiere Season, has the following objectives: to form proficient theatre-goes as part of a liberal arts education (in both lower division and upper division work); to provide a foundation for potential specialists (particularly in upper division work); and to train specialists for careers in theatre, film, video, education, or related fields (graduate work).

The University Theatre

Each year the Department of Dramatic Art presents a series of stage productions of outstanding drama from various periods and countries. These productions are part of the academic program of the Department and serve an important purpose in the study of dramatic art. Participation is open to all students.

Guest Artists’ Program. The Department of Dramatic Art periodically engages professional guest artists to work with students in productions and creative workshops.

Dramatic Art

A.B. Major Requirements:

Preparatory Subject Matter .................................. 22
Dramatic Art 20, 21A, 24, 25 ......................................................... 14
Dramatic Art 21B or 27 ......................................................... 3-4

Additional units to achieve a total of 22 lower division units in Dramatic Art ......................................................... 4-5

Depth Subject Matter ......................................................... 39
Dramatic Art 127B or 160B ......................................................... 4

In exceptional cases, with the adviser’s consent, the student may petition to substitute up to 8 units from other Dramatic Art courses for any of the above courses.

Minor Program Requirements:

Dramatic Art ......................................................... 19
Dramatic Art 124A, 156, 157 or 158, 159 ......................................................... 19

Major Adviser. G.A. Chesley, T.J. Shank

Transfer Students. If you are a transfer student you should see the major adviser for an evaluation of your experience.

Teaching Credential Subject Representative. G.A. Chesley, T.J. Shank. See page 105 for the Teacher Education Program.

Graduate Study. The Department of Dramatic Art offers programs of study and research leading to the M.A., M.F.A. (acting, design, directing, playwriting, or any combination of these), and Ph.D. (theatre research) degrees. Detailed information may be obtained by contacting the Graduate Adviser.

Graduate Adviser. E. d’Hamoncourt.

Lower Division Courses

10. Introduction to Acting (3) I, II, III. The Staff

Laboratory-discussion—4 hours. Fundamentals of movement, speech, stage-games, and improvisations. Selected reading and viewing of theatre productions intended for students not specializing in Dramatic Art.

15. The Art of the Cinema (4) I, II. d’Hamoncourt

Lecture—3 hours, laboratory—2 hours. The cinema as an art form, its relation to other arts, its evolution with emphasis on the significant modern contributions.

15L. Introduction to Filmmaking (2) I, II. d’Hamoncourt

Lecture-demonstration—1 hour; laboratory—3 hours. Pre-requisite to be taken in conjunction with course 15 or by consent of instructor. Students in small groups will write, shoot, and edit 8 mm films, and prepare sound tracks for them.
elements of design, execution of designs for modern and period plays.

124C. Principles of Theatrical Design (3) I. Winn Lecture—2 hours; laboratory—2 hours. Prerequisite: course 24 or consent of instructor. Theories of lighting the stage, equipment and control systems, execution of lighting plots.

124D. Principles of Theatrical Design (3) I. Kress Lecture—2 hours; laboratory—2 hours. Prerequisite: course 24 or consent of instructor. Source materials for theatrical costuming and design: analysis of plays in terms of costume design, execution of designs for modern and period plays.

126. Production Management (3) I. Chesley Lecture—3 hours. Prerequisite: course 127A. Theatrical production process, including techniques of stage management, technical direction, casting procedures and audience control.

127A. Principles of Directing (4) I. Stambusky Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 21A and consent of instructor. Theory and practice of directing: emphasis on character analysis, interpretation, and development. Acting in a student-directed project. Viewing of theatrical productions. Limited to those planning to major in Dramatic Art.

218. Fundamentals of Acting (4) III. The Staff Lecture—2 hours; laboratory—4 hours. Prerequisite: course 21A and consent of instructor. Theory and practice of acting with emphasis on character analyses, interpretation, and development. Acting in a student-directed project. Viewing of theatrical productions. Limited to those planning to major in Dramatic Art.

24. Visual Aspects of Dramatic Art (4) III. Snyder Lecture—3 hours; laboratory—2 hours. Understanding and appreciation of the visual arts of dramatic art; theatre architecture, scenery, lighting, costume, and makeup.

25. Technical Aspects of Dramatic Art (2) I, I, I, III. Winn Lecture—1 hour; laboratory—2 hours. Understanding and appreciation of the technical principles of dramatic production; design, costuming, scenic construction, setting design, space rendering, costume construction, stage rigging, lighting and sound equipment and control systems.

27. Fundamentals of Playwriting and Directing (3) III. Kiebler Lecture—2 hours; laboratory—2 hours; reading of selected texts in the theory of directing and playwriting: Prerequisite: consent of instructor. Exercises in conceiving and developing theatre pieces with emphasis upon the creative collaboration of playwright and director.

28. Visual Arts and Theatre (4) I. Synder Lecture-discussion—4 hours. The correlation between the visual arts and design for performance. Intended for students in the visual arts as well as for prospective majors.

30. Theatre Laboratory (1-5) I, I, III. The Staff Lecture—4 hours, lab—4 hours. Prerequisite: course 25 or consent of instructor. Projects in acting, directing, design, casting, costume, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit up to a total of 6 units.

70. Theatre in Performance (4) III. Kiebler Lecture-discussion—4 hours. Theatre attendance and appreciation; traditional and experimental. Field trips, readings, discussions, intended for students not specializing in Dramatic Art as well as for prospective majors. May be repeated once for credit.

98. Directed Group Study (1-5) I, I, I, III. The Staff (Chairperson in charge) Directed Group Study of a special topic. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, I, I, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses

115. Advanced Study of Major Film Makers (4) II. de Hamoncour Lecture—3 hours; laboratory—2 hours. Prerequisite: course 121A. Analysis of the contribution of some outstanding film creators. Study of diverse aesthetic theories of the cinema and the application to selected films. May be repeated for credit when different film creator studied.

121A. Advanced Acting (4) I. Johnson Lecture—2 hours; laboratory—4 hours. Prerequisite: course 21B and consent of instructor. Theory and practice of acting focusing on performance problems and the maximization of individual resources.

121B. Advanced Acting (4) I. Johnson Lecture—2 hours; laboratory—4 hours. Prerequisite: course 121A and consent of instructor. Theory and practice of acting focusing on performance problems and the maximization of individual resources.

124A. Principles of Theatrical Design (3) I. Chesley Lecture—2 hours; laboratory—2 hours. Prerequisite: course 121A and consent of instructor. Theory and practice of acting focusing on performance problems and the maximization of individual resources.

124B. Principles of Theatrical Design (4) II. Snyder Lecture—2 hours; laboratory—2 hours. Prerequisite: course 124A. Analysis of plays in terms of scene design;

NOTE: For key to footnote symbols, see page 150.

1977. Tutoring in Dramatic Art (1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: upper division or graduate standing with major in dramatic art; consent of department chairperson. Leading of small workshop groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, I, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, I, I, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200. Methods and Materials in Theatre Research (4) I. Sarris Seminar—3 hours. Essential research tools in theatre and related fields: bibliographical, primary sources; methods of evaluating and presenting evidence; delineating research areas in the field.

211. Advanced Voice and Speech (2) I, I, III. The Staff Laboratory—4 hours. Open to advanced undergraduates with consent of instructor. Rhythm, movement, patterns related to acting problems in classic and modern plays.

212. Advanced Stage Movement (2) I, II, III. The Staff Lecture—4 hours. Prerequisite: open to advanced undergraduates with consent of instructor. Rhythm, movement, patterns related to acting problems in classic and modern plays.

214. Advanced Problems in Acting (4) I. Johnson Seminar—2 hours; laboratory—4 hours. Prerequisite: consent of instructor. Advanced acting problems arising from differences in the type and style of plays selected from Greek to the Renaissance.

215. Special Problems in Acting (4) I. Johnson Seminar—2 hours; laboratory—4 hours. Prerequisite: consent of instructor. Advanced acting problems relating to plays selected from the Renaissance to Romanticism.

216. Special Problems in Acting (4) II. Johnson Seminar—2 hours; laboratory—4 hours. Prerequisite: consent of instructor. Advanced acting problems in plays drawn from Romanticism to the present.


218. Advanced Principles and Theories of Theatrical Design (4) I. Chesley Seminar—3 hours. Special problems in the design of stage scenery and costumes; practice in design.

219. Advanced Principles and Theories of Theatrical Design (4) II. Chesley Seminar—3 hours. Design of a production for three different types of theatres: open stage, arena, and proscenium.

227. Seminar in Directing Theory: Realism (4) I, Kiebler Seminar—3 hours; term project. Modern directing theory as it applies to theatrical realism; development of directorial concepts for productions of selected realistic plays; emphasis on textual analysis. Offered in even-numbered years.

228. Seminar in Directing Theory: Non-Realism (4) I, Kiebler Seminar—2 hours; laboratory—4 hours. Prerequisite: consent of instructor. Specialized directorial techniques in the staging of non-realistic plays.

229A. Special Problems in Directing (5) I, Stambusky Seminar—2 hours; laboratory—2 hours; rehearsal—4 hours. Prerequisite: consent of instructor. Advanced acting problems arising from differences in the style and type of plays selected from Greek to the Renaissance.

229B. Special Problems in Directing (5) II. The Staff Seminar—2 hours; laboratory—2 hours; rehearsal—4 hours. Prerequisite: consent of instructor. Projects in directing scenes selected from plays of the Greek to the Renaissance periods.

229C. Special Problems in Directing (5) III. The Staff Seminar—2 hours; laboratory—2 hours; rehearsal—4 hours. Prerequisite: consent of instructor. Projects in directing scenes selected from plays of the emergence of Realism to the present.

230A-230B. Classic and Medieval Theatre (4-4) I, II. Fahn- ner, Sarris Seminar—3 hours. The theatre of Greece, Rome and Middle Ages; emphasis on relationship of dramas of the period to
East Asian Studies: Ecology

physical circumstances of production. Course 230A may be taken separately includes readings and discussion; 230B emphasizes research culminating in a substantial scholarly paper. (Deferred grading only, pending completion of sequence. Can be in effect.)

235A-235B. Renaissance and Ibarque Theatre (4-4) II, III. Fahmeh, Sarlos. Seminar—2 hours. The theatre of Italy, Spain, England, and France, 1500-1660; emphasis on relationship of drama to the physical circumstances of production. Course 235A may be taken separately includes readings and discussion; 235B emphasizes research culminating in a scholarly paper. (Deferred grading only, pending completion of sequence can be in effect.)

240A-240B. Neoclassic and Romantic Theatre (4-4) II, III. Fahmeh, Sarlos. Seminar—2 hours. The theatre of France, England, Germany, Italy, and America, 1660-1860; emphasis on relationship of drama to the period to the physical circumstances of production. Course 240A (may be taken separately) includes readings and discussion; 240B emphasizes research culminating in a scholarly paper. (Deferred grading only, pending completion of sequence can be in effect.)

250. Modern Theatre (4) II, III. Sarlos. Seminar—2 hours. The theatre of Europe and America, 1860-1940, with emphasis on the relationship of the drama of the period to the physical circumstances under which they were produced. Offered in even-numbered years.

259. Contemporary Theatre (4) II, Cohn. Seminar—2 hours. Term paper. Selected aspects of contemporary Western theatre, with attention to their modes of production.


292. Contemporary Theatre Practice (2) III. The Staff. Seminar—2 hours. Seminar in the techniques and requirements for pursuit of studies as a theatre professional. Includes survey of Broadway, Off-Broadway, regional, university, and community theatres. Offered in even-numbered years.

296. Group Study (1-5) I, II, III. The Staff. (Chairperson in charge. Prerequisite: consent of instructor.)

299. Individual Study (1-12) I, II, III. The Staff. (Chairperson in charge. (SU grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff. (Chairperson in charge. (SU grading only.)

Professional Courses

413. Stage Make-up (1) II. The Staff. Lecture—2 hours. Prerequisite: consent of instructor. Lectures, demonstrations, and practical work in aspects of theatrical make-up.

East Asian Studies

(College of Letters and Science)

Program Office, 371 Voorhis Hall (752-0439)

Committee in Charge

Don C. Price, Ph.D. (History), Committee Chairperson, Fall Quarter
Mary H. Fong, Ph.D. (Art)
Key H. Kim, Ph.D. (Oriental Languages and Civilizations)
East H. Kimmorn, Ph.D. (History)
Whalen W. Lai, Ph.D. (Religious Studies)
Janet Shinbomoto, M.A. (Oriental Languages and Civilizations)

The Major Program

The East Asian Studies major is designed to give the student an understanding of East Asia (especially China and Japan) through interdisciplinary studies, combining sustained work in an oriental language (or the equivalent) on East Asian countries. The program provides preparation either for a career that involves working with East Asian affairs and people (e.g., journalism, business, government service, teaching, and counseling), or as preparation for graduate studies in the East Asian field. Students are required to develop a special field (e.g., anthropology, history, oriental languages) within the major, to be chosen in consultation with their advisor.

Since six quarters of language work are required, students normally should apply to this program in their sophomore year.

East Asian Studies

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Units</th>
<th>Preparatory Subject Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>History 9A, 9B</td>
</tr>
<tr>
<td>8</td>
<td>One course from Art 10, 20, 25, Comparative Literature 53A, History 90A, 90B, Political Science 92C, Religious Studies 4A, 70</td>
</tr>
<tr>
<td>4</td>
<td>Two courses in Japanese or Chinese language (Chinese 1-2, 3-4, 5-6, Japanese language 1-2, 3-4, 5-6)</td>
</tr>
<tr>
<td>36</td>
<td>Depth Subject Matter</td>
</tr>
<tr>
<td>20</td>
<td>History 1929-1930 or 1949-1950</td>
</tr>
<tr>
<td>6</td>
<td>Political Science 148A or 148B</td>
</tr>
<tr>
<td>4</td>
<td>Anthropology 196 or 191 or Sociology 147</td>
</tr>
<tr>
<td></td>
<td>At least 20 units from the following courses, as approved by the Committee in charge:</td>
</tr>
<tr>
<td></td>
<td>Agricultural Economics 125</td>
</tr>
<tr>
<td></td>
<td>Individual and group study courses (196, 199), as approved by the Committee in charge.</td>
</tr>
</tbody>
</table>

Total Units for the Major 84

Recommended

Students are strongly urged to take a substantial number of courses in Euro-American civilization as a basis for comparison for a deeper understanding of America's relations with East Asia.

Minor Program Requirements:

Courses taken for the minor are expected to reflect the predominant interest in either China or Japan, but to provide some exposure to the other of the two countries. All courses counting towards the East Asian Studies major, including individual and group study courses (198, 199), may be used to fulfill the requirements for the minor program, as long as they deal predominantly with China, Japan, or both.

Courses in East Asian Studies. The following courses are open to students throughout the campus. Refer to departmental listings for course descriptions.

Anthropology:

190. Cultures of China and Korea
191. Culture of Japan

Art:

1D. Asian Art
25. Myths and Symbols in Chinese Art
162A. Chinese Art
138B. Chinese Painting
164. The Arts of Japan

Economics:

171. Economy of East Asia

History:

9A. History of East Asian Civilization (China)
9B. History of East Asian Civilization (Japan)
90A. Modernization of China
90B. Modernization of Japan
102G. Undergraduate Proseminar: China to 1800
102H. Undergraduate Proseminar: China since 1800
102N. Undergraduate Proseminar: Japan
191A. Classical China
191B. Imperial China
192A. Late Imperial China: Background to Revolution
193C. The Chinese Revolution
193. History of the People's Republic of China, 1949 to the Present
194A. Sino-Tibetan and Sino-Japanese
193B. Early Modern Japan
194C. Modern Japan
194D. Topics in Japanese Social and Economic History
195. Modern China and the West

Language:

Chinese 1-2-3, Elementary Modern Chinese
4-5-6, Intermediate Modern Chinese
101. Classical Chinese
111. Modern Chinese Literature, Reading and Discussion
123-2. Elementary Modern Japanese
4-5-6. Intermediate Modern Japanese
121. Modern Japanese, Reading and Discussion

Oriental Languages and Civilizations 100. Languages of Eastern Asia

Literature in Translation:

Comparative Literature 55A. Literature of the Eastern World: China and Japan

Political Science:

9. Introduction to Contemporary Problems of Asia
132. The American Role in Asia
133. International Relations: East Asia
148A. Sino-Japanese, 148B. Government and Politics in East Asia
Religious Studies:

70. Introduction to Buddhism
172B-2. Zen (Zen) Buddhism

Sociology:

147. Sociological Perspectives on East Asia

Ecology (A Graduate Group)

R. Morton Love, Ph.D., Chairperson of the Group

Graduate Group. The Graduate Group in Ecology offers the M.S. and Ph.D. degrees in three broad study options: (1) biological, (2) human, and (3) physical and chemical sciences. Several areas of specialization are possible in each of the three. Details of the program may be obtained from the Chairperson of the Group.

Preparation. Appropriate preparation is undergraduate work in any of the biological, social or behavioral and physical sciences, mathematics or engineering. But note that all applicants to the (1) biological and (3) physical-chemical areas will nor-
Agricultural Economics 106). Examination of recent research and practice in the evaluation of environmentally related policies, programs, and plans. Ex-ante and ex-post evaluation will be studied. Offered in odd-numbered years. (Same course as Environmental Studies 212B.)

213. Advanced Demography (4) II. Cramer (Sociology) Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 145, Sociology 170, and Ecology 210, or consent of instructor; graduate standing. An analysis of the social and economic determinants of morbidity, fertility, and population size; of selected consequences of demographic trends; and of methods of demography related to human ecology. Special emphasis on methods of analysis and on contemporary societies. Offered in even-numbered years.

220. Transport Processes in the Biosphere (3) I. Myrup (Land, Air and Water Resources) Lecture—2 hours; discussion—1 hour. Prerequisite: undergraduate training in integral and differential calculus, college physics and general biology, graduate standing, and Atmospheric Science 123. A unified approach to the study of transport processes in biological systems; conservation laws and their mathematical representation; similarity principles; the phenomenon of turbulence; role of turbulent and molecular transport; in specific ecosystems. Offered in even-numbered years.

230. Analysis of a Selected Ecosystem (4) I. Sabatier, Foin (Environmental Studies) Lecture—3 hours; discussion—1 hour; field trip. Prerequisite: graduate standing in biological science orapproved courses in the Department of Plant Biology. Ecological theory, lecture, laboratory, and field work. Information will be presented by specialists from several areas. May be repeated for credit.

250. Seminar in Ecology (1-3) II. The Staff (Chairperson in charge) Seminar—1-3 hours. Prerequisite: consent of instructor. Topics in biological, human, physical, and chemical ecology. Students are expected to present an oral seminar on a particular aspect of the general topics under consideration. (S/U grading only.)

266. Group Study (1-6) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing and consent of instructor. Perception, definition, and attack on a selected ecological problem, under the supervision of a faculty member in a different department in the Graduate Group in Ecology. (Sec. 1, letter grading; all other sections, S/U grading only.)

Economics

(Economics, College of Letters and Science) Frank C. Child, Ph.D., Chairperson of the Department, Department Office, 380 Kerr Hall

Faculty

Andrzej Brzeski, Ph.D., Professor Frank C. Child, Ph.D., Professor Robert A. Drakul, Ph.D., Assistant Professor Bruce Glassburner, Ph.D., Professor Victor P. Goldberg, Ph.D., Professor W. Eric Gustafson, Ph.D., Lecturer Timothy D. Hau, Ph.D., Acting Assistant Professor L. Jay Helms, Ph.D., Assistant Professor Isamu Kaneda, Ph.D., Professor Elise M. Knoer, Ph.D., Assistant Professor Peter H. Lindert, Ph.D., Professor Thomas Maynard, Ph.D., Professor Martin Oettinger, Ph.D., Associate Professor Alan L. Olmstead, Ph.D., Professor John E. Roberts, M.A., (J.D.) (Ph.D.) Professor Linda Shafer, Ph.D., Assistant Professor Steven Sheffrin, Ph.D., Assistant Professor T. Y. Shen, Ph.D., Professor Ross M. Starr, Ph.D., Professor Elias H. Tzima, Ph.D., Professor Luan L. Wegge, Ph.D., Professor

The Major Program
Economics is the study of human social arrangements and institutions used in mankind's efforts to satisfy material wants. The economic problem is to maximize satisfaction of society's material wants within the limits established by the availability of resources and the state of our knowledge, with due allowance for noneconomic values. To maximize the economy's economic welfare, a society must utilize resources fully and efficiently in the production of goods of highest social priority and then distribute that output equitably among its members.

A major in economics will assist the student to learn how the economists examine these questions, and is an appropriate major for undergraduates contemplating graduate study in business administration, law, regional planning or public affairs.

Economics

A.B. Major Requirements:

Preparatory Subject Matter: 15
Economics 1A-B ........................................ 10
Economics 12 ........................................ 5
(At least a C average in the above courses.)

Depth Subject Matter: 36
Economics 100 or 100M: 101 ........................................ 10
One course from 110A, 110B, 111A, 111B: 4
Additional economics courses to achieve a minimum of 36 upper division units: 12-14

Total Units for the Major: 51

Recommended

Students considering graduate study in economics or business administration are strongly urged to take Mathematics 16A, 16B.

It is highly recommended, but not required, that students take Economics 100 prior to 101; and the Department also suggests that these courses be taken as soon as possible after the introductory courses. Except under extraordinary circumstances, not more than three economics courses may be taken in any one quarter. In special cases, the department will accept a limited number of related upper division courses from other departments in satisfaction of the economics upper division course requirements. Approval from a departmental adviser is required in all such cases.

Graduation with Highest Honors. To graduate with Highest Honors in Economics, a student must earn in all upper division economics classes a grade-point average equal to that required by the College in all University of California work.


American History and Institutions. This University requirement can be satisfied by completion of Economics 111A, 111B. (See also page 61.)

Teaching Credential Subject Representative. A. Brzeski. See page 105 for the Teacher Education Program.

Economics

For information on admission to graduate study, degree requirements, and financial aid, consult the Announcement of the Graduate Division and contact the chairperson of the departmental graduate committee.


Courses in Economics

Lower Division Courses

1A. Principles of Microeconomics (5) I, II, III. The Staff Lecture—3 hours; discussion—2 hours. Courses 1A and 1B may be taken in either order. Analysis of the allocation of resources and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems.

1B. Principles of Macroeconomics (5) I, II, III. The Staff Lecture—2 hours; laboratory—2 hours. The history and basic concepts of accounting; the ledger; journals, income statement, and the balance sheet; inventory valuation; depreciation, capital cost accounting; analysis of financial statements; social accounting. (Deferred grading only, pending completion of 1A-11B sequence.)

1C. Elementary Accounting (5) I. Oettinger Lecture—2 hours; laboratory—2 hours. Prerequisite: course 1A. Continuation of course 1A. (Deferred grading only, pending completion of 1A-11B sequence.)

12. Introduction to Quantitative Methods in Economics (5) I, II, III. Gustafson. Lecture—4 hours, laboratory—2 hours. Prerequisite: two years of high school algebra. Methods of analyzing quantitative economic data including descriptive statistics; sampling and statistical inference number means, correlation, and time series. Emphasis is on logic of procedures, interpretation, and application. Not open to students having credit for Statistics 13, or Sociology 46A-46B.

48. Lower Division Seminar (1-3) I, II, III. The Staff (Chairperson in charge).

Seminar—1 hour. Prerequisite: lower division standing and consent of instructor. (PINP grading only.)

92. Internship and Field Work (1-12) I, II, III. Oettinger Lecture—3 to 36 hours; term paper. Prerequisite: junior or senior standing; availability of internships position or approved field work project; stock-brokerage interns must have completed course 1A-11B. Consent of instructor. Intensive study of practical application of concepts in economics, stressing research methods and empirical analysis. (PINP grading only.)

98. Group Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. Primarily for lower division students. (PINP grading only.)

99. Individual Study for Undergraduates (1-5) I, II, III, The Staff (Chairperson in charge). Prerequisite: consent of instructor. (PINP grading only.)

Upper Division Courses

100. Intermediate Micro Theory (10) I, II, III. The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: consent of instructor. Theory of income distribution theory under conditions of perfect and imperfect competition; welfare economics. Not open to students who have received credit for Economics 100A or Agricultural Economics 109G or 110A.

100B. Intermediate Micro Theory (5) I, II. The Staff (Chairperson in charge). Lecture—4 hours, discussion—1 hour. Prerequisite: courses 1A-10B or consent of instructor. Theory of income distribution theory under conditions of perfect and imperfect competition. Welfare economics. Extensive use of algebra and the calculus. Recommended to students who have completed course 100. Agricultural Economics 100A or 100B.

101. Intermediate Macro Theory (5) I, II, III. The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-10A or consent of instructor. Theory of income distribution theory under conditions of perfect and imperfect competition. Employment and prices under various conditions. Application of the theory of the household to the economy, the determination of the price level, and the theories of price, employment and prices under static and dynamic conditions.

105. History of Economic Thought (4) III. Shen Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-18 or consent of instructor. Historical survey of economic thought from ancient to modern times. Historical and philosophical work of economists. Neoclassical theory, criticism of classical thought, emergence of modern economic thought.

110A. Economic History (4) I. Tuma Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in Europe prior to the year 1700, to the present; references to other regions of the Western Hemisphere; implications for contemporary economic development.

110B. Economic History (4) II. Tuma Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in Europe from the year 1700 to the present; reference to other regions of the Western Hemisphere; implications for contemporary economic development.

111A. Economic History (4) II. Olmstead Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in the United States from Colonial Times to 1865; reference to other regions in the Western Hemisphere.

111B. Economic History (4) III. Olmstead Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in the United States from 1865 to the post World War II era.

15A-11B. Economic Development (4-4) I, II. Glassburner, Keneda. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Theories of economic development and underdevelopment; economic policy for growth and development. Contemporary and historical case studies.


17. The Soviet Economy (4) III. Brzeski. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of Soviet economic development; economic organization, methods of planning, and performance.

17. Political Economy of Agrarian Reform (4) II. Tuma Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or the equivalent. Theory and concepts of reform; illustrations from various periods and regions. Impact on economic development; problems of change and relationships to economic, social, and political institutions.

19. Marxian Economics (4) III. Roemer. Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Introduction to Marxian economic theories, including theories of value, surplus value and exploitation; accumulation; the business cycle and crises; the role of the State and its relation to classes; imperialism. Write-up on Marx and economists in the Marxist tradition will be studied.

21A. Industrial Organization (4) I. Shen Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 (or 100M), or consent of instructor. An appraisal of the role of competition and monopoly in the American economy, market structure, conduct, and economic performance of a variety of industries.

21B. Industrial Organization (4) II. Goldberg Lecture—3 hours; discussion—1 hour. Prerequisite: course 12A-12B. Public policy in a private enterprise economy; antitrust and other policies toward industry; economics of regulated industries.

23. Ecology and Economics (4) I, II. Gustafson Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Economics and populations and the environment; economic regulation of man's interaction with its environment. Topics: population growth and its economic determinants; optimal rates of use of renewable resources; implications of common property in resources; prospects for agricultural growth.

23A-25B. Urban Economics (4-4) I, II, Shaffer Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 (or 100M), or consent of instructor. Analysis of the structure and growth of the urban economy. Topics include: labor market; housing markets; transportation; metropolitan fiscal problems; urban decay and renewal, poverty, discrimination; public policy.

130. Public Finance (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-19, 11A, 12 and Mathematics 16A. General background and rationale of corporation; finance as a resource allocation over time; decision-making under uncertainty and cost; role of financial institutions; capital market and interest rate structure; financial decisions.

135. Money, Banks and Financial Institutions (3) I, Mayer Lecture—3 hours. Prerequisite: courses 1A-18 and consent of instructor. Monetary analysis of the banking system, money creation, the Federal Reserve System, the tools of monetary policy.

138A. Monetary Theory (4) I. Mayer Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Money theory; the impact of changes in the quantity of money and of liquid assets on money income.

138B. Monetary Policy (3) III. Mayer Lecture—3 hours; discussion—1 hour. Prerequisite: courses 135 and 136A. Evaluation of monetary policy, its impact on the economy and past performance, the problem of inflation.

140. Introduction to Econometrics (4) III. Helms Lecture—3 hours; laboratory—2 hours. Prerequisite: course 12 or the equivalent. 100 or 120, 101, Mathematics 18A and 21A. Introduction to problems of observation, estimation and hypothesis testing in economics through the study of the theory and application of linear regression models; critical evaluation of empirical research and exercises in applied econometrics.

150A. Economics of Trade Unionism (4) I. Oettinger Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A-1B. Theory and philosophy of labor movements in America, Western Europe and the developing world; the structure, history and government of American Trade unions; theory and practice of collective bargaining. Offered in even-numbered years.

150B. Labor and Public Policy (4) I. Oettinger Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. Minimum wage, the content of various labor legislation; labor disputes, and the collective bargaining process; the interests of labor in welfare programs. Offered in even-numbered years.

15A. Economics of the Labor Market (4) II. Shaffer Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 100M. Theory of labor supply and demand, determination of wages and employment in the labor market. Economic theories of labor unions. Policy issues: labor force participation by married women; minimum wages and youth unemployment; effect of unions on wages. Offered in odd-numbered years.

15B. Economics of Human Resources (4) III. Shen Lecture—3 hours; discussion—1 hour. Prerequisite: course 15A. Human resource analysis. Introduction to human capital theory and economic analysis. Basic theory of wage differentials, including theories of labor market discrimination; income distribution; poverty. Policy issues: negative income tax; manpower training programs; income policy. Offered in odd-numbered years.

160. International Trade (4) I, II. Keneda Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-19, 101 or self-placement. Students who have completed Economics 162 may only re- receive 2 units credit for course 150. International theory and practice of trade on the domestic and the world economies; public policy toward external trade.

161. International Finance (4) I. Shen Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-19, 101 or self-placement. Students who have completed Economics 162 may only receive 2 units credit for course 150. International and capital markets and their impact in the domestic and world economies; international financial institutions and policies.

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162. International Economic Realties (4) III. Child
Lecture—3 hours; discussion—1 hour. Prerequisite:
courses 1A-1B or consent of instructor. International trade
and investments, foreign trade policy, exchange rate poli-
policies toward international capital migration and invest-
ment. Emphasis on current policy issues. Course intended
exclusively for non-majors. Students who have completed
course 150 or 161 may not receive credit for this course.

173. Economy of the Middle East (4) I, II, III. The Staff (Chair-
person in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite:
courses 1A-1B or consent of instructor. Intensive reading,
discussion and research on selected topics from the econo-
mies of the countries of the Middle East. Consult depart-
ment for course scheduling.

171. Economy of South Asia (4) I, II, III. The Staff (Chair-
person in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite:
courses 1A-1B or consent of instructor. Intensive reading,
discussion and research on selected topics from the econo-
mies of the countries of South Asia. Consult depart-
ment for course scheduling.

174. Economy of Europe (4) I, II, III. The Staff (Chair-
person in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite:
courses 1A-1B or consent of instructor. Intensive reading,
discussion and research on selected topics from the econo-
mies of the countries of Europe. Consult depart-
ment for course scheduling.

175. Economy of Sub-Saharan Africa (4) I, II, III. The Staff (Chair-
person in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite:
courses 1A-1B or consent of instructor. Intensive reading,
discussion and research on selected topics from the econo-
mies of the Sub-Saharan Africa. Consult depart-
ment for course scheduling.

100. Topic in Econometrics (4) I, II, III. The Staff
Lecture-discussion-seminar—4 hours. Prerequisite:
consent of instructor. Selected topics in economic analysis
and public policy. Variable content. May be repeated for
credit.

105A-105BH: 155H-C. Special Study for Honors Students—2
Lecture-discussion—2 hours. Prerequisite: consent of instructor.
Seminar: major in Economics with senior standing;
consults with instructor. Program of research cul-
minating in the writing of a senior honors thesis under the
tuition of a faculty advisor. (Defered grading only; pending
completion of course.)

107T. Tutoring in Economics (1-5) I, II, III. The Staff (Chair-
person in charge)
Undergraduate tutors will lead small voluntary discussion
groups affiliated with one of the department's regular
courses, under the supervision of, and at the option of the
instructor in charge of the course. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chair-
person in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates—1-5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses
200A. Microeconomic Theory (5) II. The Staff (Child in charge)
Lecture—4 hours; discussion—1 hour. Prerequisite: Eco-
nomics/Agricultural Economics 103, Mathematics 16A-
16B, or consent of instructor. Theories of the behavior
of individuals and institutions. Characteristics of market
equilibrium in perfectly competitive, monopolistic, and monop-
opolistic markets. (Same course as Agricultural Economics 200A.)

200B. Microeconomic Theory (5) III. The Staff (Child in charge)
Lecture—4 hours; discussion—1 hour. Prerequisite: course
200A or consent of instructor. Introduction to theories of
NOTE: For key to footnote symbols, see page 130.

162. International Economic Realities (4) III. Child
Lecture—3 hours; discussion—1 hour. Prerequisite:
courses 1A-1B or consent of instructor. International trade
and investments. Foreign trade policy, exchange rate policies
toward international capital migration and investment.
Emphasis on current policy issues. Course intended
exclusively for non-majors. Students who have completed
course 150 or 161 may not receive credit for this course.

173. Economy of the Middle East (4) I, II, III. The Staff (Chair-
person in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite:
courses 1A-1B or consent of instructor. Intensive reading,
discussion and research on selected topics from the econo-
mies of the countries of the Middle East. Consult depart-
ment for course scheduling.

171. Economy of South Asia (4) I, II, III. The Staff (Chair-
person in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite:
courses 1A-1B or consent of instructor. Intensive reading,
discussion and research on selected topics from the econo-
mies of the countries of South Asia. Consult depart-
ment for course scheduling.

174. Economy of Europe (4) I, II, III. The Staff (Chair-
person in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite:
courses 1A-1B or consent of instructor. Intensive reading,
discussion and research on selected topics from the econo-
mies of the countries of Europe. Consult depart-
ment for course scheduling.

175. Economy of Sub-Saharan Africa (4) I, II, III. The Staff (Chair-
person in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite:
courses 1A-1B or consent of instructor. Intensive reading,
discussion and research on selected topics from the econo-
mies of the Sub-Saharan Africa. Consult depart-
ment for course scheduling.

100. Topic in Econometrics (4) I, II, III. The Staff
Lecture-discussion-seminar—4 hours. Prerequisite:
consent of instructor. Selected topics in economic analysis
and public policy. Variable content. May be repeated for
credit.

105A-105BH: 155H-C. Special Study for Honors Students—2
Lecture-discussion—2 hours. Prerequisite: consent of instructor.
Seminar: major in Economics with senior standing;
consults with instructor. Program of research cul-
minating in the writing of a senior honors thesis under the
tuition of a faculty advisor. (Defered grading only; pending
completion of course.)

107T. Tutoring in Economics (1-5) I, II, III. The Staff (Chair-
person in charge)
Undergraduate tutors will lead small voluntary discussion
groups affiliated with one of the department's regular
courses, under the supervision of, and at the option of the
instructor in charge of the course. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chair-
person in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates—1-5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses
200A. Microeconomic Theory (5) II. The Staff (Child in charge)
Lecture—4 hours; discussion—1 hour. Prerequisite: Eco-
nomics/Agricultural Economics 103, Mathematics 16A-
16B, or consent of instructor. Theories of the behavior
of individuals and institutions. Characteristics of market
equilibrium in perfectly competitive, monopolistic, and monop-
opolistic markets. (Same course as Agricultural Economics 200A.)

200B. Microeconomic Theory (5) III. The Staff (Child in charge)
Lecture—4 hours; discussion—1 hour. Prerequisite: course
200A or consent of instructor. Introduction to theories of
NOTE: For key to footnote symbols, see page 130.
Education

Education

(Connect of Letters and Science)

Julius M. Sassenrath, Ph.D., Chairperson of the Department
David R. Wampler, Ph.D., Head of Teacher Education
Department Office, 174 Kerr Hall

Faculty

Donald G. Amstine, Ph.D., Professor
Helen G. Bacon, Ed.D., Lecturer in and Supervisor of Teacher Education
Hugh C. Black, Ph.D., Professor
Vincent A. Crockenback, Ph.D., Associate Professor
W. Augustus Davis, Ph.D., Lecturer in and Supervisor of Teacher Education
Linnea C. Ehrl, Ph.D., Associate Professor
Richard A. Figueroa, Ph.D., Assistant Professor
Jane Garrison, M.A., Lecturer in Teacher Education
Maryann Gatheral, B.A., Lecturer in and Supervisor of Teacher Education
Burt Liebert, M.A., Lecturer in and Supervisor of Teacher Education
Jack E. Lowy, M.A.T., Lecturer in and Supervisor of Teacher Education

Barbara J. Merino, Ph.D., Assistant Professor
Douglas L. Minnis, Ed.D., Senior Lecturer
Susan A. Ostergard, Ed.D., Lecturer in and Supervisor of Teacher Education
Victor A. Perkes, Ed.D., Lecturer in and Supervisor of Teacher Education
Jonathan H. Sandoval, Ph.D., Associate Professor
Julius M. Sassenrath, Ph.D., Professor
Joan D. Keenan, M.A., Lecturer in and Supervisor of Teacher Education
Carlton J. Spring, Jr., Ph.D., Associate Professor
Lery F. Trouthre, Ph.D., Associate Professor
David R. Wampler, B.A., Lecturer in and Supervisor of Teacher Education
George D. Yonge, Ph.D., Professor

Teacher Education Curricula

For a statement of complete requirements and appointments with credential counselors, apply to the department office. Applicants for the credential program should consult the department early in the Fall Quarter of the senior year. (See also page 105.)


CREDENTIALS COUNSELORS: Single Subject: W. A. Davis, B. Liebert, J. E. Lowy, V. A. Perkes.

(The Department of Education does not offer an undergraduate major program. However, it does offer a minor.)

Minor Program Requirements:

Educational theory is considered to be the foundation for a basic area for undergraduates to elect as a minor if they wish to (1) major in an allied program, (2) obtain a teaching credential, or (3) obtain a master's degree in education or allied field, (4) obtain a Ph.D. degree in education, (5) enter a profession that focuses on work with people, (6) seek employment in governmental or industrial training programs, or (7) obtain a better understanding of the issues and concerns of public and private education.

Minor Advisers: All faculty members with professional titles.

Courses in Education

Upper Division Courses

100. Introduction to Teaching (3) I, II, III

Lecture—1 hour; seminar—1 hour; field work—3 hours. Study of the classroom teacher's responsibilities and workplace. Skills for observing classroom activities. Observing and tutoring in public schools.

110. Educational Psychology: General (4) I, II, III, EH

Figueroa, Sandoval, Siska

Lecture—4 hours. Prerequisite: Psychology 1; upper division standing. Learning processes, intellectual development, individual differences, and testing.

114. Quantitative Methods in Educational Research (4) I, II

Yonge

Lecture—4 hours. Prerequisite: two years of high school algebra. Procedures and methods in data analysis. Design of research projects. Some considerations of procedures suited to digital computers.

115. Educating Handicapped Children (4) I, II

Figueroa

Lecture—4 hours. Prerequisite: upper division standing. Educational processes and skills required for teaching handicapped children who are integrated into regular classrooms.


Figueroa

Lecture—4 hours. Prerequisite: course 110. Examination of psycho-educational literature on Chicano children within the framework of Erik Erikson's theories towards development of an assessment-interpretation capability.

117A. Psychology of Reading (3) I, II

Eli

Lecture—3 hours. Prerequisite: Psychology 1 or the equivalent. First and second semester reading. Application of verbal learning and motivational principles to the design of curricula for the word-identification stage of beginning reading.

117B. Psychology of Reading (3) I, II

Eli

Lecture—2 hours. Prerequisite: Psychology 1 or the equivalent. Upper division reading. Consideration of theory and research on the psychological structures and processes involved in achieving reading proficiency, with emphasis on comprehension and a psycholinguistic approach to reading.

117C. Psychology of Reading (3) I, II

Eli

Lecture—2 hours. Prerequisite: Psychology 1 or the equivalent. Upper division standing. An examination of the research dealing with information processing problems in poor readers, and related remedial instructional methods.

200. Philosophical and Social Foundations of Education (4) I

Amstine, Black, Thibodeaux

Lecture—4 hours. Prerequisite: upper division standing. Philosophical historical, and sociological study of education and the school in our society.

122. The Teaching of Science (4) I, II

Crockenback

Lecture—4 hours. Prerequisite: upper division standing. The school as a social and political institution; the structure of school government, the role of teachers' organizations, the civil rights and responsibilities of teachers and students and the processes of institutional change.

123. John Dewey and the Foundations of Education (4) II

Amstine

Lecture-discussion—4 hours. Prerequisite: upper division standing. The philosophical and social foundations of education as interpreted by Dewey. While focusing on his criticism of American education and his systematic proposals for reform, attention will also be given to criticisms of Dewey.

130. Issues in Higher Education (4) I

Crockenback, Amstine, Milton (Mathematics)

Discussion—3 hours; field work—3 hours. Prerequisite: upper division standing. The issues of current issues in higher education and of some practical implications of varying philosophical approaches to the role of the university.

130L. Issues in Higher Education Laboratory (1-4) I

Amstine, Crockenback, Milton (Mathematics)

Discussion—1 hour; field work—research—3-4 hours. Prerequisite: course 130 with a passing grade. Consent of instructor and group or research on a current issue in higher education. (PRN grading only.)

140. Ivan Illich: Deschooling Society (4) I

Trouthre

Lecture—2 hours, discussion—2 hours. Discussion and analysis of the ideas of Ivan Illich particularly on schooling, deschooling, medicine, and energy.

150. Educating and Teaching Minority Children (3) II

Milton (Mathematics)

Lecture—1 hour, discussion—1 hour, tutoring or work as teacher aide in school—3 hours. Poverty, racism, and youth cultures as they affect a person's performance in school and how to deal with them in the school and community.

151. Language Development in the Chicano Child (3) II

Minnis

Lecture—3 hours. Prerequisite: some knowledge of Spanish and linguistic competence. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicano Spanish and the role of dialect varieties.

152. Communication Skills for Bilingual Teachers (3) I

Milton (Merino in charge)

Lecture-discussion—2 hours; field work—3 hours. Prerequisite: course 151; Survival/Develop communication skills of prospective educators with an emphasis on the study of and use of standard Spanish and Southwestern Spanish dialects in teaching science, mathematics, social science, music, art and language arts to bilingual elementary school pupils.
183. Guidance and Counseling (4) I, II. Figueroa. Sandstone Lecture.—4 hours. Prerequisite: course 110 may be taken concurrently. May not be taken concurrently with pupil personnel services: basic tools and techniques of guidance: theory and practice of counseling psychology, with emphasis on educational and vocational aspects. 184. Practicum and Seminar in Counseling (2) II. Seminar.—2 hours. Prerequisite: course 183 and consent of instructor. Practicum and seminar in counseling youth and adults. May be repeated twice for credit. (IPN grading only.)

189. Teaching in Learning Centers (3) II. Turner. Lecture.—1 hour; discussion.—1 hour; fieldwork.—3 hours. Methods and materials used by instructors in college learning centers, with particular emphasis on improving reading and study skills of college students. 190. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. (IPN grading only.) 199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: upper division standing and consent of instructor. (IPN grading only.)

Graduate Courses

200. Educational Research (2) II. Yonge. Lecture.—1 hour; seminar.—1 hour. Prerequisite: course 114 or the equivalent, or consent of instructor. A study of how to design, interpret, and conduct educational research.


204. Existential Thought and Education (4) I. Trounson. Lecture.—1 hour; discussion.—1 hour; seminar.—2 hours. A study of the implications of existential thought for education.

205. The Concept of Mind in Teaching (4) I. Astinme. Seminar.—4 hours. A philosophical analysis of the problems of effective practice which are created, aggravated, and sometimes solved by varying conceptualizations of mind and thinking.

207. Concepts of the Curriculum (3) I. Crockenberg Lecture.—3 hours. Prerequisite: graduate standing or consent of instructor. Development of the skills of philosophical analysis in the examination of curriculum theory and practice, including the conceptual analyses purposes of the organization of subject matters, and the methods of instruction.

208. Education and the Law (2) II. Crockenberg Seminar.—2 hours. Prerequisite: graduate standing or consent of instructor. An analysis of how selected areas of law have developed, criticism of the present state of that law, and influence on education.

209. Pedagogics (4) III. Yonge, Trounson Seminar.—4 hours. A critical analysis of the literature available in English dealing with theoretical and practical issues in education in terms of Pedagogics (i.e. the fundamental phenomenological approach to the systematic study of education). 210. Cognitive Learning (3) I. Sasserman. Lecture-discussion.—3 hours. Prerequisite: consent of instructor. A critical analysis of selected problems and procedures in the study of cognitive learning processes.

211. Psychopedagogics (4) I. Yonge. Seminar.—4 hours. Prerequisite: graduate standing or consent of instructor. A phenomenological approach to the psychosocial aspects of the educational situation. Emphasis on the consideration of how psychopedagogics contributes to the theory and practice of education.

212. Language and Intellectual Development (4) I. Elfr. Seminar.—4 hours. Prerequisite: consent of instructor. Theory and research on the development of language and thought in children; emergence of grammatical, semantic systems and operational thought; implications for education.

213. Individual Assessment (3) II. Sanov. Lecture.—3 hours; laboratory.—2 hours. Prerequisite: courses 114 and 219. Admission to school psychology program. Theories of intellectual functioning and the measurement of cognitive abilities in children; measure of intelligence: history and tactics of mental testing. Supervised practice in administration and scoring of contemporary tests including the WISC, the WAIS and the Stanford Binet with children.

215. Motivation and Behavior Modification (3) Lecture.—1½ hours; discussion.—1½ hours. Prerequisite: course 110 or consent of instructor. Analysis of the techniques for influencing behavior in educational settings, including theory and research on intrinsic and extrinsic motivation.

216. Testing Minority Children (3) III. Figueroa Lecture.—3 hours; field work.—3 hours. Prerequisite: admission to school psychology program or to M.A. bilingual education program or consent of instructor. Emphasizes tests and techniques that are appropriate for use with Hispanic students. The use of multicultural pluralistic assessment, review of guidelines and on use of tests with minority children.

219. Educational Testing and Evaluation (3) III. Sasserman. Lecture-discussion.—3 hours. Prerequisite: courses 114 and 200 or consent of instructor. Test theory as it applies to research and evaluation in education, with an emphasis on general ability and reading tests.

231. Research in Bilingual and Second Language Education (3) II. Menlo. Discussion.—1 hour; seminar.—2 hours. Prerequisite: course 151; knowledge of a foreign language. Discussion and analysis of recent research in bilingual and second language education. Topics include: language acquisition in second language learners and bilinguals; second language teaching methods; language use models in bilingual education; interaction analysis in a bilingual/cross-cultural classroom; use of the vernacular in classroom.

232. Bilingual/Multi-Cultural Instructional Strategies and Curriculum (3) II. Menlo. Seminar.—2 hours; field work.—3 hours. Prerequisite: proficiency in Spanish; courses 151, 152. Methods and techniques for development of bilingual curriculum and multi-cultural curriculum content and instruction in elementary school or cross-curricular strategies in classroom; recent cross-cultural research on motivation and cognition; development of multi-media bilingual cross-cultural curriculum.

235. Language Arts in Bilingual Education (3) I, I. Marini Seminar.—2 hours; field work.—3 hours. Prerequisite: course 151 or the equivalent; proficiency in Spanish. Analysis of bilingual education arts curriculum for bilingual cross-cultural classrooms. Topics include: language assessment; methods of teaching reading in Spanish; use of dialectal/varieties of English; methods of teaching English and Spanish as a first and second language.

270A. Reading Diagnoses and Prescription (3) III I, II. Gathenah Seminar.—2 hours; discussion.—1 hour. Prerequisite: course 300 or the equivalent. The diagnosis and treatment of reading disabilities and the recognition of reading abilities. Analysis of clinical techniques, testing, use of materials and teaching procedures.

270B. Reading Instruction in Secondary Education (3) II. Liebert Lecture.—1½ hours; discussion.—1½ hours. Prerequisite: course 301 or the equivalent. Causal factors and diagnosis of reading disabilities. Principles of reading instruction in secondary education, including phonics, whole word, and other approaches.

270C. Research in Reading Instruction (3) III. Bacon Seminar.—3 hours. Prerequisite: course 270A or 270B or the equivalent. Examination of pertinent research in phonetic analysis, comprehension, testing, oral fluency, and dialect.

270D. Clinical Laboratory and Seminar in Reading Problems (5) Extra-section summer. Bacon, Gathenah Seminar.—5 hours; laboratory.—2 hours. Prerequisite: course 300 or consent of instructor. Development and application of diagnostic and prescriptive techniques in a reading clinic.

271. Recent Developments in Social Studies Education (3) III. Lowry Lecture.—2 hours; field work.—2 hours. Prerequisite: consent of instructor. Analysis of curricular objectives, and assumptions about learning and teaching strategies, and evaluation techniques in selected social studies curriculum projects.

272. Recent Developments in Science Education (3) II. Perkes Lecture.—3 hours. Prerequisite: consent of instructor. Analysis of contemporary curricula with special emphasis upon philosophical, psychological and pedagogical attributes of their design; trends, issues, and research in science curriculum and instruction.

275. Effective Teaching (4) I. Minnis Seminar.—4 hours. Prerequisite: course 110, consent of instructor. Analysis of contemporary curricula with special emphasis upon philosophical, psychological and pedagogical attributes of their design; trends, issues, and research in science curriculum and instruction. Effects of teacher behavior on student learning. Use of research in the study of effective teaching strategies. Ways to decide on the most appropriate instructional strategies in specific teaching situations.

290. Seminar (2) I, II, III. The Staff (Chairperson in charge) Seminar.—2 hours. Prerequisite: graduate standing.

299. Research (1-6) I, II, III. The Staff (Chairperson in charge) Individual research for graduate students. (SU grading only.)

Professional Courses

300. Reading and Language Arts in the Elementary School (4) I. Bacon, Gathenah Lecture.—3 hours; field work.—2 hours. Prerequisite: consent of instructor. Principles, procedures and curriculum materials for the teaching of reading and the oral and written language arts. Includes phonics and other developmental reading skills.

301. Reading in the Secondary School (4) I, II, III. Liebert. Discussion.—4 hours. Prerequisite: must be teaching or student teaching. Principles, procedures, and materials to help secondary school teachers improve the reading comprehension of their students. The teaching of phonics, structural analysis, and alternative methods of coping with the problem reader in the classroom.

303. Art Education (3) III. Garrison Lecture.—1 hour; discussion.—1 hour; laboratory.—2 hours. Prerequisite: admission to multiple subject credential program. Understanding the principles of art and art through participation. Development of concepts, introduction to media and techniques suitable for the elementary school, with emphasis on cross-discipline explorations.

304. A. Teaching in the Elementary Schools (5) I, III. The Staff (Wampler in charge) Lecture-discussion.—3 hours; field work.—15-30 hours; seminar.—2 hours. Prerequisite: acceptance into a Teacher Education Program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Selection and organization of teaching materials. Introduction to techniques of diagnosing school academic performance of children.

304B. Teaching in the Elementary Schools (5) II, II. The Staff (Wampler in charge) Lecture-discussion.—3 hours; field work.—15-30 hours; seminar.—2 hours. Prerequisite: course 304B. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Evaluation of teaching materials including audio-visual aids. Current elementary school curriculum with emphasis on contributions from fine arts and humanities.

305A. Teaching in the Middle Grades (5-6). The Staff (Wampler in charge) Lecture-discussion.—3 hours; discussion.—2 hours; student teaching.—15-30 hours. Prerequisite: acceptance into a Teacher Education Program. Supervised teaching in regular or special education classrooms in intermediate grades. Selection, organization, and evaluation of teaching materials including audio-visual aids. Effective teaching methods in grades 4-9.

305C. Teaching in the Middle Grades (5-8) I. The Staff (Wampler in charge) Lecture.—3 hours; discussion.—2 hours; student teaching.—15-30 hours. Prerequisite: course 305B. Supervised teaching in regular or special education classrooms in intermediate grades. Current conceptions of the middle grades curriculum with emphasis on social, biological, and physical sciences. Effective teaching methods.

305B. Teaching in the Middle Grades (5-8) II. The Staff (Wampler in charge) Lecture.—3 hours; discussion.—2 hours; student teaching.—15-30 hours. Prerequisite: course 305A. Supervised teaching in regular or special education classrooms in intermediate grades. Selection, organization, and evaluation of teaching materials including audio-visual aids. Effective teaching methods in grades 4-9.

306C. Teaching in the Secondary Schools (5-8) I, II, III. The Staff (Wampler in charge) Lecture.—2 hours; discussion.—2 hours; student teaching.—15-30 hours. Prerequisite: course 306B. Supervised teaching in regular or special education classrooms in intermediate grades. Current conceptions of the middle grades curriculum with emphasis on social, biological, and physical sciences. Effective teaching methods.

306B. Teaching in the Secondary Schools (5-8) II, III. The Staff (Wampler in charge) Lecture.—3 hours; discussion.—2 hours; student teaching.—15-30 hours. Prerequisite: course 306A. Supervised teaching in regular or special education classrooms in intermediate grades. Current conceptions of the middle grades curriculum with emphasis on social, biological, and physical sciences. Effective teaching methods.
Education Abroad Program

peated by undergraduates for a total of 15 units; 21 units by graduates in Physical Education and Music, and 24 units by all graduate programs.

309. Early Childhood and Kindergarten Education (2) Ill. Skinner Lecture—2 hours. Prerequisite: consent of instructor. Methods, materials, and history of nursery school and kinder-
garten education.

313. Secondary Art Methods (3) L. Garrison Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: admission to students with Art major or secondary teaching specialty, or consent of instructor. Current reading in and practice of contemporary art and teaching. Formulation of curriculum and practice of techniques used in secondary schools. Observation and evaluation of several-

1. 222. Methods in Secondary Social Studies (3), L. Lowry Lecture—2 hours; field work—3 hours. Prerequisite: acceptance into career program with a social science major or minor. Emphasis in the secondary school on teaching strategies and curriculum materials with an em-
phasis on inquiry approaches.

1. 232. Secondary School Curriculum: Science (3), L. Perkes Lecture-discussion—2 hours; field work—3 hours. Conception-
1. of science curriculum and instruction. Scientific knowl-
edge and methods as applied to course design and teach-
ing, rationale and objectives of science programs, labora-
tory as an environment for learning. Lecture, laboratory, 
observation, and participation in public schools.

3. 24. Teaching Methods in Mathematics (3), L. Cogert-Lee Lecture—3 hours. Prerequisite: admission to a teacher edu-
caration program; simultaneous teaching experience; mathe-

1. matics background or consent of instructor. Methods and curricu-
1. lum for teaching mathematics in secondary schools (grades 9-12); review of innovative mathematics programs in State.

1. 35. Advanced Fieldwork in Bilingual Education: Teaching (3-0) I. The Staff Seminar—2 hours; field work—3-9 hours. Prerequisite: admission to Bilingual Education Specialist Program. Discus-

1. sion and implementation of methods, techniques and material in the bilingual/cross-cultural classroom, in-
cluding team teaching with paraprofessionals. Implementation of models in the classroom involving planning, 

1. selection and use of bilingual/cross-cultural materials.

1. 35. Advanced Fieldwork in Bilingual Education: Supervision (3-0) II. The Staff Seminar—2 hours; field work—3-9 hours. Prerequisite: admission to Bilingual Education Specialist Program. Pro-

1. vides opportunity to acquire evaluation skills in the field under supervision of University staff and an experienced program evaluator. Topics and experiences include preparation and evaluation of instruments, development and assessment of diagnostic and placement instru-
1. ments, program evaluation design.

1. 35. Advanced Fieldwork in Bilingual Education: Supervision (3-0) III. The Staff Seminar—2 hours; field work—3-9 hours. Prerequisite: admission to Bilingual Education Specialist Program. Pro-

1. vides opportunity to acquire supervisory skills under guid-
ance of University staff and a supervisor in bilingual or cross-
1. cultural education. Topics and experiences include: analysis and use of videotape and formal observation sche-
1. dules in teacher supervision; local, national, and interna-
1. tional resources for bilingual/cross-cultural materials; in-
1. service training in bilingual/cross-cultural education.

361A. 361B. 361C. School Psychology: Introduction (2-2-2) I-III. Sandoval and Staff Seminar—2 hours; field work—1/2 school day per week. Prerequisite: admission to school psychology credential program. School applications of learning and developmental theory, institutional organizational theory, psychological theory and child development, psychological and emotional problems of children in the school. Field work in the school and other institutions serving children. (SU grading only.)

362A. 362B. 362C. School Psychology: Advanced (2-2-2) I-III. Sandoval, Staff Seminar—2 hours; field work—1/2 school day per week. Prerequisite: course 361C and admission to school psychology credential program. Theories and applications in school-based consultation, advanced individual and group counseling, crisis counseling, educational program evaluation, legal issues in school psychology. (SU grading only.)

363. School Psychology: Internship (4-0) I-III. Sandoval, Figueroa Seminar—2 hours; internship—6-12 hours per week. Prerequisite: admission to school psychology credential program. Individual assessment and program evaluation, selected intervention strategies to pro-
1. mote the school learning and adjustment of children. Selected topics in school psychology. (SU grading only.)

370A. Advanced Fieldwork in Reading: Elementary (2) I. Bacon, Gatheral Fieldwork plus conference with supervisor—4 hours. Prere-
1. quisite: acceptance into reading credential program. Su-
1. pervised advanced practice in reading instruction in an elementary school. Emphasis on development and use of 
1. diagnostic-prescriptive techniques. (SU grading only.)

370B. Advanced Fieldwork in Reading: Secondary (2) II. Liebert Fieldwork plus conference with supervisor—4 hours. Prere-

1. quisite: acceptance into reading credential program. Advanced study of methods and materials in secondary reading instruction, including experience in diagnostic pre-

1. scription, remediation, and evaluation in a reading labora-
1. tory. (SU grading only.)

370C. Fieldwork in Reading Supervision (2) II. Bacon, Gatheral, Liebert Fieldwork plus conference with supervisor—4 hours. Prere-

1. quisite: acceptance into reading credential program. Field experience in developing and supervising reading programs. Planning and implementing teacher in-service education at school and district levels. (SU grading only.)

Briefing of their planned year of study abroad must also consult the Campus Coordinator before sub-
mitting an application; the probability of such stu-
1. dents being accepted is rather low.

Selection

1. The Academic Senate Committee on the Education Abroad Program has the final authority to decide which applicants will be nominated as candidates for EAP participation by the Davis campus. This committee strongly recommends that prospective participants take appropriate courses dealing with the country of their interest in preparation for the year abroad. Applicants who are taking or have completed such courses at the time of the campus selection process tend to have an increased prob- 
ability of receiving the endorsement of the Commit-
1. tee, other factors being equal. Lists of suggested courses and reading materials are available in the EAP Office and the Office of the Coordinator.

1. Once the completed application materials have been filed, an applicant will be interviewed by a selection committee consisting of Faculty and EAP

1. returnees. Among other things, knowledge of the
1. host country and the United States and proficiency in the language of the host country, when applic-
1. able, will receive considerable attention during the
1. interviews.

1. Flies of applicants receiving the endorsement of the Senate Committee on EAP are forwarded to the University Office of the EAP on the Santa Barbara campus, where final selection decisions will be made.

Academic Program

In most cases, the students from the University of California live as the students of the host country do and attend the same courses, taught by faculty of the host country. In some countries, language skills are very important. To aid adjustment of US students to different, often unfamiliar educational practices, tutorials are a part of the academic program of most centers. Tutorials also assist in overcoming language problems and provide cul-
1. tural background information presupposed in the

1. courses. Tutorials are taught by graduate students or junior staff of the host university and are directed in association with courses in which a sufficient number of US students has enrolled.

1. In order to assist in the adjustment and the academic work of the students, faculty members of the University of California serve as Directors and/or Associate Directors at most of the study centers abroad.

1. The academic program of each student includes:

1. (1) an intensive preparatory course in the language of the host country (except for the programs in the United Kingdom, Ireland, Egypt, Ghana, and Ken-
1. ya); (2) a full year of academic courses; (3) broad opportu-
1. nity to audit courses within the host university. It is expected that students will complete a minimum of 36 units during the academic year in addition to units earned in the intensive language program. Lower unit minima may be set for centers with an exceptionally short academic year.

Graduation Requirements

All prospective applicants, but particularly stu-
1. dents who intend to study abroad during their senior year, should plan their course programs for Davis and abroad. The following are essential: University, College, and major requirements for the degree. The provisional planning form is intended to take care of this, but a few potential problems deserve emphasis.

Although units and grade points earned in the EAP are incorporated into the University transcript and on the major departmental GPA, the right to determine which EAP courses will be accepted in satisfaction of major requirements. Several major programs have identified key upper

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division courses which must be completed in residence at Davis. Major advisors should be consulted early so that the pre-departure program at Davis will be planned appropriately.

All degree candidates must meet the University residence requirement (page 67). Students planning to graduate upon completion of their major in the EAP may satisfy residence requirements within the final 45 units preceding entrance in the EAP. Otherwise, subject to prior approval of the study abroad office or program concerned, the requirement may be satisfied as follows: Within the final 90 units earned toward the degree, 35 units must be completed in residence in the student's College of School, 12 units of which must be completed after returning from EAP participation. The applicant's College or School Dean is the source for information on the University residence requirement and additional residence requirements imposed by the College.

Participants satisfy all degree requirements while abroad and expect to graduate upon completion of the year abroad should file for candidacy to receive the degree in September. Unfortunately, transfers from abroad take a long time to get to the home campus and are not received in time for EAP returnees to be included on the June degree list. Such returning students may participate in the June commencement ceremony, however.

Study Centers

At any one center, the courses and fields of study open to UC students may be limited. Moreover, each of the host institutions has special areas of excellence and strength. The listing of centers below incorporates selected information concerning these points. More detailed information is available in the flyers describing each of the centers and from the academic counselor in the Coordinator's Office.

Europe

Austria. The program is small and is designed to offer an opportunity to pursue a specialized interest to a limited number of highly qualified students. A compulsory intensive language course at Georg-August University in Göttingen, Germany, precedes the beginning of the academic year. All courses are taught in German.

University of Vienna. Eastern European studies (Balkans, Soviet Union), fine arts (history of art, music, theatre arts), folklore, history. (This is a cooperative program with Stanford University.)

France.

A compulsory intensive language course precedes the beginning of the academic year. All courses are in French. UC faculty directors are in residence at Bordeaux, Grenoble, and Paris.

University of Bordeaux. Broad areas of the humanities and social sciences. The Institute of Political Science and the Institute of Prehistory (Anthropology) are well known.

University of Grenoble. Mainly in the social sciences through the Université des Sciences Sociales (Grenoble II); some humanities, mathematics and computer science. Offerings in anthropology, psychology, and history are severely limited. Not suitable for life and physical sciences.

University of Marselles. Biological sciences and environmental marine biology. The Marseilles program is open only to students in the biological sciences. Students who have completed only one year of French are eligible for participation, but they must take part in the two-month summer intensive Scientific French program at the University of Montpellier.

University of Montpellier. Humanities and literature, primarily through Paul Valéry University.

University of Paris. Film studies and some theatre studies. Graduate programs in history and literature.

Pau-Paris. The participants spend the first semester at the University of Pau and then, at the end of January, move to Paris to study at the University of the New Sorbonne (Paris III). In addition to required core courses in French civilization, students are able to take courses in humanities and social sciences, with emphasis on comparative cultural studies, French civilization and language.

University of Poitiers. Humanities, with major emphasis in history and medieval studies; mathematics; physics.

Germany. A compulsory intensive language course precedes the beginning of the academic year. All courses are taught in German.

Georg-August University, Göttingen. Broad curriculum covering most majors. Excellent science programs, with substantial strength in biology, chemistry, and physics. Space in laboratory courses in biology and psychology may be limited.

Italy. A compulsory intensive language program in language and history precedes the beginning of the academic year. Students who have completed one year of Italian are eligible for participation in EAP in Italy. but they must take part in a special two-month summer language program at the University of Perugia, followed by the normal, compulsory intensive language program in Padua. A UC faculty director resident in Padua administers all EAP programs in Italy. All courses are taught in Italian.

University of Padua. History of art (including archaeology), Italian literature (including linguistics), and political science (which includes history, social sciences, geography, and demography, as well as political science in the American sense). Sciences are not available for UC students.


Academia delle Belle Arti di Venezia, Venice. Art studio and some art history. Colored slides of portfolio of artistic work must be submitted for admission.

Civi Foundation, Venice. Independent study projects for graduate students in art history.

Norway. Knowledge of Norwegian is not required, but a compulsory intensive course in Norwegian (mid-June to mid-August) precedes the beginning of the academic year. Intensive language course is continued during the fall semester. All courses are taught in Norwegian.

University of Bergen. Humanities, social sciences, natural sciences, and mathematics are available, but space in the sciences may be limited. The usual pattern is study of a single subject, usually the major or a closely allied field, for the entire year.

Spain. A compulsory intensive language program precedes the beginning of the academic year. All instruction is in Spanish.

University of Barcelona. Humanities (with emphasis on Spanish art, history, literature, linguistics) and some social sciences. A study program consists entirely of core courses developed for the Center and taught by the University of Barcelona. (This is a cooperative program with the University of Illinois.)

University of Madrid. Humanities and some social sciences. The core program, developed for the UC Study Center and other American programs, concentrates on Spanish and Spanish studies in the broadest sense. Core and Study Center courses are taught by Spanish faculty. EAP students are required to take one regular year-long course in the University of Madrid.

Sweden. Compulsory intensive language course during the summer for students who are not already fluent in Swedish. Language study continues during the fall semester for all students until the student has gained the equivalent of two years of Swedish. Most courses are taught in Swedish, but a few courses offered in English may be available.

University of Lund. Bread curriculum. Excellent science programs.

United Kingdom and Ireland. The program, which includes 14 institutions, is administered by a director and associate director located in London. The UK program is highly competitive, largely due to its popularity with students. A director has been selected for participation by the EAP administration; he or she must still be accepted by a specific department in one of the host institutions. In many host institutions, the student can pursue studies in that department only. Participating institutions are:

England: University of Birmingham, University of Exeter, University of Kent, University of Leeds, University of Sussex, Westfield College (University of London.) Occasionally, students may be placed on an ad hoc basis at such institutions as University of Bath, London School of Economics, Oxford University, Polytechnic of Central London, University of Warwick, Wimbledon School of Art (London). Ireland: Trinity College of the University of Dublin.

Scotland: University of Edinburgh, University of St. Andrews, University of Stirling.

Generally, the host universities offer a broad curriculum that includes most liberal arts majors. Life sciences and physical sciences are available. Polytechnic of Central London is open to students in architecture; and Wimbledon offers art studio, art history, and three-dimensional design, including theatre design.

USSR. The Russian program is a one-semester program organized by the State University of the USSR. Three years of Russian at the university level is a firm prerequisite. The program is primarily intended for language majors, but it is open to students of literature, history, area studies, etc.

Leningrad State University. Russian language and civilization only.

Middle East

Egypt. All courses are taught in English, except courses in Arabic language and literature.

The American University of Cairo. A broad curriculum offered by the Faculty of Arts and Sciences. All students are required to take at least one year-long course in Arabic. Offerings in science are limited.

Israel. First priority is given to students who have completed at least one year of Hebrew. A compulsory language course precedes the beginning of the academic year. Study centers in Israel are administered by a UC faculty director located in Jerusalem.

University of Haifa. Humanities and social sciences with special emphasis on contemporary Israeli and Arab-Jewish studies. Limited opportunities in the sciences. Special program in Underwater Archaeology. Courses are taught in Hebrew. The Department of Study Center Program at the University of Haifa offers a core curriculum in Jewish, Middle East and Israeli studies, social sciences, and history of modern Israel.

Hebrew University, Jerusalem. Bread curriculum; emphasis on Israel and Middle Eastern studies. UC students enroll in a special program for foreign
Engineering

The major programs offer courses in Jewish, Israeli, Middle Eastern studies, and a few courses in the general social sciences and humanities. In addition, the School for Overseas Studies in cooperation with the mathematics and science faculty offers an extensive one-year program in the sciences based mainly on laboratory courses. Students with command of Hebrew have access to a broad curriculum throughout the Hebrew University.

Far East

Hong Kong. A limited selection of courses is offered in English. Knowledge of Chinese is not required for acceptance, but all students are required to include 18 units of Mandarin or Cantonese in their annual program. A compulsory intensive Cantonese program precedes the beginning of the academic year.

Chinese University of Hong Kong. Humanities and social sciences, emphasis on Chinese studies. Art studio and music performance courses are available. Information about courses is offered in English is announced only one week before instruction begins.

Japanese. Completion of one year of Japanese at the university level or the equivalent is required for acceptance. (A compulsory intensive language course precedes the academic year.) Students are expected to complete an additional 16 units of Japanese language during their year in Japan. A limited number of courses taught in English is available.

International Christian University, Misaka (Tokyo). Humanities and social sciences, emphasis on Japanese language and problems of the Orient.

University of Tsukuba. Open to graduate students only. Admission requires completion of at least two years of college-level Japanese. Major fields of graduate study are available, most UC students will be accepted in the Area Studies program.

Africa

Kenya. Open to undergraduate and graduate students. As in the British system, students take a year-long program of study in their major or area of specialization. Examinations are given once, at the end of the academic year, and are mandatory for receiving credit.

University of Nairobi. Humanities and social sciences, emphasis on African studies. Limited opportunities in the sciences and in veterinary science. Graduate students in history, political science, sociology, anthropology, and design may associate with the Institute for Development Studies, institute for African Studies, or the Housing and Research Development Unit.

West Africa. The West-African Study Center includes three universities in three different countries: The University of Ghana (Accra), Fourah Bay College (Sierra Leone), and the University of Benin (Togo). A UC faculty director is in residence at the University of Ghana. Tentative plans are to open this center for the 1989-90 academic year. The center is intended primarily for students with interests in various aspects of African studies.

University of Ghana; Legon-Accra, Ghana. Open to undergraduate and graduate students. As in the British system, students take a year-long program of study in a single area. Introduction to engineering systems—Engineering 3 (Engineering 3 is designed for freshmen students. More advanced students may petition to substitute 3 units of technical electives for Engineering 3).

Engineering graphics in design—Engineering 4 (majors in Electrical and Computer Engineering and in Electrical and Computer Engineering may substitute 3 units of technical electives for Engineering 4.)

The Major Programs

Eighteen undergraduate engineering curricula, including six formal double-major programs, are offered. Each of these is a four-year program leading to the degree of Bachelor of Science. The Agricultural, Chemical, Civil, Electrical, and Computer, and Mechanical Engineering curricula are five- to six-year programs which have been accredited by the Engineer's Council for Professional Development, the nationally recognized accrediting body for engineering curricula.

Major Advisers. For adviser assignment or change of adviser, contact the College Undergraduate Office.

Graduate Study. See pages 87 and 94. For additional information refer to the College of Engineering Bulletin, available from the College Undergraduate Office.

B.S. Major Requirements:

Except for the individual major, the four-year undergraduate program is divided into two parts, namely the appropriate Lower Division Program and the Upper Division Program of your choice.

Curricula

See pages 79-87 for general descriptions of the majors in engineering and for lists of suggested technical electives, and 74-76 for lists of acceptable Basic Science and Mathematics electives and acceptable Humanities-Social Sciences electives.

Students who enter the College of Engineering with fewer than 84 quarter units of credit follow one of the two common Lower Division Programs outlined below. One program is for students who plan to major in either Chemical Engineering or the double major, Chemical Engineering and Materials Science and Engineering. The other program is for students planning study in the other Engineering majors. The Lower Division Program for students who enter the College of Engineering with 84 or more quarter units of credits is listed under "Admission to Advanced Standing" on page 74.

Engineering—Lower Division Program

Requirements common to all Engineering majors except Chemical Engineering and the double major, Chemical Engineering/Materials Science and Engineering.

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Quarter TAKEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus—Mathematics</td>
<td>21A-21B-21C</td>
</tr>
<tr>
<td>Differential equations</td>
<td>Mathematics 22B</td>
</tr>
<tr>
<td>Vector analysis</td>
<td>Mathematics 22C</td>
</tr>
<tr>
<td>General physics</td>
<td>Physics 8A-8B-8C-8D</td>
</tr>
<tr>
<td>General chemistry</td>
<td>Chemistry 1A-1B or 4A-4B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to engineering systems</td>
<td>Engineering 3</td>
</tr>
<tr>
<td>Engineering graphics in design</td>
<td>Engineering 4</td>
</tr>
<tr>
<td>Majors in Electrical and Computer Engineering and in Electrical and Computer Engineering</td>
<td>Materials Science and Engineering</td>
</tr>
</tbody>
</table>

John D. Kemper, Ph.D., Dean of the College. Roy Beiner, M.S., LL.D., Dean Emeritus of the College.

Don O. Bush, Ph.D., Associate Dean—Undergraduate Study. Zahir A. Miar, Ph.D., Associate Dean—Graduate Study.

Ray B. Krone, Ph.D., Associate Dean—Research.

College Office, 2132 Beamer Hall.

Faculty

Worden Waring, Ph.D., Professor (School of Medicine)
Chemical Engineering — Lower Division Program

Requirements for major in Chemical Engineering and the double major, Chemical Engineering/Materials Science and Engineering only.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>C21A-21B-21C</td>
<td>1-2-3</td>
</tr>
<tr>
<td>22A</td>
<td>6</td>
</tr>
<tr>
<td>22C</td>
<td>4</td>
</tr>
<tr>
<td>23A-23B</td>
<td>1-4-5-6</td>
</tr>
<tr>
<td>128A, 128B</td>
<td>6-4-5</td>
</tr>
<tr>
<td>123A</td>
<td>2</td>
</tr>
<tr>
<td>44-45</td>
<td>1 or 4</td>
</tr>
<tr>
<td>46</td>
<td>4</td>
</tr>
</tbody>
</table>

Chemical Engineering/Materials Science and Engineering majors take 45 units of Engineering 3 or 4 units of Chemical Engineering majors take 45 units of Engineering 3.

Agricultural Engineering

Minimum units required: 180.

Upper Division Program

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical circuits — Engineering 100</td>
<td>4</td>
</tr>
<tr>
<td>Fluid mechanics — Engineering 103A, 103B</td>
<td>9</td>
</tr>
<tr>
<td>Mechanical Engineering 110</td>
<td>9</td>
</tr>
<tr>
<td>Applied thermodynamics — Engineering 105A, 105B</td>
<td>12</td>
</tr>
<tr>
<td>Vehicle aerodynamics — Mechanical Engineering 171</td>
<td>4</td>
</tr>
<tr>
<td>Controls and systems analysis — Mechanical Engineering 171</td>
<td>4</td>
</tr>
</tbody>
</table>

Agricultural Engineering (Forest Engineering Option)

Minimum units required: 195.

Upper Division Program

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied mechanics — Engineering 102A, 103A, 104A, or Mechanical Engineering 165A, 165B, respectively, Berkeley campus</td>
<td>9</td>
</tr>
<tr>
<td>Applied thermodynamics — Engineering 105A (or Mechanical Engineering 105A)</td>
<td>3</td>
</tr>
<tr>
<td>Mechanical Engineering 171</td>
<td>4</td>
</tr>
<tr>
<td>Electronic circuits — Engineering 100</td>
<td>4</td>
</tr>
<tr>
<td>Design — Agricultural Engineering 150 plus one of the following courses: Civil Engineering 130 or 145 or Mechanical Engineering 150A</td>
<td>4</td>
</tr>
<tr>
<td>Electromagnetics I — Engineering 106A</td>
<td>3</td>
</tr>
<tr>
<td>Mechanical Engineering 150A</td>
<td>4</td>
</tr>
</tbody>
</table>

Chemical Engineering

Minimum units required: 187.

Upper Division Program

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied thermodynamics — Engineering 105A, 105B</td>
<td>12</td>
</tr>
<tr>
<td>Chemical Engineering — Engineering 165A, 165B, or Mechanical Engineering 150A</td>
<td>4</td>
</tr>
</tbody>
</table>

Mathematics elective


Unrestricted electives

Select from Forestry 101, 102, 110A, 110B, 114, 120, 122, Wood Science and Technology 131, 132, 133, 134, Berkeley campus.

Technical electives

Must be selected from engineering courses.

Humanities-social sciences electives

Unrestricted electives

Total units

105
Civil Engineering (Accredited by Engineers' Council for Professional Development)
Minimum units required: 180.

Upper Division Program

Subject Areas and Courses
- Electronic circuits—Engineering 100 or 111
- Applied mechanics—Engineering 102A, 103A
- Applied thermodynamics—Engineering 130A or Chemistry 110A
- Structures—Engineering 146B
- Civil Engineering 131A
- Soil mechanics—Civil Engineering 171, 172
- Hydraulics and water resources—Civil Engineering 141, 141L, 142, 148A
- Civil engineering design—Civil Engineering 132A, 132C, 134, 149, 144, 145, 146, 146B, 152, 173
- Electromagnetics—Engineering 106
- Transportation electives—select from Civil Engineering 160, 161, 162 (Civil Engineering 10 required prior to taking these courses)
- Applied Science 115, Engineering 118, 160, Civil Engineering 152
- Technical electives. 9 of these units must be selected from engineering courses
- Humanities and social sciences electives

Total Units: 90

Civil Engineering/Materials Science and Engineering
Minimum units required: 180.

Upper Division Program

Subject Areas and Courses
- Electronic circuits—Engineering 100
- Applied mechanics—Engineering 102A, 103A
- Applied thermodynamics—Engineering 131A
- Structures—Engineering 146B, Civil Engineering 131A
- Soil mechanics—Civil Engineering 171, 172
- Hydraulics and water resources—Civil Engineering 141, 141L, 142, 148A
- Civil engineering design—Civil Engineering 132A, 132C, 134, 149, 144, 145, 146, 146B, 152, 173
- Electromagnetics—Engineering 106
- Transportation electives—select from Civil Engineering 160, 161, 162 (Civil Engineering 10 required prior to taking these courses)
- Applied Science 115, Engineering 118, 160, Civil Engineering 152
- Technical electives. 9 of these units must be selected from engineering courses
- Humanities and social sciences electives

Total Units: 90

Electrical and Computer Engineering

(2010-2011)

(48 units)

Electrical and Computer Engineering: Computers

(48 units)

Electrical and Computer Engineering: Solid State, Microwaves and Quantum Electronics

(20 units)
### Electrical and Computer Engineering: Materials Science and Engineering

Minimum units required: 180.

#### Upper Division Program

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics—Mathematics 23A (if taken to satisfy the Basic Science and Mathematics requirement, substitute any mathematics course at a level higher than 20, except 101)</td>
<td>3</td>
</tr>
<tr>
<td>Professional responsibilities—Engineering 190</td>
<td>3</td>
</tr>
<tr>
<td>Engineering science—Engineering 102A, 102B, 105A, 130</td>
<td>10</td>
</tr>
<tr>
<td>Laboratory elective—Electrical and Computer Engineering courses with a total of 2 units of laboratory in physical electronics courses</td>
<td>2</td>
</tr>
<tr>
<td>Circuits, systems, and electronics—Engineering 100, Electrical and Computer Engineering 110, 111, 112</td>
<td>15</td>
</tr>
<tr>
<td>Computers—Electrical and Computer Engineering 170</td>
<td>4</td>
</tr>
<tr>
<td>Electromagnetic fields and physical electronics—Electrical and Computer Engineering 130A, 130B, 140</td>
<td>10</td>
</tr>
<tr>
<td>Materials science—Engineering 142, 148, and two courses chosen from Engineering 140, 144, 146</td>
<td>14</td>
</tr>
<tr>
<td>Technical electives</td>
<td>5</td>
</tr>
<tr>
<td>Humanities—sociocultural electives</td>
<td>15</td>
</tr>
</tbody>
</table>

Total Units: 90

### Materials Science and Engineering

Minimum units required: 180.

#### Upper Division Program

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic circuits—Engineering 100</td>
<td>4</td>
</tr>
<tr>
<td>Applied mechanics—Engineering 102A, 104A</td>
<td>6</td>
</tr>
<tr>
<td>Fluid mechanics—Engineering 103A</td>
<td>3</td>
</tr>
<tr>
<td>Materials in design—Engineering 140</td>
<td>7</td>
</tr>
<tr>
<td>Measurements and laboratory—Engineering 146; Mechanical Engineering 124, 176</td>
<td>8</td>
</tr>
<tr>
<td>Materials science—Engineering 132, 134, 135</td>
<td>18</td>
</tr>
<tr>
<td>Applied mathematics—Engineering 180</td>
<td>3</td>
</tr>
<tr>
<td>Technical electives</td>
<td>22</td>
</tr>
<tr>
<td>Humanities—sociocultural electives</td>
<td>15</td>
</tr>
</tbody>
</table>

Total Units: 90

### Mechanical Engineering

(Accredited by Engineers’ Council for Professional Development)

Minimum units required: 180.

#### Upper Division Program

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic circuits—Engineering 100</td>
<td>4</td>
</tr>
<tr>
<td>Applied mechanics—Engineering 102A, 104A</td>
<td>12</td>
</tr>
<tr>
<td>Applied thermodynamics—Engineering 105A, 105B, 130, Mechanical Engineering 169</td>
<td>13</td>
</tr>
<tr>
<td>Fluid mechanics—Engineering 103A, 103B</td>
<td>6</td>
</tr>
<tr>
<td>Mechanical design—Engineering 140, Mechanical Engineering 152A</td>
<td>9</td>
</tr>
<tr>
<td>Controls and systems analysis—Mechanical Engineering 171</td>
<td>4</td>
</tr>
<tr>
<td>Materials science</td>
<td>11</td>
</tr>
<tr>
<td>Measurements and laborator—Engineering 102A, 103A, 103B, Mechanical Engineering 176</td>
<td>6</td>
</tr>
</tbody>
</table>

#### Mechanical Engineering/Aeronautical Engineering

Minimum units required: 180.

#### Upper Division Program

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic circuits—Engineering 100</td>
<td>4</td>
</tr>
<tr>
<td>Applied mechanics—Engineering 102A, 102B, 104A, 104B</td>
<td>12</td>
</tr>
<tr>
<td>Applied thermodynamics—Engineering 105A, 105B, Mechanical Engineering 169</td>
<td>9</td>
</tr>
<tr>
<td>Fluid mechanics—Engineering 103A, 103B, Mechanical Engineering 110</td>
<td>9</td>
</tr>
<tr>
<td>Mechanical design—Mechanical Engineering 102A, 102B</td>
<td>9</td>
</tr>
<tr>
<td>Controls and systems analysis—Mechanical Engineering 171</td>
<td>3</td>
</tr>
<tr>
<td>Vehicle aerodynamics—Mechanical Engineering 127</td>
<td>3</td>
</tr>
<tr>
<td>Structures—Civil Engineering 135</td>
<td>3</td>
</tr>
<tr>
<td>Vehicle design—Mechanical Engineering 129A, 129B</td>
<td>12</td>
</tr>
<tr>
<td>Measurements and laboratory—Engineering 102A, 103L, 105L, Mechanical Engineering 176</td>
<td>6</td>
</tr>
<tr>
<td>Technical electives</td>
<td>14</td>
</tr>
<tr>
<td>Two courses must be chosen from Mechanical Engineering 124, 134, 150B, 152, 155, 172</td>
<td>15</td>
</tr>
</tbody>
</table>

Total Units: 90

### Individual (Engineering) Major

Minimum units required: 180.

An engineering student who has a definite career objective that is not compatible with one of the named curricula may propose an Individual engineering major. (See page 231.)

### Courses in Engineering

#### Lower Division Courses

1. Plane Surveying (3) III. Goss
   - Lecture—2 hours; laboratory—3 hours. Prerequisite: plane trigonometry; Consumer Technology 31 recommended. Not open to students in Engineering: Principles of measurement of horizontal, vertical and horizontal angles, elevations and differential levels, including stadia methods. Field problems with special reference to agriculture, forestry and landscape applications.

2. Introduction to Engineering Systems (3) III, IV, V
   - Tchobanoglous
   - Lecture—2 hours; laboratory—3 hours. Prerequisites: Math 21A recommended (may be taken concurrently). An introduction to the engineering profession. A general view of the engineering profession as obtained by participation in laboratory experiments illustrative of the solution of representative, but greatly simplified, engineering problems. (P/N grade only.)

3. Engineering Graphics in Design (3) III, IV, The Staff (Beaulieu in charge)
   - Lecture—2 hours; laboratory—3 hours. Principles of descriptive geometry and of mechanical and free-hand drawing; their application in the representation, visualization, and solution of engineering problems. Computer-aided graphics. Introduction to engineering design.

4. Applications of Computers (3) III, III, The Staff (Aligaz in charge)
   - Discussion—1 hour; lecture—2 hours. Prerequisite: Mathematics 16A or 21A. Introduction to digital computation and computer programming. Algorithms and their description. Basic programming, debugging and debugging. Problems in approximate computing accuracy and significance. Practice with an algebraic language (FORTRAN) in solving simple numerical and non-numerical problems. Students having had Mathematics 29 may not receive credit for this course, and those having had Mathematics 19 may receive only two units of credit.

5. Technology and Society (3) III. I. The Staff (Romstad in charge)
   - Lecture—2 hours; discussion—1 hour. Types of technology: communication, computation, defense technology, information development, and transportation. World energy resources and society's energy needs. Effects of technology on society and society's technology. Development of technology and the economy. (P/N grade only.)

6. """"Computers and People"" (3) I, Dolf
   - Lecture—2 hours; discussion—1 hour. Prerequisite: high school algebra. An introduction to computers for those not majoring in Engineering. The applications of computers in society. History, nature and use in business, education, government and the arts. Cybernetics, artificial intelligence and the social consequences of computers. BASIC programming.

7. Circuits (3) III, IV, IV, The Staff (Aligaz in charge)
   - Lecture—3 hours. Prerequisite: Mathematics 22B (may be taken concurrently). Physics 8A, enrollment open to Engineering students only. Basic circuit analysis techniques; transient and steady-state solutions using differential equations.

8. Statics (3) III, IV, III, The Staff (Romstad in charge)
   - Lecture—3 hours. Prerequisite: Mathematics 22C (may be taken concurrently). Physics 8A, enrollment open to Engineering students only. Force systems and equilibrium conditions with emphasis on engineering problems.
Engineering: Engineering: Agricultural

45. Properties of Materials (4) I, II, III. Mullin in charge Lecture—3 hours; laboratory—3 hours. Prerequisite: one semester of study in engineering or permission of Instructor: introductory course on the properties of engineering materials and their relation to the internal structure of materials.

Upper Division Courses

100. Electronic Circuits and Systems (4) I, II. The Staff (Agile) The lecture course—3 hours; laboratory—3 hours. Prerequisite: 109. Theory of circuit theory and application of analog and digital systems. 109 is strongly recommended that students enroll in this course as soon as possible after completing 107.

102. Dynamics (3) I, II, III. The Staff (Kamcop in charge) Lecture—3 hours. Prerequisite: 35. Mathematics 22B, 22C. Kinematics and kinetica of particles, of systems of particles, and of rigid bodies applied to engineering problems.

120. Dynamics (3) I, II, III. Kamcoe Lecture—3 hours. Prerequisite: course 102A. Tensors in rigid body dynamics; elementary dynamics of vibrating systems; introduction to energy methods.

121. Dynamics Laboratory (1) I. Hubbard Laboratory—3 hours. Prerequisite: course 102B. (May be taken concurrently.) Experimental laboratory to demonstrate the principles of Dynamics and their application to engineering problems. Introduction to instrumentation for dynamic motion measurements.

130A. Fluid Mechanics (3) I, II, III. The Staff (Drew in charge) Lecture—3 hours. Prerequisite: course 102A (May be taken concurrently). Fluid properties, fluid statics, continuity and linear momentum, friction factors for control volumes, flow of compressible fluids in pipes. Artinal analysis.

130B. Fluid Mechanics (3) I, II, III. Giedt Lecture—3 hours. Prerequisite: course 102B. Incompressible viscous flow, boundary layer flow, one-dimensional compressible flow, fluid measurements, applications.

135. Fluid Mechanics Laboratory (1) I. The Staff (Beadle in charge) Laboratory—3 hours. Prerequisite: course 102B (May be taken concurrently). The basic principles and devices which are common in fluid mechanics are illustrated with a few simple experimental demonstrations. The experiments are concerned with flow, pressure and viscosity measurements.


140B. Materials of Materials (3) I, II, III. The Staff (Roomstad in charge) Lecture—3 hours. Prerequisite: course 104B. Selected topics including the analysis of plates, shells, curved beams, rings and arches. Torsion of noncircular shafts and thin walled sections.

150A. Thermodynamics (3) I, II, III. The Staff (McKellog in charge) Lecture—3 hours. Prerequisite: Mathematics 22B and 22C. Fundamentals of thermodynamics, the first law, thermal properties of gases, application of first law, cycles and the second law, reversibility, Carnot cycle and Kelvin-Planck cycle, entropy, thermodynamic diagrams, steam tables, and applications of thermodynamics to engineering problems.

150B. Thermodynamics (3) I, II, III. The Staff (Beadle in charge) Lecture—3 hours. Prerequisite: course 105A. Review of first and second laws, devices of power cycles, thermodynamic relations, gas and liquid thermodynamic properties, phase diagrams, tables, laws of thermodynamics, and statistical mechanics.

150C. Thermodynamics Laboratory (1) I, II, III. The Staff (Beadle in charge) Laboratory—3 hours. Prerequisite: course 125B (May be taken concurrently). Demonstrations and experiments to illustrate the first and second laws of thermodynamics as well as to show how various state variables such as temperature, pressure, etc., are measured and used to develop the state equations of engineering systems.

106. Engineering Economics (3) I, II. Darocad, Helweg Lecture—3 hours. Prerequisite: upper division standing in engineering. The analysis of problems in engineering economy, the determination of the least-cost system. Compounding, tax, origins and cost of capital, economic life, and risk and uncertainty are applied to methods of determining the most economic alternatives.

111. Electric Power Equipment (3) I, III, M. Miller, Chessional Lecture—2 hours; laboratory—2 hours. Prerequisite: course 117. Principles of AC and DC electric motors and solenoids, their systems and power sources. Construction features, performance characteristics, and selection of motors for typical applications.


122. Introduction to Mechanical Vibrations (3) I, II. Hull Lecture—3 hours. Prerequisite: course 120B. Free and forced vibrations in lumped-parameter systems with and without damping; vibrations in coupled systems; electro-mechanical analogs; use of energy conservation principles.

130. Thermodynamics of Materials Processes (4) I, Jr. Murin Lecture—3 hours; discussion—1 hour. Prerequisite: courses 44 and 104B: upper division standing in Engineering. Application of the principles of Thermodynamics to solid engineering materials with emphasis on solving problems associated with materials processes, e.g., alloying, phase stability, surface properties, semiconductors, thermoelectric power and thermal and mechanical energy conversion.

132. Structure of Engineering Materials (4) I. Shackelford Lecture—3 hours; laboratory—3 hours. Prerequisite: course 44. Upper division standing. Structure of engineering materials on atomic scale will be described by exploring fundamentals of crystallography. Importance of this structure to material properties will be emphasized. Experimental determination of structure will be obtained using x-ray diffraction techniques.


140. Materials in Engineering Design (4) II. The Staff (Beadle in charge) Lecture—2 hours; discussion—1 hour. Prerequisite: upper division standing in Engineering or consent of Instructor. Descriptive treatment of common engineering materials. Mechanical properties of structural metals, wood, cement, glasses, and polymers. Properties of heat treatment and fabrication as they affect design parameters, and applications in engineering will be emphasized.

142. Principles of Nondestructive Testing (4) I. Shackelford Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Basic principles of nondestructive testing techniques, radiographic, ultrasonic, electrical, magnetic, wet- dry methods, etc., are discussed. Typical results expected from these tests and their application in material science and engineering will be emphasized.


145. Materials Laboratory (3) I, II, III. Howitt Laboratory—4 hours. Prerequisite: upper division standing in Engineering. Project on governing the interaction between engineering materials and their environment, corrosion in aqueous media, soils and biological systems. Oxidation of structural materials in high temperature applications. Design and selection criteria for the prevention and control of corrosion.

145. Materials Laboratory (3) I, II, III. Howitt Laboratory—4 hours. Prerequisite: upper division standing in Engineering. Project on governing the interaction between engineering materials and their environment, corrosion in aqueous media, soils and biological systems. Oxidation of structural materials in high temperature applications. Design and selection criteria for the prevention and control of corrosion.

146. Engineering Applications of Materials Principles (3) I, III. Mukherjee Lecture—3 hours; discussion—1 hour. Prerequisite: courses 44 and 105A (or the equivalent). Upper division standing in Engineering. The physical principles metallic, polymeric and ceramic materials are discussed with emphasis on microstructure and engineering applications. The strengthening processes, mechanical failure modes and service stability of materials systems are outlined.

160. Energy, Society, and the Environment (4) I. The Staff (Beadle in charge) Lecture—3 hours; discussion—1 hour. Overview of energy systems, resources, energy conversion, technology and environmental problems. Interactions of society with technology, politics and economics are considered. Current and projected energy systems are studied: nuclear, fossil fuel, geothermal, solar and others. For engineering and nonengineering students. Lower division students are referred to Environmental Studies 20.

162. Advanced Energy Technology (3) I, III, Craig Lecture—3 hours. Prerequisite: course 105A. Broad coverage of the basic features of the new energy technologies. Recovery of oil from oil shale, coal conversion, gasification, hydrocarbon production, solar power, fusion power, control of thermonuclear reactors, laser fusion, synthetic fuels, geothermal power, energy from biomass conversion. (P/F grading only.)


190. Professional Responsibilities of Engineers (3) I, III. The Gilded Staff (Beadle in charge) Lecture—3 hours. Overview of the engineering profession: ethics and management; introduction to contracts, specifications, and bidding laws; technical writing: written and oral presentations on the interactions between engineering and society.

Graduate Course

291. Seminar in Teaching (1) I, II, III. J. Henderson, Beaugth Seminar—1 hour. Discussion of previous experience as a student and actual practice as a teacher. (SIU grading only.)

Engineering: Agricultural

(Graduate Engineering)

Roger E. Garrett Ph.D., Chairperson of the Department of Engineering

Department of Engineering B100 (752-1020)

Faculty

Norman B. Akeson, M.S., Professor
Jaine Amorocho, Ph.D., Professor
Roy Bailer, M.S., LL.D., Professor Emeritus
David E. Bruno, Ph.D., Assistant Professor
Robert H. Burg, M.S., Professor
Paul A. Carrod, Ph.D., Assistant Professor
William J. Chancelor, Ph.D., Professor
Michael (Paul) Chan, Ph.D., Professor
Roger E. Garrett, Ph.D., Professor
John R. Goss, M.S., Professor
Debort W. Henderson, Ph.D., Professor
S. M. Johnson, M.S., Sc. D. Professor
Emeritus
David J. Hillis, Ph.D., Assistant Professor
Mark Stephen Saleska, Ph.D., Assistant Professor
Robert A. Kepner, B.S., Professor Emeritus
Coby Lorenzen, Jr., Ph.D., Professor Emeritus
James W. Luthin, Ph.D., Professor Emeritus
Miguel A. Marfo, Ph.D., Professor
R. Larry McLean, Ph.D., Professor Emeritus
John A. Mies, Ph.D., Assistant Professor
Stanton R. Morison, Ph.D., Professor Emeritus
Loren W. Neubauer, Ph.D., Professor Emeritus
Michael O'Brien, Ph.D., Professor
William G. Pruitt, M.S., Lecturer
Thomas R. Rumsey, Ph.D., Assistant Professor
Vern E. Scott, Ph.D., Professor
Courses in Engineering: Agricultural

Lower Division Courses

1. The Agricultural Engineer in Tomorrow's World (1) I. Garrett
Discussion—2 hours. Exploration of opportunities in Agricultural Engineering as they relate to society, environment, and biological systems, including interdisciplinary approaches. Discussion and demonstrations of agricultural engineering, projects illustrating design, development, testing, and evaluation methods. (P/NP grading only.)

2. Introduction to Forest Engineering (1) II. M. Miles
Discussion—laboratory—3 hours. Introduction to the engineering aspects of forestry problems, including nursery operations, reforestation, harvesting, logging, and residue utilization. (P/NP grading only.)

3. Internship in Agricultural Engineering (1-5) I, II, III
The Staff (Garrett in charge)
Work-experience experience. Prerequisite: lower division standing; approval of project prior to period of Internship. Supervised work-study experience in agricultural engineering. May be repeated for credit. (P/NP grading only.)

8. Directed Group Study (1-5) I, II, III, The Staff (Garrett in charge)
Prerequisite: consent of instructor. Group study of selected topics; restricted to lower division students. (P/NP grading only.)

9. Special Study for Lower Division Students (1-5) I, II, III
The Staff (Garrett in charge)
(P/NP grading only.)

Upper Division Courses

112. Engines for Agriculture, Industry and Transportation (3) I. Kimnaka
Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 105A. Operational and performance characteristics of internal combustion engines with emphasis on combustion and emission control. Engineering comparison of alternative power units with conventional engines. Design criteria for engines used in agriculture, industry, and transportation.

114. Principles of Field Machinery Design (3) II. Yates
Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 102A. Functional requirements and basic operating principles of field machines; elements of field machinery design; use of instrumentation and computer techniques for analysis of specific machines.

115. Forest Engineering (3) III. Miles
Lecture—2 hours; laboratory—3 hours. Prerequisite: Civil Engineering 10, Engineering 102A and 104A; Forestry 100A, 100B, 100C (Barkeley campus) strongly recommended. Applications of engineering principles to problems in the forest industry, including consideration of nursery operations, reforestation, harvesting, road layout, log transport and milling operations.

116. Forest Engineering Field Problems (3) III. Miles
Lecture—1 hour; three weekend field trips to Bodgett Forest. Prerequisite: course 114 or 115. A field study and critical analysis of operations, techniques, and equipment common in forest management, with particular consideration to measurements, data analysis, safety of operations, and maintenance practices.

117. Stability and Traction of Off-Road Vehicles (2) I, II
Chancellor
Lecture—2 hours. Prerequisite: Engineering 102A and 104A. Mechanics of interactions between paved or solid surfaces and tires or tracks. Vehicle response to external and dynamic forces during pulling, turning, lifting and transporting. Effects of design parameters and component characteristics on vehicle performance and safety.

118. Testing and Evaluation of Engineering Designs (3) III. Chair
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 150 (preferred) or CIVIL 104A or 146, or Mechanical Engineering 150A, or Water Science 110B. Methods and procedures for evaluating functional adequacy, reliability, maintainability and safety of designs. Failure modes; test design; test analysis; accelerated testing; field testing; case studies.

119. Hydraulic and Pneumatic Systems (3) I. Studier
Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 103A. Design of hydraulic and pneumatic systems for power, sensing and controlling machine functions. Characteristics of pumps, motors, control valves, fluidic devices, servo-mechanisms, energy transducers, pressure and volume transmission; solar heat locators, solar-air concept; methods of water usage.

125. Agricultural Structures: Environmental Aspects (3) I. Morrison
Lecture—3 hours. Prerequisite: Engineering 105A. Environmental and functional design of agricultural storage and production facilities, plants and systems; ventilating, heating, lighting, insulation, psychrometrics, energy balance, vapor transmission; solar heat locators, solar-air concept; methods of water usage.

133. Mechanical Unit Operations and Processes (3) II. Rumsy
Lecture—2 hours; laboratory—2 hours. Prerequisite: Engineering 103A. Mechanical unit operations applied to process systems as non-Newtonian flows, flow and sediment, and mixing of granular materials, materials handling, storing, plant layout, work efficiency.

134. Thermal Unit Operations and Processes (3) III. Singh
Lecture—2 hours; laboratory—2 hours. Prerequisite: Engineering 105A. Thermal unit operations related to drying, refrigeration, freezing, cold storage, evaporation, boiling, distillation, etc.

140. Seepage and Drainage (3) III. Luthin
Lecture—3 hours. Prerequisite: Engineering 103A. Flow through porous materials: hydraulic conductivity; seepage through hydraulic structures: anisotropy flow nets; drainage design for water table and salt control. Offered in odd-numbered years.

141. Spillway and Drip Irrigation System Design (3) III. The Staff (Garrett in charge)
Lecture—2 hours; laboratory-discussion—3 hours. Prerequisite: Engineering 103A. Water Resources 10B or 160. Civil Engineering 141 recommended. Design and evaluation of spillway and drip irrigation systems.

150. Engineering Design Projects for Agriculture and Forestry (2) II. Kerper
Laboratory-discussion—2 to 3 hours. Prerequisites: any of the following (one may be taken concurrently): courses 104, 115, 125, 133. Civil Engineering 145 recommended. Engineering 150A: Water Science 111A, 110B, 160. Individual or group projects involving the design, structures, or systems of agriculture or forestry. Students may select their projects, subject to approval of the instructor.

151. Human Factors in Engineering and Design (3) II. Kimnaka
Lecture—2 hours; laboratory—3 hours. Principles of human factors; applications of human factors data to engineering design.

152. Internship in Agricultural Engineering (1-5) I, II, III
The Staff (Garrett in charge)
Work-experience experience. Prerequisite: upper division standing; approval of project prior to period of Internship. Supervised work-study experience in agricultural engineering. May be repeated for credit. (P/NP grading only.)

188. Directed Group Study (1-5) I, II, III
The Staff (Garrett in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III
The Staff (Garrett in charge)
(P/NP grading only.)

Graduate Courses

21. Soil-Machine Relations in Tillage and Traction (3) I, II
Chairman
Lecture—3 hours. Prerequisite: course 114 or 117. Mechanics of interactions between agricultural soils and tillage and traction devices; determination of relevant physical properties of soil; analysis of stress and strains in soil due to machine applied loads; experimental and analytical methods for synthesizing characteristics of soil systems.

22. Advanced Unit Operations in Process and Food Engineering (3) II. Rumsy
Lecture—2 hours. Prerequisite: an upper division course in process of food engineering. Basic procedures applicable to process and food engineering. Heat and mass transfer applications to drying, dehydration and freezing; flow of food and semi-fluid materials; size reduction; separation of biomaterials.

23. Hydrodynamics of Surface Irrigation (3) III. The Staff (Garrett in charge)
Lecture—3 hours. Prerequisites: a course in differential and integral calculus; a course in hydraulics or fluid mechanics including some open-channel flow; a course in irrigation principles. Mathematical models of surface-irrigation systems for prediction of the ultimate disposition of water flowing onto a field. Quantity of runoff and distribution of infiltrated water over field length as a function of slope, roughness, infiltration and flow rates.

245. Agricultural Wastes Management (3) II. Hills
Lecture—2 hours; discussion—laboratory—1 hour. Prerequisite: consent of instructor. Animal, crop, and food processing wastes; pesticides, fertilizers, odors, dust and smoke in relation to environmental pollution. Disposal methods; present and future; regulation, economics and public concern; coordination with municipal and industrial wastes management.

250. Design of Mechanical Systems (2) II. Goss
Lecture—2 hours. Prerequisite: mechanical design and economics recommended. Experience with design; evaluating design concepts and establishing design criteria; analysis and synthesis in design; optimization techniques; human factors in design.

255. Environmental Engineering in Agriculture (3) I. Morrison
Lecture—3 hours. Prerequisite: Mechanical Engineering 160. The description, methods of measurement and effect on man, animals and plants of physical environmental factors, and the design of systems for their control. Offered in odd-numbered years.

265. Design and Analysis of Engineering Experiments (4) II. Studier
Lecture—3 hours; laboratory—3 hours. Prerequisite: at least one undergraduate course in statistics or consent of instructor. Design, management, and analysis of engineering experiments with emphasis on criteria for the selection and utilization of statistical methods. Problems necessitating the use of campus and departmental computing facilities will be assigned.

275. Physical Properties of Agricultural Materials (3) I. Chen
Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Selected topics on physical properties such as mechanical, optical, rheological, and aerodynamic properties, as related to the design of harvesting, handling, sorting, and processing equipment. Techniques for measuring and recording physical properties of agricultural materials.

284. Advanced Topics in Agricultural Engineering (1-5) I, II, III
The Staff (Garrett in charge)
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Directed group study of selected topics with separate sections. (A) Simulation of Food Processing Systems: (B) Thermal Process Design; (C) Fermentation Engineering; (D) Alternate Energy Systems.

299. Seminar (1-3) I, II, III
The Staff (Garrett in charge)
Seminar—1 hour. (SU grading only.)

300. Group Study (1-5) I, II, III
The Staff (Garrett in charge)
(P/NP grading only.)

Research (1-12) I, II, III
The Staff (Sudder in charge) (SU grading only.)

Engineering: Applied Science

(Office of Engineering)
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Department Office, 228 Walker Hall (752-0360)

Faculty
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Stuart D. Bleske, Ph.D., Professor
David C. Camp, Ph.D., Lecturer
Paul P. Craig, Ph.D., Professor
John S. DeGrout, Ph.D., Professor
O. C. DeNeef, Ph.D., Associate Professor
William B. Durham, Ph.D., Lecturer
John G. Fletcher, Ph.D., Lecturer
John C. Garrison, Ph.D., Lecturer
Abraham Goldberg, Ph.D., Adjunct Professor

185
Courses in Engineering: Applied Science

David

Lower Division Courses

96. Directed Group Study (1-5) I, II, III. The Staff (Woon in charge) Prequisite: consent of instructor. Restricted to lower division students. Group study of selected topics. (P/N grading only.)

99. Special Study for Undergraduates (1-9) I, II, III. The Staff (Woon in charge) Prequisite: consent of instructor. Lower division standing. (P/N grading only.)

Upper Division Courses

115. Introduction to Numerical Methods for Computers (3-3) I, II, III. The Staff (Woon in charge) Lecture—3 hours. Prerequisite: Engineering 5; Mathematics 21, 22. Lectures and laboratory work on computer operations and their application to engineering problems.

135A. Introductory Nuclear Science and Technology (3) I, II. Craig Lecture—3 hours. Prerequisite: Physics 121 or the equivalent. Introduction to nuclear physics, nuclear reactions, and nuclear technology. Radiative and electric interactions of matter.

135B. Introduction to Plasma Physics and Controlled Fusion (4) III. DeGroot Lecture—3 hours; laboratory—3 hours. Prerequisite: Physics 110. Laboratory work on plasma physics. Theoretical studies of plasma phenomena. (P/N grading only.)

146. Group Study (1-5) I, II, III. The Staff (Woon in charge) Prerequisite: consent of instructor. Group study of selected topics. Students may enroll in one or more sections. (P/N grading only.)

168. Special Study for Advanced Undergraduates (1-9) I, II, III. The Staff (Woon in charge) Prerequisite: consent of instructor. (P/N grading only.)

Graduate Courses


260A-260B-260C. Plasma Physics and Controlled Fusion (3-3-3) I, II, III. Woon Lecture—3 hours. Prerequisite: courses 260A, 234B or consent of instructor. Equilibrium plasma systems; single particle motion and fluid equations; waves and instabilities in fast plasma; plasma kinetic theory; and transport coefficients; linear and nonlinear plasma theory; fluctuations, correlations, and relaxation in inertial and magnetic confinement systems in controlled fusion.


266-A. Special Topics in Applied Science (1-5) I, II, III. The Staff (Woon in charge) Lecture—1 hour. Laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: (A) Atomic and Molecular Physics; (B) Chemical Physics; (C) Computational Physics; (D) Computer Science; (E) Materials Science. (P/N grading only.)

266-B. NMR Spectroscopy (3) I. Soil Lecture—3 hours. Prequisite: course 266-A. NMR Spectroscopy. (P/N grading only.)

266-C. Quantum Electrodynamics (4) I. Soil Lecture—3 hours. Prequisite: course 266-A. Quantum Electrodynamics. (P/N grading only.)

299. Research (1-2) I, II, III. The Staff (Woon in charge) (S/U grading only.)

Livermore

Upper Division Courses

112A-112B. Introduction to Computing Science (3-3) I, II. The Staff (Woon in charge) Lecture—2 hours. Prerequisite: course 112A or 112B or the equivalent. A survey of computer science, including computer architecture, assembly and high-level languages, algorithms, computer systems, and computer applications. (P/N grading only.)

115. Introduction to Numerical Methods for Computers (3) I, II, III. Talley Lecture—3 hours. Prerequisite: Engineering 5, Mathematics 220B or the equivalent. An introduction to scientific computing and its applications. (P/N grading only.)

134. Introduction to Electromagnetic Theory (3) I, II, III. Talley Lecture—3 hours. Prerequisite: ordinary differential equations and elementary classical mechanics. Electrostatic and magnetostatic properties of materials; electromagnetic waves in vacuum, dielectric media, and interfaces; radiative effects from moving particles; charged particles in electromagnetic fields.

135A. Introductory Nuclear Science and Technology (3) I. Bloom Lecture—3 hours. Prerequisite: Physics 121 or the equivalent. Material sciences and design of nuclear systems; utilization; reactors; fast reactors; reactor physics; nuclear fuels; radiation effects; control; instrumentation; and reactor measurements. Nuclear technology. Nuclear chemistry.

135B. Introductory Nuclear Science and Technology (3) II. Bloom Lecture—3 hours. Prerequisite: course 135A or the equivalent. Techniques of radiation and particle detection; nuclear instrumentation techniques; pulse height analysis; coincidence measurement; technology of charged particles and neutrons.

135C. Introductory Nuclear Science and Technology (3) III. Bloom Lecture—3 hours. Prerequisite: course 135B or the equivalent. Production and uses of radiotopes in industry, chemistry, and biochemical research. Chemistry of radioactivity in the environment. Chemistry and properties of uncommon materials for reactor operation, e.g., zirconium, thorium, and major fission products. Wastes from nuclear power plants.

149. Structure of the Earth (3) I. Kasama Lecture—3 hours. Prerequisite: consent of instructor. Composition and structure of the interior of the earth—evidence from seismic waves, plate tectonics, and the geophysical sciences. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Woon in charge) Prerequisite: consent of instructor. (P/N grading only.)

Graduate Courses


202A-202B. Formal Languages and Automata Theory (3-3) I, II. The Staff (Woon in charge) Lecture—3 hours. Prerequisite: Electrical and Computer Engineering 161 (or the equivalent). A survey of automata and language theory; particular emphasis on finite automata, context-free languages, and Turing machines. Introduction to computability and computational complexity. Hierarchies of languages and machines. Introduction to parsing theory.

203A. Computer Architecture (3) I. Anderson Lecture—3 hours. Programming project performed. Prerequisite: course 202A-202B or the equivalent. Hardware knowledge for software designers. Students learn how hardware functions, what elements compose it, how to read parts and logic diagrams. Course covers simple machine architecture in detail, hardware design algorithms, input/output methods and computer peripherals.

303B. Computer Architecture (3) II. Anderson Lecture—3 hours. Programming project performed. Prerequisite: course 202A-202B or the equivalent. Design and implementation of low-level computer systems. Implementation of microprocessors and microprocessors, and their role in modern computer systems. Emphasis on operating systems, system programming, and software. (P/N grading only.)

304. Data Structures (3) I. The Staff (Woon in charge) Lecture—3 hours. Prerequisite: Electrical and Computer Engineering 181 (or the equivalent). Data structures and programming techniques; linear data structures and their representations, tree traversals, sorting, searching, and techniques for efficient search applications; file processing and pure Lisp; garbage collection and the dynamic storage allocations; file structures and the database management systems.

205A. Mathematical Methods (3) I, II. Kleene Lecture—3 hours. Prerequisite: introductory courses in ordinary differential equations, vector analysis, infinite series, and functions of a complex variable. Calculus of
Courses in Engineering: Chemical

Lower Division Courses

1. The Scope of Chemical Engineering (1) II. The Staff
   Lecture—1 hour, discussion—1 hour. Demonstrations and discussions of the opportunities in chemical engineering for professional development, contributions to basic knowledge, and service to society. (PINP grading only.)

14i. Directed Group Study (1-5) II, III. The Staff
   Prequisite: consent of instructor. Restricted to lower division students. Group study of selected topics. Students may enroll in more than one section. (PINP grading only.)

19. Special Study for Undergraduates (1-5) II, III. The Staff
   Prequisite: consent of instructor. (PINP grading only.)

Upper Division Courses

150A. Chemical Engineering Fluid Mechanics (3) III. I. Bell
   Lecture—3 hours. Prequisite: Engineering 102A and Mathematics 22A. Fluid statics and one-dimensional laminar flows. Kinematics of point and integral functions. Stress, strain rate, stress tensor, relaxation, Newton's law of viscosity, and application of the Navier-Stokes equations to laminar flow. Dimensional analysis. Flow of non-Newtonian fluids. Students excelling this course may not receive credit for Engineering 103A.

150B. Chemical Engineering Fluid Mechanics (3) III. Carboll
   Lecture—3 hours. Prequisite: course 150A. Turbulent flows and time averaging. Application of Bernoulli's equation for the macroscopic mass, momentum, and mechanical energy balances to a variety of practical problems. Introduction to compressible flow. The entropy equation and isotropic processes. Shock waves and choked flow. Students excelling this course may not receive credit for Engineering 103B.

151. Material and Energy Balances (3) I. Smith
   Lecture—3 hours. Prequisite: Chemical Engineering 110A and 128B (may be taken concurrently). Use of principles of conservation of mass and energy in chemical process calculations.

152A. Chemical Engineering Thermodynamics (3) III. McCoy
   Lecture—3 hours. Prequisite: course 151. Chemical Engineering 110A. Application of principles of thermodynamics to chemical processes.

152B. Chemical Engineering Thermodynamics (3) III. Jackman
   Lecture—3 hours. Prequisite: course 152A. Continuation of course 152A.

153. Chemical Engineering Heat Transfer (4) III. The Staff

154A. Mass Transfer (3) III. Bell

154B. Applications of Mass Transfer (3) III. The Staff (McCoy in charge)
   Lecture—3 hours. Prequisite course 154A. Application of the principles of mass transfer and thermodynamic equilibrium to absorption, extraction, distillation and other separation processes.

155A. Chemical Engineering Laboratory (4) I, II. The Staff (McCoy in charge)
   Laboratory—12 hours. Prequisite: course 154A. Laboratory experiments in heat, mass, and momentum transfer and in chemical kinetics.

155B. Chemical Engineering Laboratory (4) II. III. The Staff (McCoy in charge)
   Laboratory—12 hours. Prequisite: courses 154B, 155A. Continuation of course 155A.

156A. Chemical Engineering Kinetics (3) III. Smith
   Lecture—4 hours. Prequisite: courses 152B, 154A and Chemical Engineering 111B. Kinetics may be taken concurrently. Chemical kinetics and reaction mechanisms. Homogeneous and heterogeneous reaction models.

156B. Chemical Engineering Kinetics (3) III. Smith
   Lecture—3 hours. Prequisite: course 156A. Continuation of course 156A.

157. Process Dynamics and Control (4) III. Jackman
   Lecture—3 hours. Laboratory—3 hours. Prequisite: courses 152B, 154A. Chemical engineering models of linear chemical processes. Classical feedback and feed forward control of dynamic processes. Direct digital control. Laboratory experiments in process dynamics, analog and digital feedback control.

158. Chemical Engineering Process Design (3) III. McCoy
   Lecture—3 hours. Prequisite: courses 148B and 156A. Chemical Engineering process design optimization and economics.

159. Chemical Engineering Analysis (3) I. The Staff (McCoy in charge)

160. Design of Piping Systems and Heat Exchangers (2) II. Jackman

169. Group Study (1-5) II, III. The Staff (McCoy in charge)
   Prequisite: consent of instructor. Group study of selected topics. Student groups may be organized in instrumentation and design problems. Students may enroll in one or more separate subjects. (PINP grading only.)

190. Special Study for Advanced Undergraduates (1-5) II, III. The Staff (McCoy in charge)
   Prequisite: consent of instructor. (PINP grading only.)

Graduate Courses

252. Advanced Thermodynamics (3) I. Smith
   Lecture—3 hours. Prequisite: course 152B or Engineering 105E. A general treatment of the first and second laws; applications of thermodynamic relationships to phase and chemical reaction equilibria; introduction to statistical thermodynamics.

253A. Advanced Transport Phenomena I (4) I. Carboll
   Lecture—3 hours. Prequisite: course 153. Tensor and vector methods in the formulation of equations of mass, momentum, and energy in continuous media with particular emphasis on fluids. Applications to the formulation of rheological equations of state for viscoelastic fluids and fluid interfaces.

253B. Advanced Transport Phenomena II (4) II. The Staff (McCoy in charge)
   Lecture—4 hours. Prequisite: course 253A or consent of instructor. Application to both differential and integral mass, momentum, and energy balances. Radiation, transport and heat transfer in reacting systems.

253C. Advanced Transport Phenomena III (3) II. Whittaker
   Lecture—3 hours. Continuation of course 253B with special emphasis on multiphase systems. The laws of molecular diffusion and energy transport, including the effects of concentration, temperature, electric field, and pressure fields. Convective mass transfer and chemically reacting flows.

254. Molecular Theory of Transport Phenomena (3) II. The Staff (McCoy in charge)
   Lecture—3 hours. The transport of mass, momentum, and energy is considered from the molecular point of view. Derivations of the Boltzmann equation are considered, and solutions for special cases are discussed. Methods for calculating transport coefficients are presented.

255. Applied Kinetics and Reactor Design (3) II. Whittaker
   Lecture—3 hours. Prequisite: courses 156B and 252 or consent of instructor. Application of kinetics and molecular transport rates to the design of chemical reactors with emphasis on homogeneous systems.

258. Chemical Process Dynamics (2) II. The Staff (McCoy in charge)
   Lecture—2 hours. Prequisite: courses 154B, 156B. Unsteady-state processes, analysis, examples of fast and second order processes, coupling of mixed order processes with chemical reaction kinetics, mixing and heat transfer, and fluid mechanics, simulation of chemical processes and computer equipment. Microorganisms, crystallization, aerosols, hydrosols, colloids. Distribution functions, population balance, fluidized gas, phenomena, concentration polarization in reverse osmosis and filtration.

261. Separation Processes (3) II. McCoy
   Lecture—3 hours. Prequisite: course 154A. Analysis of particle behavior in settling and chemical processing equipment. Microorganisms, crystallization, aerosols, hydrosols, colloids. Distribution functions, population balance, fluidized gas, phenomena, concentration polarization in reverse osmosis and filtration.

262. Separation Processes: Column Operations (3) III. McCoy
   Lecture—3 hours. Prequisite: course 154A. Analysis and design of chemical separation processes: distillation, extraction, chromatography, adsorption. Finite difference equations, unified design methods, axial dispersion models, probability and random walk theories, methods of characterization, moment analysis, optimization.

290. Seminar (1) I, II, III. The Staff (McCoy in charge)
   Seminar—1 hour. (SU grading only.)

298. Group Study (1-5) II, III. The Staff (McCoy in charge)

299. Research (1-12) II, III. The Staff (McCoy in charge)
   Research—(SU grading only.)

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Engineering: Civil

College of Engineering
Karl M. Romstad, Ph.D., Chairman of the Department
Department Office, 206 Walker Hall (752-0596)

Faculty

Jaime Amoroso, Ph.D., Professor (Civil Engineering: Land, Air and Water Resources)

Kardinal Arulananand, Ph.D., Professor

Don C. Brush, Ph.D., Professor

Robert H. Burgy, M.S., Professor (Civil Engineering: Land, Air and Water Resources)

Daniel P. Yang, Ph.D., Associate Professor

James A. Cherry, Ph.D., Professor

Yannis F. Dafalias, Ph.D., Associate Professor

Otto J. Helweg, Ph.D., Associate Professor

Ray B. Krope, Ph.D., Professor

Tommy N. Lam, D.Eng., Professor

Bruce E. Larock, Ph.D., Professor

James N. Luthin, Ph.D., Professor (Civil Engineering: Land, Air and Water Resources)

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Gerald T. Oribi, Ph.D., Professor

Ott G. Raabe, Ph.D., Adjunct Associate Professor

Melvin R. Ramey, Ph.D., Professor

Karl M. Romstad, Ph.D., Professor

Edward W. Schrader, Ph.D., Professor

Verna H. Scott, Ph.D., Professor (Civil Engineering: Land, Air and Water Resources)

Chih-Kang Shen, Ph.D., Professor

Michael A. Taylor, Ph.D., Professor

George Tchobanoglous, Ph.D., Professor
186A-J, Selected Topics in Civil Engineering (1-5), I, II, III. The Staff (remotely in charge). Instructed by faculty member through laboratory, or by a combination of these two. Prerequisite: consent of Instructor. Delegated group of selected topics with separate requirements.


192. Internship in Engineering (1-5), I, II, III. The Staff (remotely in charge). Prerequisite: upper division standing; approval of project prior to submission; student must be in internship. Supervised work-study experience in civil engineering. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5), I, II, III. The Staff (remotely in charge). In instruction in these variable-unit courses may be carried out by lecture or by laboratory, or by a combination of these two. Prerequisite: consent of Instructor. Open to study of selected topics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5), I, II, III. The Staff (remotely in charge). Prerequisite: senior standing in engineering and at least a B average. (P/NP grading only.)

Graduate Courses


240. Inelastic Behavior of Solids: Viscoelasticity (3) I. Dally. Lecture-3 hours. Prerequisite: course 201. Fundamentals of the theory of viscoelasticity for solids, representation of linear viscoelastic behavior in integral operator and complex variable formulation, characterization of engineering materials, e.g., metals, concrete, soil, asphalts, rubbers, etc. General analysis procedures for problems in viscoelasticity. (P/NP grading only.)

250. Continuum Mechanics (3) I, II, III. Lecture-3 hours. Prerequisite: course 203 or 204. Tensor form of the field equations for continuum mechanics, including large deformation effects. Introduction to nonlinear elasticity and viscoelasticity. Solution of three-dimensional problems. Offered in even-numbered years.

260. Buckling of Shells (3) I. Brush. Lecture-3 hours. Prerequisite: course 202 and 221. Continuation of course 202. Initial-stability and post-buckling analyses of cylindrical shells and of shells of revolution. Examination of the influence of initial imperfections. Offered in odd-numbered years.

261. Advanced Matrix Structural Analysis (3) I. Ramond. Lecture-3 hours. Prerequisite: course 131A. Analysis of indeterminate structures by displacement and force method. Use of digital computer programs for frame, truss, and space structures. Solution of problems by matrix analysis.


212B. Finite Elements: Application to Structural Mechanics Problems (3) II. Hermann. Lecture-3 hours. Prerequisite: course 212A. Introduction to finite element method for linear and non-linear one-, two- and three-dimensional problems in continuum mechanics. Solution of plate and shell problems by finite element method. Introduction to two- and three-dimensional fluid flow problems, including inviscid and viscous flow, convection-diffusion problems, the shallow water wave problem and flow through porous media.

221C. Analysis of Structures Subjected to Dynamic Loads (3) I.Ramond. Lecture-3 hours. Prerequisite: course 138. Analysis of structural response to dynamic loads. Distribution, consistent, and lumped mass techniques. Solution by direct numerical integration and normal mode integration. Solution of complex systems using the computer. Current research on earthquake effects. Offered in even-numbered years.


222. Design of Concrete Formed Plates and Shells (3) II. Ramond. Lecture-3 hours. Prerequisite: course 201. Current methods used in the design of formed plates and thin shell concrete structures. Design of structural concrete elements, concrete domes, conical shells, shells of revolution, cylindrical shells and formed plate roofs. Offered in odd-numbered years.

223. Advanced Analysis of Plates and Shells (3) III. Brush. Lecture-3 hours. Prerequisite: course 201. Theory of thin elastic shells of general shape. Approximation to static, dynamic, and stability analyses of plates, cylindrical shells, and shells of revolution. Offered in odd-numbered years.


233. Advanced Design of Steel and Concrete Structures (3) III. Ramond. Lecture-3 hours. Prerequisite: courses 120A, 120B, 200. Design considerations for columns and frame buckling; design for corrosion and axial loading of concrete compression members; steel-plate girder design; steel-concrete composite design.

240. Water Quality (3) I. C. Ricardo. Lecture-3 hours. Prerequisite: course 141. Water quality requirements for domestic, industrial, and recreational and wildlife water uses; properties of natural surface and groundwaters; treatment and fate of water pollutants. (P/NP grading only.)

241. Land Quality (3) I. Klone. Lecture-3 hours. Prerequisite: consent of instructor. Factors determining land quality for use in man's activities; and modification for temperature control; out-of-doors noise and its control; interrelations of land and vegetation on qualities of air and water.


243A. Water and Waste Treatment (3) I. Schroder. Lecture-3 hours. Prerequisite: course 148A. Characteristics of water and airborne wastes; treatment processes and process kinetics; treatment system design.

243B. Water and Waste Treatment (3) I. Schroder. Lecture-3 hours. Prerequisite: course 148A. Consent of instructor. Continuation of course 243A.

244. Environment Quality Management (2) I. Klone. Lecture-3 hours. Prerequisite: course 244A or consent of instructor. Introduction of course 243A.

245. Applied Aquifer-Solution Chemistry (3) I. Chang. Lecture-3 hours. Prerequisite: Chemistry 1, 2, or the equivalent; Chemistry 5 and/or Chemistry 10A recommended. Chemical principles underlying current practices in the examination and treatment of aqueous systems. Topics include: chemical equilibria, redox reactions, and surface chemistry. Offered in odd-numbered years.

245L. Applied Aquifer-Solution Chemistry Laboratory (1). Lecture-Laboratory-3 hours. Prerequisite: Chemistry 1A and 1B or the equivalent. Conduct laboratory experiments in the examination of water and wastewater. "Wet chemical" and instrumental techniques.

246. Pilot Plant Laboratory: Physical Chemical Processes (2) I. Tschobanoglous. Lecture-Laboratory-3 hours. Prerequisite: course 243B or consent of instructor. Laboratory investigation of physical and chemical processes for water and wastewater treatment.

246B. Pilot Plant Laboratory: Biological Processes (2) I. Tschobanoglous. Lecture-Laboratory-3 hours. Prerequisite: course 243B or consent of instructor. Study of selected biological systems used in wastewater management.

250. Transportation Policy Planning (3) I. Lam. Lecture-3 hours. Prerequisite: course 152; course 160 (may be taken concurrently). Socio-technical nature of transportation. The societal, technical, and system bases for planning transportation developments. Policy framework of transportation developments and effects of planning decisions. Development of objectives, policy alternatives, and program implementation. Emphasis involved in evaluations and decision-making. Offered in odd-numbered years.

251. Transportation Planning Models (3) I. Kitamura. Lecture-3 hours. Prerequisite: course 160. Detailed study and discussions of quantitative models of urban passenger transportation, including trip generating, trip distribution, and trip mode choice models. Brief discussions of land-use models and freight transportation. Offered in even-numbered years.

252. Evaluation of Transportation Alternatives (3) III. Lecture-3 hours. Prerequisite: Environmental Studies 108A or the equivalent. Study of theory and practice of transportation evaluation. Topics include transportation economics, pricing, theoretical and applied transportation evaluation techniques, and use of citizen participation in transportation evaluation. Offered in even-numbered years.

254. Transportation Attitude and Behavior (3) III. Lecture-3 hours. Prerequisite: course 160. Study of individual and household travel decisions. Emphasis is on conceptual and statistical issues involved in the specification of mathematical models of travel behavior. Objective and attitudinal evaluations of travel behavior are considered. Planning applications are explored. Offered in odd-numbered years.

255. Characteristics of Transportation Systems (3) I, II. Lecture-3 hours. Prerequisite: course 161 or consent of instructor. Mathematical modeling of transportation systems and system characteristics of transportation systems. Definition and quantification of variables important to planning and system design. Interchange of freight and passenger systems. Characteristics. Introduction to methods of analyzing transportation systems. Offered in even-numbered years.

256. Transportation Impact Assessment (3) I. Kitamura. Lecture-3 hours. Prerequisite: course 161. Techniques, models, and computer programs for the analysis of transportation systems. (P/NP grading only.)

257. Operations of Transportation Systems (3) III. Kitamura. Lecture-3 hours. Prerequisite: course 161. Stochastic modeling of transportation systems and analysis of system operations. Detailed study of system components including vehicle movements, terminals, and control sub-systems. Application of mathematics of probability to transportation operations for various modes of transportation. Offered in odd-numbered years.


281. Cohesive Particle Transportation (3) III. Krone
Lecture—3 hours. Prerequisite: course 141. Cohesion; cohesion model for particulate materials; processes of aggregation and dispersion; aggregate properties; deposition and scour; channel and harbor design and maintenance. Offered in even-numbered years.

286. Economics of Water Resources Planning (3) III. Helweg
Lecture—3 hours. Prerequisite: Engineering 106 or Agricultural Economics 148; course 152 and Economics 1A recommended. The evaluation of water-supply projects and alternatives. The uniqueness of water in microeconomic theory. The relation of traditional methods such as benefit cost analysis to project evaluation and utility theory in evaluating non-consumable resources.

270. Advanced Water Resources Planning (3) III. Helweg
Lecture—3 hours. Prerequisite: course 142, 152, and 153 (may be taken concurrently) or consent of instructor. Philosophy and history of planning. Descriptive structure of plans and procedures to formulate plans. Advanced topics in institutional analysis, decision theory, data management, value theory and mathematical modeling.

27L. Water Resources Planning Laboratory (3) III. Helweg
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 270. Application of hydrology, hydraulics, economics, systems analysis and planning in conducting a water resource analysis. Techniques for water-supply recreation, flood control, water quality and urban renewal. Lectures provide background and guidance to utilize computer models and advanced planning techniques for class projects.

272. Groundwater Flow and Seepage (3) III. Lutkin

273. Analysis of Groundwater Systems (3) III. Marinho
Lecture—3 hours. Prerequisite: course 144 or the equivalent. Mathematics 120 recommended. Groundwater motion theory and applications. Analysis of transient groundwater flow problems including flow to fully- and partially confined, nonleaky and leaky artesian aquifers. Multiple well systems, identification of aquifer parameters. Artificial recharge, spreading basins, recharging wells. Offered in odd-numbered years.

274. Hydraulics of Pipe Lines (3) I. Larock
Lecture—3 hours. Prerequisite: course 141; Engineering 5 or the equivalent. Mechanics of fluid flow in pipes and pipe network systems. Steady flow, unsteady flow, surge and water-hammer problems. Introduction to stability and resonance phenomena. Offered in odd-numbered years.

275. Stochastic Hydrology (3) III. Amrocho
Lecture—3 hours. Prerequisite: course 142 or Water Science 141 or the equivalent. Mathematics 212, 22A, 293 recommended. Theory and application of the methods of modern systems analysis and mathematical statistics to problems of hydrological prediction. Emphasis on current developments in parametric and stochastic hydrologies.

277. Unsteady Flow in Open Channels (3) III. The Staff (Romatkevich in charge)
Lecture—3 hours. Prerequisite: course 141. Long waves in open-channel systems; Saint-Venant equations; method of characteristics; finite-difference and finite-element methods; stability of numerical schemes; double-sweep method; influence of hydraulic structures; flood routing; boundary dam break; waves in two-space dimensions.

277L. Computer Laboratory in Water Waves (3) III. The Staff (Romatkevich in charge)
Laboratory—1 hour. Prerequisite: course 277 (may be taken concurrently); a short course in Fortran programming. Development of computer programming for computing long waves in open channels. Explicit and implicit schemes, hydraulic bores, computation of catastrophic, dam-break floods.

278. Hydrodynamics (3) II. Larock
Lecture—3 hours. Prerequisite: Mathematics 120 or 185A; course 277 recommended. Applications for conservation of mass, momentum, energy. Vorticity. Scale influences on function, velocity potential. Flows by superposition and conformal mapping. Free streamline applications, gravity effects, introduction to wave motion. Offered in odd-numbered years.

279. Advanced Mechanics of Fluids (4) I. Larock
Lecture—4 hours. Prerequisite: course 141 and Mathematics 212. Rotational flows. Navier-Stokes equations and solutions for laminar, viscous flow; boundary layer equations and solution techniques. Nature of turbulence, statistical and phenomenological characteristics, Reynolds equations; isotropy simplification. Offered in even-numbered years.

281. Advanced Soil Mechanics (3) III. Aularanian
Lecture—3 hours. Prerequisite: course 171. Consolidation, shear strength and analysis of slope stability problems.

282. Advanced Soil Mechanics Laboratory (3) III. Shen
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 281. Subsurface exploration, advanced laboratory techniques including consolidation, shear strength, pore water pressure measurement, pavement design tests, in situ tests. Offered in even-numbered years.

283. Physicochemical Properties of Soils and Soil Behavior (3) III. Aularanian
Lecture—3 hours. Prerequisite: course 171. Analysis of the mechanical behavior of soils from consideration of clay mineralogy, colloidal phenomena, ion-exchange and soil-water characteristics. Conduct of phenomena, deformation mechanisms, strength, swelling, compaction and erosion. Microscopic theories to explain yielding of soils.

284. Theoretical Soil Mechanics (3) III. Chen
Lecture—3 hours. Prerequisite: course 171. Unified theory of stress-strain behavior of soil, consolidation and rate of settlement, interpretation of laboratory tests, drained and undrained strength of soil, anisotropy, and time dependent behavior.

285. Pavement Design and Soil Stabilization (3) III. Shen
Lecture—3 hours. Prerequisite: course 171. Principles and methods of pavement design for highway and airport pavements; purposes, principles and methods of soil stabilization in foundation engineering. Offered in odd-numbered years.

286. Advanced Foundation Design (3) III. Shen
Lecture—3 hours. Prerequisite: course 173. Design and analysis of building loads; deep excavation; tie-back systems; tunneling in soft ground; piled foundations; piled capacity; footing foundations; additional topics of footing and raft design.

287. Dynamic Response of Soils (3) III. Aularanian
Lecture—3 hours. Prerequisite: course 171. Seismic survey; dynamic soil properties, analysis of the behavior of soils under earthquake conditions; applications to liquefaction, seismic response of soil deposits, earth dams and other structures.

289A, J. Selected Topics in Civil Engineering (1-5) I, II, III
The Staff (Romatkevich in charge)
Introduction in these variable-unit courses may be carried out by lecture or by laboratory or by a combination of these two. Prerequisite: consent of instructor. Directed group study of special topics with separate sections in (A) Environmental Engineering; (B) Hydraulics and Hydrologic Engineering; (C) Engineering Geology; (D) Geotechnical Engineering; (E) Structural Engineering; (F) Structural Mechanics; (G) Transportation Engineering; (H) Transportation Planning; (I) Water Resources Engineering; (J) Water Resources Planning. May be repeated for credit.

290. Seminar (1) I, II, III
The Staff (Romatkevich in charge)
Seminar—1 hour. Discussion of current graduate research and student advances. Oral presentation of individual study. Course required of graduate degree candidates. (SU grading only.)

298. Group Study (1-5) I, II, III
The Staff (Romatkevich in charge)
Instruction in these variable-unit courses may be carried out by lecture or by laboratory or by a combination of these two. Prerequisite: consent of instructor. Group study of selected topics. (SU grading only.)

299. Research (1-12) I, II, III
The Staff (Romatkevich in charge)
(SU grading only.)

NOTE: For key to footnote symbols, see page 130.

Engineering: Electrical and Computer

(College of Engineering)

V. Ralph Algazi, Ph.D., Chairperson of the Department
Department Office, 3118 Bainter Hall (752-0583)

Faculty

V. Ralph Algazi, Ph.D., Professor
George R. Branner, Ph.D., Associate Professor
John N. Churchill, Ph.D., Associate Professor
K. Wayne Current, Ph.D., Associate Professor
Andrew J. Diens, Ph.D., Professor
Richard C. Dorf, Ph.D., Professor
Hermetic H. Fink, Ph.D., Professor
Leonard Forbes, Ph.D., Associate Professor
Gary E. Ford, Ph.D., Assistant Professor
William A. Gardner, Ph.D., Associate Professor
Tien C. Hsu, Ph.D., Professor
A. J. Kain, Ph.D., Professor
William G. Lane, Ph.D., Lecturer
Wen C. Lin, Ph.D., Professor
Herschel H. Loop, JR., Ph.D., Professor
Earle W. Owen, D.Eng., Sci., Associate Professor
John B. Powers, Ph.D., Professor Emeritus
Robert J. Smith II, Ph.D., Lecturer
Michael A. Shorterstrand, Ph.D., Associate Professor
Ronald F. Soohoo, Ph.D., Professor
Richard F. Watters, Ph.D., Professor

Courses in Engineering: Electrical and Computer

Lower Division Courses

1. Introduction to Electrical and Computer Engineering (1)
The Staff (Algazi in charge)
Lecture—1 hour. Electrical and computer engineering as a professional activity. What electrical engineers know and how they use their knowledge. Problems they are concerned with and how they go about solving them. A presentation of basic ideas and their applications. Examination of some case studies. (P/P grading only.)

2. Internship in Electrical and Computer Engineering (1-5)
The Staff (Algazi in charge)
Work-place experience—3.5 hours. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work-place experience in Electrical and Computer Engineering. May be repeated for credit. (P/P grading only.)

3. Directed Group Study (1-5) I, II, III
The Staff (Algazi in charge)
Prerequisite: consent of instructor; restricted to lower division students. Group study of selected topics. (P/P grading only.)

4. Special Study for Lower Division Students (1-5) I, II, III
The Staff (Algazi in charge)
(P/P grading only.)

Upper Division Courses

110. Electronic Circuits (4) III. Churchill, Current
Lecture—4 hours. Prerequisite: course 112, Engineering 100. Large and small signal device models; analysis and design of linear circuits, both discrete and integrated forms; analysis and design of nonlinear, digital and pulse circuits.

111. Electronic Circuits Laboratory (4) III. Forbes, Churchill, Current
Laboratory—8 hours. Prerequisite: course 110 (may be taken concurrently). Projects on the design, analysis and evaluation of elementary transistor circuits, amplifiers, operational amplifiers, feedback circuits and digital circuits.

112. Linear Systems and Circuits (4) II. Ford, Algazi
Lecture—4 hours. Prerequisite: Engineering 17, Characteristic analysis and analysis of linear systems and circuits. Time domain analysis by convolution techniques. Emphasis on
140. Fundamental Principles of Device Physics (3) I. Chur-

141. Bipolar Integrated Circuit Applications (3) I. Forbes, Chur-

142. MOS Integrated Circuit Applications (3) II. Forbes, Chur-

143. Integrated Circuits Design Technology (3) I. Churchill, Chur-

144. Bipolar Integrated Circuit Design and Fabrication Labora-

145. Integrated Circuits Design and Fabrication Labora-

146. Instrumentation Systems (3) I. Owen, Chur-

147. Control Systems (3) I. Owen, Chur-

148. Discrete Time Systems (3) I. Hsiu, Ford

149. Fourier Analysis and Modulation (3) I. Gardner, Ford

150. Data Communication (3) I. Gardner, Ford

151. Computer Structure and Assembly Language (4) I. II.

152. Microcomputer-Based Systems (4) III. Loomis, Lin

153. Radar Systems and Signals (3) II. Branner

154. Computer Devices and Systems (3) III. Soochow

155. Digital Systems I (4) II. Lin, Ford

156. Digital Systems II (4) III. Lin, Ford

157. Programming Languages and Compilers (3) III. The Staff (Algaie in charge)

158. Operating Systems (3) III. The Staff (Algaie in charge)

159. Database Systems (4) III. Chang

160. Computer Science-Topics in Electrical and Computer Engi-

161. Computer Science-Topics in Electrical and Computer Engi-

162. Internship in Electrical and Computer Engineer-

163. Instrumentation for Biological and Medical Engineer-

164. Computer Science-Topics in Electrical and Computer Engi-

165. Microcomputer-Based Systems (4) III. Loomis

166. Microcomputer-Based Systems (4) III. Loomis

167. Microcomputer-Based Systems (4) III. Loomis

168. Computers and Their Applications (3) III. The Staff (Algaie in charge)

169. Computer Devices and Systems (3) III. Soochow

170. Computer Structure and Assembly Language (4) I. II.

171. Computer Structure and Assembly Language (4) I. II.

172. Microcomputer-Based Systems (4) III. Loomis

173. Computer Structure and Assembly Language (4) I. II.

174. Computer Devices and Systems (3) III. Soochow

175. Computer Devices and Systems (3) III. Soochow

176. Microcomputer-Based Systems (4) III. Loomis

177. Microcomputer-Based Systems (4) III. Loomis

178. Microcomputer-Based Systems (4) III. Loomis

179. Digital Signal Processing (3) II. Ford

180. Digital Signal Processing (3) II. Ford

181. Signal Processing (3) II. Ford

182. Fourier Analysis and Modulation (3) I. Gardner, Ford

183. Data Communication (3) I. Gardner, Ford

184. Computer Science-Topics in Electrical and Computer Engi-

185. Computer Science-Topics in Electrical and Computer Engi-

186. Computer Science-Topics in Electrical and Computer Engi-

187. Computer Science-Topics in Electrical and Computer Engi-

188. Computer Science-Topics in Electrical and Computer Engi-

189. Computer Science-Topics in Electrical and Computer Engi-

190. Computer Science-Topics in Electrical and Computer Engi-

191. Computer Structure and Assembly Language (4) I. II.

192. Computer Structure and Assembly Language (4) I. II.

193. Computer Structure and Assembly Language (4) I. II.

194. Computer Structure and Assembly Language (4) I. II.

195. Computer Structure and Assembly Language (4) I. II.

196. Computer Structure and Assembly Language (4) I. II.

197. Computer Structure and Assembly Language (4) I. II.

198. Computer Structure and Assembly Language (4) I. II.

199. Computer Structure and Assembly Language (4) I. II.

200. Computer Structure and Assembly Language (4) I. II.

201. Computer Structure and Assembly Language (4) I. II.

202. Computer Structure and Assembly Language (4) I. II.

203. Computer Structure and Assembly Language (4) I. II.

204. Computer Structure and Assembly Language (4) I. II.

205. Computer Structure and Assembly Language (4) I. II.
221. Passive Filter Design (3) I. Soderström, Current Lecture—3 hours. Prerequisite: course 220 or the equiva-

222. Active Filter Design (3) III. Soderström, Current Lecture—3 hours. Prerequisite: course 220 or the equiva-

223A. Quantum Electronics (3) I. Dienes, Fink Lecture—3 hours. Prerequisite: courses 130B and 140 or the equiva-

223B. Microwave Electronics (3) II Soooh Lecture—3 hours. Prerequisite: courses 130B and 140 or the equiva-

230A. Advanced Electromagnetic Theory (3) II. Dienes, Branner Lecture—3 hours. Prerequisite: course 230A or the equiva-

245C. Applied Solid-State Physics (3) II. Fink, Soooh Lecture—3 hours. Prerequisite: course 245A. Theory of magnetism in solids, with application to ferromagnetic de-

246. Advanced Semiconductor Devices (3) III. Dienes, Current Lecture—3 hours. Prerequisite: course 145B. Physical prin-

251. Linear Control Systems (3) III. Owen Lecture—3 hours. Prerequisite: courses 187B and 212. Techniques for solving nonlinear control problems; state

253. Introduction to Adaptive Systems (3) I. Haia Lecture—3 hours. Prerequisite: course 151. An introduction to

254. Digital and Sampled-Data Control Systems (3) II. Haia Lecture—3 hours. Prerequisite: courses 157B, 212 or the equivalent. Introducing major topics in digital and sampled-

270. Finite-State Machines (3) III. Loomis, Spilman Lecture—3 hours. Prerequisite: course 191. A study of fi-

271. Advanced Digital System Design (4) III. Loomis, Lin Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 177. Topics in advanced design of

277. Advanced Programming and Data Structures (3) II. The Staff (Aligaz in charge) Lecture—3 hours. Prerequisite: courses 180, 181 or 182; recommended. Formal specification of data structures, design and representation of data structures, elements of
graph theory, general list structures: manipulation of list structures; LISP; compiler design principles. Offered in even-numbered years.

278. Introduction to Digital Programming Languages (3) II. The Staff (Aligaz in charge) Lecture—3 hours. Prerequisite: courses 180, 181 and 278A. Compilation process; storage allocation. Object code generation; bootstrap techniques; parsing techniques; interpreting techniques. Ta-

279. Artificial Intelligence (3) II. The Staff (Aligaz in charge) Lecture—3 hours. Heuristic programming; Representation
Engineering: Mechanical


283. Random Signals and Noise (4). II. Gardner, Algazi Lecture—3 hours; discussion—1 hour. Prerequisite: course 160B or the equivalent 118. Introduction to random processes with applications to optimum and adaptive filtering of signals in noise. Second order stochastic calculus. Correlation functions; power spectral density, mean-ergodicity. Linear minimum-mean-squared-error estimation, and stochastic approximation for smoothing, filtering, prediction, cancellation.


288-A. Special Topics in Electrical and Computer Engineering (1-5). I, II, III. The Staff (Alzaga in charge) Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in (A) Biomedical Engineering; (B) Computer Science; (C) Programming Systems; (D) Digital Signal Processing; (E) Control Systems; (F) Digital Signal Processing; (G) High-Frequency Phenomena and Devices; (H) Solid-State Devices and Electronic Devices; (J) Control Systems; (K) Computer Software; (M) Computer Hardware; (N) Microprocessing; (O) Electronics.

290. Seminar (1-12). I, II, III. The Staff (Alzaga in charge) Seminar—1 hour. Discussion and presentation of current research and development. (SU grading only.)

298. Group Study (1-5). I, II, III. The Staff (Alzaga in charge) Instruction in these variable-unit courses may be carried out by lecture only or laboratory or by a combination of these two. Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12). I, II, III. The Staff (Alzaga in charge) (SU grading only.)

John D. Kemper, Ph.D., Professor
Donald L. Margolis, Ph.D., Associate Professor
Allan A. McGee, Ph.D., Professor
Paul G. Migliore, Ph.D., Assistant Professor
Paul S. Moeller, Ph.D., Lecturer
Bruce F. White, Ph.D., Assistant Professor
A. Tsu Yang, D.E.Sc., Professor
Marvin F. Young, Ph.D., Lecturer

Division of Materials Science and Engineering

Faculty
David G. Howell, Ph.D., Assistant Professor
Iryna M. Kukhmejeva, D.Phil., Professor
Zuhair A. Munir, Ph.D., Professor
James F. Shackelford, Ph.D., Associate Professor

Courses in Mechanical Engineering

Lower Division Courses

1. Mechanical Engineering (1). I. McKillop Lecture—1 hour. Description of the field of mechanical engineering with examples taken from industrial applications; discussion of the role of mathematics in engineering, ethics and responsibilities. (P/NP grading only.)

2. Internship in Mechanical Engineering (1-5). I, II, III. The Staff (Beadle in charge)

3. Fluid Mechanics (3). I. White Lecture—3 hours; Prerequisite: Engineering 102B. Development of general equations of motion for viscous fluids; inviscid flow theory; viscous flow; thin shear flows; transition; turbulence; simple mixing theories of turbulence. Applications to turbomachinery, and aerofoils.

4. Mechanical Engineering Projects (2-3). I, II, III. The Staff (Beadle in charge) Laboratory—4 hours. Prerequisite: consent of instructor. Projector of projects which include design, development and evaluation of a mechanical engineering system or related experiments which give the student experience in theoretical modeling and experimental evaluation. May be repeated once for credit.

5. Aerodynamics of Lift and Thrust (3). I. White Lecture—3 hours; Prerequisite: Engineering 102B. Two dimensional analysis and similarity, review of basic potential flow. Thin airfoil theory, infinite wing theory, finite wing theory, boundary layer, and three-dimensional effects. Drag and lift characteristics. Theory of propellers.

6. Vehicle Design (2-2). I, II, III. Migliore Lecture—1 hour; discussion—1 hour. Prerequisite: Engineering 104B. Design of aerodynamically related systems, including the influence of aerodynamic and inertial loading on structural integrity, stability, and control.

7. Vehicle Stability (3). I. Kempp Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 102B. Introduction to the static and dynamic stability characteristics of transportation vehicles with examples drawn from aircraft, high-performance automobiles and waterborne vehicles including hovercraft. Laboratory experiments illustrate response to various inputs such as gusts, surface roughness, and control deflections.

8. Mechanical Design and Manufacturing Processes (4). I, II, III. Henderson Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 104B, or (4) may be taken concurrently. The principles of engineering mechanics applied to the fundamentals of mechanical design. Theories of stress and fatigue failures of metal. Design projects emphasizing evolution and fabrication of conceptual design to hardware. Manufacturing processes laboratory.

9. Mechanical Engineering (3). I, II. The Staff (Beadle in charge) Lecture—2 hours; discussion—1 hour. Prerequisite: course 150A, or Demonstration of principles of engineering mechanics, failure theories and fatigue theory applied to design and selection of mechanical components. Micrometer, micrometer caliper, trans to conceptual design, engineering analysis, engineering drawing, methods of manufacture, material selection and cost.

10. Advanced Mechanical Design (3). I. Hull Lecture—2 hours; laboratory—3 hours. Prerequisite: course 150B (may be taken concurrently). Introduction to computational aided design and finite element analysis, static design and reliability theory, and selected advanced analytical techniques in design.

11. Mechan擒 Design (3). I. Yang Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 102B. Application of complex-number methods to kinematic, static and dynamic analyses of plane mechanism and dynamic balancing of mechanisms. Design of belt gear trains and intermittent mechanisms. Introduction to kinematic synthesis of mechanisms for function generation, curve tracing and body guidance.


14. Gas Turbine Power Plants (6). I. Hoffman Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 102B and 105B. Introduction to gas turbine power plants for electric power generation, aircraft propulsion and other transportation applications. Gas dynamic and thermodynamic analysis of compressors, turbines and the other gas turbine components as well as complete power-plant cycle.


18. Measurement Systems (3). I, II, III. Hull Lecture—2 hours; discussion—1 hour; laboratory—1 hour. Prerequisite: Engineering 100 and 102A. Theory of measurements, measurement techniques for mechanical systems: transducers; data manipulation and processing; data digitization.

19. Internship in Engineering (1-5). I, II, III. The Staff (Beadle in charge)

20. Directed Group Study (1-5). I, II, III. The Staff (Beadle in charge)

Graduate Courses

205. Thermal Radiation (3). I. Brand Lecture—3 hours; Prerequisite: 150B or consent of instructor. The transfer of radiant energy. Geometrical and spectral characteristics of systems involving thermal radia-
208. Experimental Techniques in Fluid Mechanics and Heat Transfer (3) I. Baugh, McKillop Lecture—2 hours; laboratory—3 hours. Prerequisite: course 210A and consent of instructor. Techniques for experimental measurements in fluid mechanics and heat transfer. Uncertainty and statistical analysis of data. Steady and transient measurements of flow pressure, velocity, and flow rate. Mean and fluctuating velocity and temperature measurements of fluids with hot-wire anemometry.

210A. Fundamentals of Fluid Mechanics and Heat Transfer (4) I. McKillop Lecture—4 hours. Prerequisite: course 210A. Analytical and numerical analysis of the Navier-Stokes and energy equations for steady, two-dimensional flows. Numerical techniques in solving fluid flow problems; turbulence transport models, boundary layers and flow stability. Other selected topics.

211. Selected Topics in Fluid Flow and Heat Transfer Design (4) I; II. Hoffman Lecture—2 hours. Prerequisite: course 210A and consent of instructor. Design aspects of selected topics from: heat conduction, thermal stresses, fins; heat transfer to turbulent liquids and gases; space heating and cooling; friction and impingement; fire; heat exchangers; flow in conduits, over airfoils and blades. Other selected topics.

212. Advanced Topics in Fluid Flow and Heat Transfer Design (4) I; II. McKillop Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. In-depth studies of advanced technology design problems. Fluid mechanics and convective heat transfer. Each student will undertake a project. Offered in odd-numbered years.

213. Advanced Turbulence Modeling (3) III. The Staff (Beck in charge) Lecture—2 hours. Prerequisite: course 210A. Methods of analyzing turbulence: kinematics and dynamics of homogeneous turbulence; Reynolds stress and heat flux equations; second order closures and their simplification; numerical relaxation, free fields; high order models. Offered in even-numbered years.

214. Advanced Numerical Fluid Mechanics (3) III. Dwyer Lecture—3 hours. Prerequisite: course 210B. Development and solution of basic and advanced finite difference schemes for the Navier-Stokes equations, laminar and turbulent boundary layer equations, and the potential flow equations. Analysis of the stability and convergence of the method with practical examples. Offered in odd-numbered years.


216. Advanced Thermodynamics (3) I. Hoffman Lecture—3 hours. Study of topics important to energy conversion systems, propulsion and other systems using high temperature gases. Classical thermodynamics, thermodynamic properties of pure chemical substances, ideal gases, mixtures, and other substances.

217. Analysis of Reacting Flows (5) I, Dwyer Lecture—3 hours. Prerequisite: course 210A and 216. Development and analysis of the basic equations for chemically reacting flow systems. Calculation of high temperature gas properties and use of reaction rate models. Selected applications with emphasis on turbulent flame propagation in both steady and unsteady situations. Offered in odd-numbered years.


219A, 219B. Mechanical Vibrations (3-3) I, II. Hubbard Lecture—3 hours. Prerequisite: Engineering 122. Applications of vibration theory to systems with many degrees of freedom and continuous systems. Introduction to random vibrations.

221. Advanced Dynamics (3) I. Hubbard Lecture—3 hours. Prerequisite: Engineering 102B. Dynamics of particles and of rigid bodies with advanced engineering applications: generalized coordinates; Hamilton's Principles; Lagrange's Equations; Hamilton-Jacobi theory.


226. Acoustics and Noise Control (4) I. Kamopp Lecture—4 hours; laboratory—3 hours. Prerequisite: Engineering 122. Description of sound using normal modes and waves. Interaction between vibrating solids and sound fields; sound absorption in enclosed spaces; sound transmission through barriers; applications in design of mufflers, acoustic enclosures, rooms, acoustics, design of quiet machinery.

229. Engineering Case Studies (2) II. Henderson Discussion—2 hours. Studies of selected problems which illustrate various methods of the design process and management in advanced mechanical engineering systems.

250. Computer-Aided Mechanical Design (3) III. Beadle Lecture—2 hours; discussion—1 hour. Prerequisite: course 102B. The use of computerized design methods including optimization techniques in mechanical design analysis and synthesis. Interactive computer-aided design.

270. Modeling and Simulation of Engineering Systems (4) I. Kamopp Lecture—3 hours. Prerequisite: course 212 or consent of instructor. Multiport models of mechanical, electrical, hydraulic, and thermal systems. Simulation techniques and state space equations; Hamilton's principle for complex systems; formulation for analog and digital simulation; identification; instrumentation, approximate models of distributed systems.

271. Analysis and Control of Multivariable Systems (3) I. Kamopp Lecture—3 hours. Prerequisite: course 270 or consent of instructor. Modern methods of state variable feedback applied to control system design: Introduction to observers and equivalent dynamic feedback. Stress on practical applications of feedback theory to engineering systems in various engineering domains.

272. Mathematical Foundations of System and Control Theory (4) I, Brewer Lecture—4 hours; laboratory—3 hours. Prerequisite: course 212 and graduate standing. Basic ideas of modern system and control theory. Feedback, control, and optimization.


273. Computer-Aided Design and Synthesis of Estimation and Control Systems (4) II, Brewer Lecture—3 hours; computational laboratory—3 hours. Prerequisite: course 272B. Principles of the design of control or in the synthesis of variable feedback systems. Optimization and optimal control. Frequency domain and graphical methods. Additional topics. Offered in even-numbered years.

276. Data Acquisition and Analysis (3) II. Hull Lecture—2 hours; discussion—1 hour. Prerequisite: course 176. Principles of data acquisition with emphasis on digital techniques. Use of micro and minicomputers to control data acquisition process. Methods of data analysis including probability distributions, correlations, regression, and Fourier analysis. Special attention to digital spectral analysis.

280. Advanced Engineering Analysis (3) I. Brandt Lecture—3 hours. Prerequisite: Engineering 180 or the equivalent. Applications in mechanical engineering or advanced analytical and numerical techniques. Topics include probability theory, calculus of variations, classification of differential equations, and advanced numerical methods.

290. Seminar (1) I, II, III. The Staff (Dwyer in charge) Seminar—1 hour. (SU grading only.)

295. Engineering Case Study Preparation (3) III. Henderson Discussion—1 hour; laboratory—6 hours. Prerequisite: course 290. Preparation of engineering case studies or ongoing or completed engineering projects from industry. (SU grading only.)

297. Dynamic Systems and Control Theory (1) I, II, III. Karppi Lecture—3 hours. Seminar—1 hour. Prerequisite: consent of instructor. A review and discussion of current literature and developments in system theory and automation for student presentations by individual students. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Beadle in charge) Seminar—1 hour. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Beadle in charge) (SU grading only.)

Graduate Courses

(In the Division of Materials Science and Engineering. (Undergraduate courses in Materials Science and Engineering are listed under Engineering core courses as Engineering 130 through 148, inclusively.)

240. Transport in Materials Processes (4) I, Munt Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Engineering. Phenomenological and atomistic mechanisms in transport processes in condensers and noncondensed phases. Application to heat treatment, chemical and physical vapor deposition, and isothermal phase bonding, sintering and joining of metals. Offered in odd-numbered years.

241. Principles and Application of Distortion Mechanics (4) II. Munk Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Engineering or consent of instructor. Thermodynamic principles of distortion and deformation of materials under stress. Discussion of cold and hot working, plasticity and creep of metallic microstructure. Offered in odd-numbered years.


244. Interaction of Materials and their Environment (4) I, Munt Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 122 and 122B. Principles of the design of materials for their environment. Stresses and strains in the environment and the response of materials. Offered in odd-numbered years.

245. Advanced Topics in Structure of Materials (4) III. Shacklette Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 122 and 122B. Principles of the design of materials for their environment. Stresses and strains in the environment and the response of materials. Offered in even-numbered years.

24A. Fundamentals of Transmission Electron Microscopy (3) I. Howitt Lecture—2 hours; discussion—1 hour. Prerequisite: consent of instructor. Course 245A (concurrently). Principles and techniques of transmission electron microscopy used in study of materials will be described. Emphasis upon practical applications and a required laboratory section.

244A. Laboratory for Electron Microscopy (2) I. Howitt Laboratory—6 hours. Prerequisite: course 245A (may be taken concurrently); consent of instructor. Practical ap-
English Majors
Up to four upper-division units in a national literature other than English or American, or in Comparative Literature, may count toward the requirements of the major.

Minor Program Requirements:

English .............................................. 20
Five upper-division courses
four of which will be literature courses ....... 20
Subject A. Students must have passed the Subject A requirement before taking any course in English.

Prerequisites. One course from 1, 2, 3 is required for admission into courses 30A, 30B, 30C, 43, 44, 45, 46A, 46B, 46C, 47, and all upper division courses. A course from courses 43, 44, and 45 is recommended as preparation for the 30 and 46 series.

Meeting for Majors. All English majors are required to attend a general meeting for majors at the beginning of each year; all new and transfer English majors are required to attend a general meeting for majors at the beginning of their first quarter in residence, all English majors must see their advisors, individually, in the spring quarters of their sophomore and junior years.


Foreign Languages. Students who contemplate advanced study in English should prepare for foreign language requirements for higher degrees, and should consult with the graduate adviser.

Honors and Honors Program. See Pages 63 and 97.

Teaching Credential Subject Representatives. W. Harsh, W. Schieiner. See also page 105 for more details on the Teacher Education Program.

Graduate Study. The Department of English offers programs of study and research leading to the M.A. and Ph.D. degrees. Detailed information may be obtained from the graduate adviser or the Chairperson of the Department.

Graduate Advisor. R. H. Hopkins.

Courses in English

Lower Division Courses

A. Language Skills (2) I, II, III. The Staff (Zender in charge) Lecture-discussion—4 hours. Introductory course to help students gain writing proficiency required for successful University-level work. Course will focus on the nature and mechanics of written English and the relationship between writing mechanics and coherent thought. Satisfies Subject A requirement.

R. Communications Skills Workshop (no credit) I, II, III. The Staff (Zender in charge) Lecture—3 hours; discussion—3 hours. Workshop in language skills for students from non-standard English backgrounds who do not qualify for English for Foreign Students. Course worth 6 units minimum study list requirement. (Deferred grading only, pending passing of course.)

1. Expository Writing (4) I, II, III. The Staff (Zender in charge) Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments will be made.

2. Language and Stylistics (4) I, II, III. The Staff (Zender in charge) Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. Introduction to modern inquiries into the nature and forms of the English language. Frequent writing assignments will be made.

3. Introduction to Literature (4) I, II, III. The Staff (Zender in charge) Lecture—2 hours; Discussion—2 hours. Prerequisite: completion of Subject A requirement. Introductory study of several genres of English literature, emphasizing both
analysis of particular works and the range of forms and styles in English prose and poetry. Frequent writing assign-
ments will be included.
SF. Introduction to Creative Writing: Fiction (4) I, II, III. The Staff (Zender in charge)
Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing
fiction. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examina-
tion.
59. Introduction to Creative Writing: Poetry (4) I, II, III. The Staff (Zender in charge)
Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing
poetry. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examina-
tion.
10AG. Topics in British and American Literature (2), (I, II, III. Lecture-discussion—2 hours. An introductory course in modern
literature designed for non-majors. Major authors and topics will vary, drawing from the following subjects: (A) The
Fantastic in Recent American Literature; (B) The New Jour-
nalism; (C) The Literature of California; (D) The Theater of
the Absurd; (E) Love and Death in the American Novel; (F) The
Literature of Sport; (G) Feminism and Modern Feminist
Literature; this text is being used only.
26. Intermediate Composition (4) I, II, III. The Staff (Zender in charge)
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3. Development of grammatical patterns of
standard English, sentence revision techniques, development of coherent paragraphs, and the form and function of the
sentences.
25. English for Foreign Students (5) I, II. Schwabe
Lecture—2 hours; discussion—2 hours; laboratory—1 hour. For foreign students only; required of those who do not pass
the English placement examination. May be repeated for credit.
26. English for Foreign Students (5) I, II. Schwabe
Lecture—2 hours; discussion—2 hours; laboratory—1 hour. Continuation of course 25.
28. Introduction to Library Research and Bibliography (3) II, III. The Staff (Zender in charge)
Lecture—1 hour; practical—6 hours. Methodology of search in academic libraries including catalogs, indexes and abstracts, and specialized sources of infor-
mation. Emphasis on preparation of detailed bibliographies and term paper research; offered in conjunction with the
library.
30A. Survey of American Literature (4) I, II. Wiggin
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3. American literature from the seven-
teenth through the nineteenth century.
30B. Survey of American Literature (4) II, II. Wiggin
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3. American literature from 1800 to 1900.
30C. Survey of American Literature (4) III, II. Deihl, Hicks
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3. American literature of the twentieth
century.
43. Critical Reading of Drama (4) II. The Staff (Chairperson in charge)
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3. An introduction to the forms of drama and
development of critical abilities through directed close reading. Frequent written exercises.
44. Critical Reading of Fiction (4) I. The Staff (Chairperson in charge)
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3. An introduction to the forms of prose fiction
and the development of critical abilities through directed close reading. Frequent written exercises.
46. Masterpieces of English Literature (4) I. The Staff (Chairperson in charge)
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3. Close reading of selections from English
and American poetry. Frequent written exercises.
50. Masterpieces of English Literature (4) II. The Staff (Chairperson in charge)
Lecture-discussion—4 hours; term paper. Prerequisite: one course from courses 1, 2, 3. Selected works of principal writers from
contemporary and historical English language studies. May
be repeated for credit when a different topic is studied.
50AG. Masterpieces of English Literature (4) III. The Staff (Chairperson in charge)
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3. The essential features of literary cri-
criticism and its history from Aristotle to the modern era, with
emphasis on the major critics.
50BG. Introduction to Masterpieces of English Literature (4) I. The Staff (Chairperson in charge)
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3. Major poets, novelists, and
critics of English literature from the late 19th century to the
present, with emphasis on the major figures of each period.
59. Special Study for Undergraduates (1-3) I, II, III. The Staff (Chairperson in charge)
(PNPA grading only)
Upper Division Courses
100F. Creative Writing: Fiction (4) I, II, III. The Staff (Chair-
person in charge)
Lecture-discussion—4 hours; evaluation of written materials and conferences with individual students. Prerequisite:
course SF or SP. Written work may be repeated for credit
with consent of instructor. No final examination.
100G. Creative Writing: Poetry (4) I, II, III. Shapiro
Lecture-discussion—4 hours; evaluation of written materials and conferences with individual students. Prerequisite:
course SF or SP. Written work may be repeated for credit
with consent of instructor. No final examination.
104F. Advanced Composition (4) I, II, III. The Staff (Chair-
person in charge)
Lecture-discussion—4 hours; individual conferences and conferences with the major. Prerequisite: one course from
courses 1, 2, 3, 20, or permission of the instructor. May be
repeated for credit with consent of the instructor. No final
examination.
105C Language Change Reflected in Literature (4) II. Scheinber
Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3. Study of historical changes
in English language and literature; history of teaching of
English language and literature. May be repeated for a total
of 4 units of credit. (PNPA grading only)
105A. Language (4) III.
Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3. Study of the grammar of
English language and literature; concentration on the history
of English language and literature. May be repeated for a
total of 4 units of credit. (PNPA grading only)
105B. Language (4) I.
Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3. Study of historical changes
in English language and literature; history of teaching of
English language and literature. May be repeated for a total
of 4 units of credit. (PNPA grading only)
105C. Language Change Reflected in Literature (4) II. Scheinber
Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3. Study of historical changes
in English language and literature; history of teaching of
English language and literature. May be repeated for a total
of 4 units of credit. (PNPA grading only)
105D. Linguistics, Literature, and Composition (4) III
Harash
Lecture-discussion—3 hours; term paper. Prerequisite: courses 105A and 105B. Linguistic approaches and methods in
literary analysis and in composition. Course considers
structural linguistics and transformational grammar em-
phasized in modern periods. Also includes a study of bellaristic
and nonbellaristic written materials.
107. Special Topics in English Language (4) II.
Seminar—3 hours; special project. Prerequisite: one course from courses 1, 2, 3. Investigation of varied subjects in
English
173. The Literature of Science Fiction (4) I. Hano Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3. Study of the literary models and methods of science fiction. The course will analyze representative novels and short stories which exemplify major themes and styles in the genre. Time travel, alternative universes, utopian, anthropological, sociological science fiction.

174. Agricultural Experience through American Literature (4) I. Webo Lecture-discussion—3 hours; paper. Prerequisite: one course from courses 1, 2, 3. Study of the literary models and methods of science fiction. The course will analyze representative novels and short stories which exemplify major themes and styles in the genre. Time travel, alternative universes, utopian, anthropological, sociological science fiction.

175. American Literary Humor (4) I. Weber Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3 or standing above Freshman level. American humorous vision of man, nature, and the supernatural. Includes one or more of the following: colonial humor; southwestern and New England humor; pre- and post-Civil War masters; local colorists; journalistic gadflies; anti-intellectuals; modernist poets and prose writers; black humor.

176. Multi-Ethnic Literature (4) III. Weber Lecture-discussion—3 hours; paper. Prerequisite: one course from courses 1, 2, 3 or standing above Freshman level. Fiction, poetry, and other writings by Americans of ethnic minority background (Native, Black, Hispanic, Jewish, etc.) which provide an understanding of the cultural diversity and contributions to American literature.

177. Children's Literature (4) I, III. Wiggins Lecture-discussion—3 hours; paper. Prerequisite: one course from courses 1, 2, 3 or standing above Freshman level. Study of the writings of black Americans, including Chestnut and Durbin in the nineteenth century, the writings of the Harlem Renaissance in the twentieth century, and the more important contemporary black writers, such as Wright, Ellison, Baldwin, Hansberry and Jones.

178. Sexuality and Sexual Experience in Literature (4) I. Webo Lecture-discussion—3 hours; term paper. Prerequisite: one course from English 1, 2, 3. Sexual experience in English language literature, poetry and prose, cultural sanctions, literary sanctions, eroticism and pornography. National origin of literature to be taught will depend on instructor.

179. Film as Narrative (4) II. Baker; III. Silva Lecture—2 hours; discussion—3 hours; term paper—11 to 12 hours. Prerequisite: one course from courses 1, 2, 3. Dramatic Art 150 is a prerequisite. A close study of modern (1930-60) feature film as a story telling medium. Emphasis on the work of American and British artists (Ford, Huston, Hitchcock, Welles).

180. Advanced Filmmaking (4) III. Baker Lecture—3 hours; term paper; one course from courses 1, 2, 3. Prerequisite: one course from courses 1, 2, 3. Film course in filmmaking. Creation of short, independent film productions. Each student will undertake to write a script, then shoot and edit a short 16mm movie. Limited enrollment.

181. Literature by Women (4) II. Dilli Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3. English language literature by women from Brontë and Breen to the Brontës, Eliot, Woolf, Plath, and Rich. The effects of social constraints upon women's art; the rise of feminism; new trends in literary criticism.

182. History and Production of the Book (4) II. Carter Lecture-discussion—3 hours; discussion—1 hour; laboratory—1 hour. Prerequisite: one course from courses 1, 2, 3. The course will cover a history of book production from the earliest written records to modern bookmaking techniques. Students will make paper and papyrus, will print and bind their book. Also covered are manuscript production, alpha- bet, type casting, book binding, etc.
188. Special Topics in Literary Studies (4) II, III, Ill. The Staff (Chairperson in charge)
Seminar—3 hours; term paper. Prerequisite: junior or senior standing with a major in English or consent of instructor.
Group study of a special topic drawn from English or American literature. The group will be offered in sections according to the topic studied, and papers will be assigned. Limited enrollment. May be repeated for credit with consent of instructor.

190. Study of a Major Writer (4) I, II, III. The Staff (Chairperson in charge)
Seminar—3 hours; term paper. Prerequisite: junior or senior standing, a major in English or consent of instructor. The artistic development of one major writer and his intellectual and literary milieu. Limited enrollment. May be repeated for credit with consent of instructor.

192. Internship in English (2-4) I, II, III. The Staff (Chairperson in charge)
Field work. Prerequisite: one course from courses 1, 2, or 3. Internships in fields where English majors can practice their skills. A maximum of 4 units allowed toward major requirements. May be repeated for credit for a total of 12 units. (FNP grading only.)

196. Stylistics (4).
Seminar—3 hours; term paper. Prerequisite: course 105A. Analysis of linguistic stylistic variation in specific works to be selected from the corpus of writings in English. (Same course as Linguistics 196.)

197. Tutoring in English (1-4) I, II, III. The Staff (Chairperson in charge)
Seminar—2 hours; one to five students. Prerequisite: upper division standing and consent of Chairperson. Leading of small voluntary discussion groups affiliated with and to serve as regular courses. Does not fulfill requirement for major. May be repeated for credit for a total of 8 units. (FNP grading only.)

197C. Community Tutoring in English (1) I, II, III. The Staff (Chairperson in charge)
Seminar—2 hours; one to five students. Prerequisite: upper-division standing and a major in English; consent of Chairperson. Field experience, with individuals in community or in instruction in English language, literature, and composition. Does not fulfill requirement for major. May be repeated for credit. (FNP grading only.)

197D. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Seminar—3 hours; one course from courses 1, 2, 3, 5, 6, 8. (FNP grading only.)

199. Special Study for Advanced Undergraduates (1-9) I, II, III. The Staff (Chairperson in charge) (FNP grading only.)

Graduate Courses


201. Literary Criticism (4) II. Hayden Discussion—3 hours; seminar. Seminar for major criticism from Aristotle to the present, with emphasis on the relationship of critical theory to the history of literature.

202. Theory and Practice of Written Composition (4) II. Harsh Seminar—3 hours; practical exercise of writing and tutorial assignments. Students admitted into this course by examination of their own writing skills. (Those with insufficient advanced command of writing shall be required to take a special section of course 103, at no credit. Before enrolling in course 202) Instruction in the teaching of composition. Emphasis on mastering both the basics and finer points of expository prose, on teaching such skills to others.

204. American English from 1800 to Present Day (4) II. Discussion—3 hours; term paper. Historical changes reflected in American writing and the study of dialect variations. Emphasis will be on patterns of development of phonology, morphology, syntax, and lexicology with emphasis on the regional dialects. Pertinent facts on both the internal and external linguistic history. Intensive reading of texts.

206. Early Modern English (4) II. Harsh Discussion—3 hours; term paper. Study of writings in the period from the Renaissance to the present day. Intensive reading of texts will include outside of phonology, morphology, syntax, lexicon, and pertinent linguistic changes in the historical period.

209. Present-Day English Linguistics (4) II. Discussion—3 hours; term paper. Theory and methods of structural linguistics and transformational grammar as applied to the analysis of English. Linguistics will be on recent linguistic techniques, particularly as these relate to the teaching of language, literature, and composition.

212. Readings in English and American Literature (4) I. Woodress Discussion—3 hours. Prerequisite; upper division English course in area to be studied. Offered in multiple sections each quarter. Credit varies according to study of instructor. Course designed for students preparing for their comprehensive examinations. May be repeated for credit.

215. Arthurian Romance (4) I. Discussion—3 hours. The sources of Arthurian Romance literature. Continental and English literary tradition; Malory’s synthesis; significant changes of attitudes in post-Malory literature.

226. Topics in Irish Literature (4) II. McGuinness Seminar—3 hours. Prerequisite: course 199. Course will vary from quarter to quarter and will include such topics as the study of the nineteenth-century Irish poetry, the rise of the drama, or a study of a major author.

228. Library Methods and Literary Criticism for the Teaching of English (4) I. The Staff Lecture-discussion—2 hours; laboratories—2 hours. Introduction to library resources, bibliography, and modes of criticism for the prospective teacher of English on the secondary and college level.

230. Study of a Major Writer (4) I. Woodress; II. Hopkins Seminar—3 hours; conferences with individual students—1 hour; research papers. Artistic development of one major writer and his intellectual and literary milieu. May be repeated for credit when a different writer is studied.

232. Problems in English Literature (4) I. Dale; III. Hayden Seminar—3 hours; conferences with individual students—1 hour; research papers. Artistic development of one major writer and his intellectual and literary milieu. May be repeated for credit when a different topic is studied.

236. Dramatic Literature (4) II, III. Cohn (Dramatic Art) Seminar—3 hours; conferences with individual students—1 hour; research papers. Selected topics in the study of drama and assessment of a limited period or topic in English literature. May be repeated for credit when different period or topic is studied.

238. Problems in American Literature (4) I. Robertson; II. Hays; III. Carter Seminar—3 hours; conferences with individual students—1 hour; research papers. Selected topics in the study of American literature. May be repeated for credit when different period or topic is studied.

240. American English from 1800 to Present Day (4) II. Discussion—3 hours; term paper. Historical changes reflected in American writing and the study of dialect variations. Emphasis will be on patterns of development of phonology, morphology, syntax, and lexicology and on characteristics of regional writing and dialectal variants.

256. Introduction to Old English (4) I. Discussion—3 hours; written reports; individual conferences. The language of Anglo-Saxon England; readings in Old English prose and poetry.

260. Beowulf (4) Discussion—3 hours; oral and written report; conferences with students. Prerequisite: course 205 or equivalent. A study of the poem and the Heroic Age of Germanic literature. Meets regularly for 2 years.

277. Middle English (4) III. Discussion—3 hours; term paper. Study of the phonology, morphology, syntax, and lexis between 1100 and 1500.

NOTE: For key to footnote symbols, see page 130.
Entomology

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

299D. Special Study for the Doctoral Dissertation (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Professional Courses

300. Problems in Teaching English Language, Literature and Composition in Secondary Schools (3) Lecture-discussion—2 hours. Prerequisite: senior of graduate student; an English teaching major or minor. This course should be completed before practice teaching. Course content is based on analysis of the requirement of the instruction in English for the general secondary credential.

302. Materials of Teaching English as a Second Language (ESL) (4) II, Swawabe Lecture—3 hours; practice teaching—3 hours. Prerequisites: Linguistics 300. Design and development of classroom curricula and instruction of ESL materials combined with instruction in classes in the ESL Clinic. Guided practice in teaching English pronunciation, grammar and sentence structure, literature comprehension and composition, discussion, and reading to foreign students.

303. Recent Research and Problems in ESL (4) II, Swawabe Lecture—4 hours; practice teaching—2, 4, or 6 hours. Prerequisite: course 302. Analysis of a particular problem in teaching ESL as an area of research in second language as ESL and testing possible solutions. Course work will include a review of literature in this area as well as presentation of a paper addressing problems.

390. Teaching English at the College Level (2) I, Zender Discussion—2 hours. Prerequisite: graduate standing and concurrent appointment as teaching assistant in Department of English. Consideration of the problems and techniques of teaching composition and literature at the college level. (SU grading only.)

392. Teaching Internship in English (2) I, II, III. The Staff (Coordinator of Writing Programs in charge) Supervised internships—4 hours. Prerequisite: graduate standing, in-class internship with English Department faculty member. Grading: credit/no credit.

401. Editing "California Quarterly" (2) I, II, III. E. Gilbert Seminar—2 hours; conference—1 hour. Prerequisite: participation in Creative Writing Program. Students will read three manuscripts submitted to California Quarterly and attend weekly editorial board meetings, choosing manuscripts for publication. They will also participate in copy editing, copyreading layout, and other aspects of juvenile production. May be repeated for a total of 6 units. (SU grading only.)

Entomology (College of Agricultural and Environmental Sciences)

Martin C. Birch, D.Phi., Chairperson of the Department

Department Office, 367 Briggs Hall (752-0475)

Faculty

Oscar G. Bacon, Ph.D., Professor
Stanley F. Bailey, Ph.D., Professor Emeritus
Martin C. Birch, D.Phi., Associate Professor
Richard M. Bohart, Ph.D., Professor Emeritus
James R. Carey, Ph.D., Assistant Professor
Sean S. Duffey, Ph.D., Assistant Professor
Leiser E. Epler, Ph.D., Associate Professor
Norman G. Gary, Ph.D., Professor
Jeffrey Granett, Ph.D., Assistant Professor
Albert A. Grigarick, Jr., Ph.D., Professor
Charles L. Judson, Ph.D., Professor
Harry K. Kaya, Ph.D., Associate Professor
Harry H. Laidlaw, Jr., Ph.D., Professor Emeritus
W. Harry Lange, Jr., Ph.D., Professor
Thomas F. Leigh, Ph.D., Lecturer
Benjamin F. Lowery, Ph.D., Professor (Nematology)

Armand R. Maggeni, Ph.D., Lecturer

G. A. H. McClintock, Ph.D., Professor
Donald L. McLean, Ph.D., Professor
Christine Y. S. Peng, Ph.D., Assistant Professor

Timothy Prott, Ph.D., Professor (Entomology, Genetics)
Dewey J. Rice, Ph.D., Professor (Nematology)
Richard E. Rice, Ph.D., Lecturer
Eugene M. Stafford, Ph.D., Professor Emeritus
Francis M. Summers, Ph.D., Professor Emeritus
Robbin W. Thorp, Ph.D., Professor
David R. Viglietichio, Ph.D., Lecturer (Nematology)
Philip S. Ward, Ph.D., Assistant Professor
Robert K. Washino, Ph.D., Professor

The Major Program

The Entomology major provides students an opportunity for extensive study of insects—their behavior, classification, structure, physiology, and ecology. Some of the areas of emphasis in entomology are: biostatistics, management of pest insects with natural enemies and chemicals, management of honeybees for pollination of agricultural crops and honey production, nematology and transmission of plant and animal pathogens. Employment opportunities abound for those who have taken this course of study in high schools and junior colleges. Other graduates matriculate in graduate programs leading to a higher degree.

B.S. Major Requirements:

For convenience in planning program the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. (Courses shown without parentheses are required.)

Preparatory Subject Matter

UNITS
Biology (Biological Sciences I) 1
Botany (Botany 2) 1
Zoology (Zoology 2-b) 1

Elective courses in biology (exclusive of entomology) including one course in entomology (Genetics 103 or Zoology 103) must be taken to satisfy this requirement.

Depth Subject Matter

Enrollment 100, 101A, 101B, 103, 104, and 105 or and one another course in entomology which requires a collection of insects.

Breadth Subject Matter

ENGLISH

and 20 units of credit (see College requirement)

Electives in social sciences and humanities 28

Unrestricted Electives 29

Total Units for the Major 180

Major Advisor: C. L. Judson

Graduate Study: The Department of Entomology offers a program of study and research leading to the M.S. and Ph.D. degrees. See pages 99 and the Announcements for the Graduate Division for further details.

Graduate Adviser: See Class Schedule and Room Directory.

Related Courses: See courses in Nematology, turf and soil science, and the Social Sciences and Humanities.

Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.

Courses in Entomology

Lower Division Courses

10. Natural History of Insects (3) I. Bacon

Lecture—3 hours. Designed for students not specializing in entomology. Not open to credit to students who have had course 100 but not 200. Students may take course 100 for credit. An introduction to the insects detailing their general life cycle, structures and functions, habitat, and their significance in relation to plants and animals including man.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PHN grading only.)

Upper Division Courses

100. General Entomology (5) I. Thorp

Lecture—3 hours, laboratory—6 hours, optional Saturday field trips to be arranged. Prerequisite: Biological Sciences 1 or the equivalent. Biology of insects including: morphology, physiology, development, ecology, classification of orders and common families, and relationship to human welfare.


Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100. Chemistry 68 recommended: course 101A preferred to 101B. Principles of evolutionary, functional and comparative aspects of insect morphology, and study of the mechanisms and processes by which insects maintain themselves and adapt to the environment. Laboratory sessions cover basic structure and introduce research principles and techniques.

103. Systematic Entomology (4) II. Ward

Lecture—2 hours; laboratory—6 hours. Prerequisite: introductory course in zoology or entomology. The principles of animal taxonomy; classification, introduction to classification and nomenclature.

104. Insect Ecology (4) II. Carey

Lecture—3 hours, discussion—1 hour. Prerequisite: a general biology course. Principles of animal ecology with emphasis on insect population dynamics: analysis of factors influencing distribution and abundance. Application of basic taxonomic to management of pest insect populations with focus on biological control and related approaches. Community structure and dynamics.

105. Insect Classification (3) I. Thorp, Grigarick, Ward

Lecture—1 hour; laboratory—8 hours. Prerequisite: course 100. Principles and methods of classification of insects to the family level with emphasis on identification.

106. Field Entomology (4) III. Thorp

Laboratory—6 hours; weekend field trips—8-10 days. Prerequisite: course 105 or consent of instructor. Collection and comparative analysis of specimens from selected ecological zones in California. Offered in odd-numbered years.

108. Chemical Control of Insects (4) I. Granett

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110 or 112. Chemistry 8A, 8B. Biochemistry or Animal Physiology recommended. Study of chemicals used to control insects and mice with regard to mode of action, chemistry, metabolism, and applied uses, particularly with an integrated control framework. Chemical-insect and chemical-environment interactions. Practical aspects of chemical use.

109. Fertil Taxonomy and Ecology (7) Extra-session summer. Lecture—2 hours; laboratory—15 hours, five-week course. Prerequisite: an introductory course in entomology or consent of instructor. The study of insects in their natural habitats: their identification and ecology. Offered in even-numbered years.

110. Economic Entomology (4) I. Grigarick

Lecture—2 hours; laboratory—6 hours. An introductory course dealing with the identification, biology, and control of insects and mites that cause economic losses. Emphasis is placed on the management of agricultural pests that includes structural, household, storage, and ornamental pest problems.

112. Agricultural Pest Management (4) II. Lange

Lecture—3 hours; laboratory—3 hours. Prerequisite: upper division standing in one of the biological sciences or consent of instructor. An introduction to the principles of pest management as they apply to representative agricultural crops with emphasis on the integration of all available control measures in the development of crop protection strategies.
116. Biology of Aquatic Insects (3-3) III. Grigarick
Lecture—2 hours and laboratory (Saturday field trips); optional laboratory on identification and/or aquatic insect collection. Prerequisite: course 100 or consent of instructor. A study of the life history, ecology, and identification of insects associated with aquatic environments and their uses.

118. Crop Resilience to Arthropod Pests (4) III. Leight
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 110 or the equivalent; upper division standing; additional topics in entomology and plant science courses recommended. An introduction to host plant resistance as a durable and efficient technique applicable to pest management. Service and research projects and/or methods. Designed for students in agricultural entomology and crop production. Offered in odd-numbered years.

119. Agriculture Laboratory (2) III. Gary
Discussion—1 hour; laboratory—2 hours; field trips taken primarily during laboratory time. Prerequisite: course 119 or consent of instructor. Biology and behavior of honey bees: fundamentals of culture, management, and use of colonies for agricultural, recreational, teaching, and research purposes. Field trips to industrial activities.

120. Insect Host-Plant Interactions (4) II. Dufy
Lecture—3 hours; laboratory—2 hours; Pesticide: course 104-101A, Biochemistry 101A-101B or the equivalent. General introductory course in botany and/or plant physiology. Detailed study of the chemical and physiological bases of host-plant selection by insects; consideration of bases of host-plant resistance to insects. Emphasis in the biochemical interactions between various organisms particularly plants and insects.

121. Insect Behavior (4) III. Birch
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in one of the biological sciences and one course in entomology or consent of instructor. Mechanisms of insect behavior; includes physiological basis for behavior, species characteristics, and types of behavior, comparative studies, learning and evolution of behavior.

123. Classification of Immature Insects (4) III. Lange
Lecture—2 hours; laboratory—6 hours. Prerequisite: introductory course in general zoology or the equivalent. A study used to identify the immature forms of the principal orders and families of insects; primary emphasis on economic groups. Offered in even-numbered years.

125. Insect Vectors of Plant Pathogens (4) III. McLean
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in entomology or plant pathology; or consent of instructor. Biological, physiological and biochemical interaction relationships between insect vectors and the plant pathogens they transmit. Emphasis placed on the insect vectors associated with plant viruses and mycoplasmas. Offered in odd-numbered years.

127. Acarology (4) I. Ethier
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100 or consent of instructor. Theory and practice of biological control of arthropod pests; biology of entomopatho- genic arthropods, role of insects in weed control, microbial control of insects and mites.

140. Insect Pathology (4) III. Kaya
Lecture—3 hours; laboratory—3 hours. Prerequisite: introductory course in entomology and at least one course in a microbiological science. Principles of insect pathology and insect diseases, including the transmission and incidence of diseases of insects, diagnosis, epizootiology, therapy, and microbial control.

153. Medical Entomology (4) I. McAllister
Lecture—3 hours; laboratory—1 hour. Prerequisite: upper division standing in one of the biological sciences or consent of instructor. The worldwide relationships of insects and human health. The biological and medical aspects of insect vector disease. Prerequisites: course in calculus, biology, and chemistry. Offered in odd-numbered years.

155. Management of Medically Important Arthropods (3) III. Washino
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 119 or consent of instructor. Topics of current interest in the control of medically important arthropod pests. Offered in odd-numbered years.

156. Biology of Parasitism (3) III. Washino, in charge. Thells
Lecture—3 hours; laboratory—2 hours. Prerequisite: Biological Sciences 1 or consent of instructors. Lectures on the biological and ecological relationships between parasitic and host species. Offered in odd-numbered years.

156L. Biology of Parasitism Laboratory (1) III. Washino, in charge. Thells.
Lecture—3 hours; laboratory—2 hours. Prerequisite: course 156 (concurrent) or consent of instructor. Laboratory demonstrations using selected species of protozoan and helminth parasitesлим organisms along with various techniques used in parasitology to exemplify concepts presented in the lecture course.

170. Insect Pest Management (6) Extra-semester summer
Lecture—60 hours total; laboratory and field trips—100 hours total. Prerequisite: upper division standing and at least one course in agricultural entomology or insect ecology. Field course in pest management principles and practices. Students participate in detection and sampling for recommended. Selected topics of insect ecology, pest identification, life history, and behavior. Also plan and conduct experiments utilizing biological, chemical, and cultural control methods.

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off-campus. course in entomology and internships supervised by a member of the faculty. (PINF grading only.)

196. Directed Group Study (1-5) I, II, III. Summer. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (PINF grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. Summer. The Staff (Chairperson in charge) (PINF grading only.)

Graduate Courses

201. Theoretical Aspects of Pest Management (3) III. Carey

202. Advanced Insect Physiology (2) II. Judson
Lecture—2 hours. Prerequisite: course 101B or the equivalent or consent of instructor: Biochemistry 101A or 101B and Biology 101A. Knowledge of Entomology. Internships supervised by a member of the faculty. Offered in odd-numbered years.

203L. Advanced Insect Physiology Laboratory (2) II. Judson
Laboratory—6 hours. Prerequisite: course 101B or Zoology 142. Investigating the morphology and physiological processes in insects and arachnids. Independent projects may be undertaken. Offered in odd-numbered years.

207. Genetic Control of Insect Pests (3) I. Pout
Lecture—3 hours; laboratory—2 hours. Prerequisite: introductory genetics, plus population genetics or evolutionary theory; graduate or upper division standing in biological science; some knowledge of genetics and of insect ecology and behavior; ability to understand population genetics. Application of population genetics to ways of altering the genetic constitution of pest populations. Including sterile male release, delayed sex ratio, the use of various cytogenetic procedures and xenic male to transform populations. Offered in odd-numbered years. (SUO grading only.) (Same course as Genetics 207.)

219. Advanced Aecology (4) III. Pang
Lecture—3 hours; laboratory—2 hours. Prerequisite: course 119L or consent of instructor. Current topics in bee biology with special consideration of morphology, caste determination, queen-rearing, nutrition, physiology, pathology, and products of honey bees.

245. Pollination Ecology (4) III. Thorp. Webster (Botany)
Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: consent of instructor. Theory of ecological relationships between plants and their pollinators with emphasis on insect pollination. Review of adaptations of both flowers and insects, and survey of the coevolution of pollination relationships. Offered in even-numbered years. (SUO grading only.)

245L. Pollination Ecology Laboratory (2) III. Thorp.
Lecture—2 hours; laboratory—6 hours. Prerequisite: one upper division course in entomology (other than course 153) and one course in microbiology; course 153 recommended. An analysis of several arthropod-borne human diseases with emphasis on the relationship of the biology of the vector to the ecology of the disease. Laboratory emphasis on general techniques and identification. Offered in an even-numbered year.

255. Electical Principles Related to Biological Research (4) II. McClean
Lecture—3 hours; laboratory—4 hours. Prerequisite: college in physics; graduate standing in a biological science or consent of instructor. Basic electrical principles of ac and dc circuits. Methods of electrical measurements, discussion of semiconductor devices, and basic circuits of power supplies, amplifiers, oscillators, and electronic switching are presented in relation to biological measurement systems. Offered in even-numbered years.

275A. Principles and Methods of Entomological Research (4) II. The Staff (McClelland in charge)
Lecture—2 hours; laboratory—6 hours. Prerequisite: Agricultural Science and Management 150, Statistics 13 or the equivalent. Philosophy of research and principles of scientific inquiry related to entomological science with emphasis on problem selection, work planning, design of experiments, methods of observation, data collection and analysis, and presentation of statistical data. Offered in even-numbered years.

275B. Principles and Methods of Entomological Research (4) II. The Staff (McClelland in charge)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 275A. Principles of scientific inquiry related to entomological science with emphasis on the synthesis of research results for written and oral presentation. Development of skills in scientific communication. Offered in even-numbered years.

280. Special Topics in Entomology (1-4) I, II, III. The Staff (Entler in charge)
Seminar—1 hour. Prerequisite: consent of instructor.

281. Seminar in Medical Entomology (2) I. McClelland, Washino
Seminar—2 hours. Prerequisite: course 153. Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in man and animals.

282. Seminar in Insect Physiology (2) I, II. Judson, McLean, Birch, Dufy
Seminar—2 hours. Prerequisite: course 101B. Critical examination of areas of current interest to insect physiology and biochemistry.

283. Seminar in Systematic Entomology (2) II. Ward, Grigarick, Ethier
Seminar—2 hours. Prerequisite: course 103. Selected topics in systematic and evolution are presented and discussed. Some topics may be illustrated by laboratory sessions.

284. Seminar in Insect Ecology (2) II. Carey, Ethier
Seminar—2 hours. Prerequisite: a general ecology course. Discussion of advances in ecology in the analysis of communities in relation to analysis of factors influencing the distribution and abundance of insects. Includes consideration of applications of basic theory as in biological control and related approaches.

285. Seminar in Agricultural Entomology (2) II. Bacon, Grigarick, Ethier, Dufy
Seminar—2 hours. Prerequisite: course 110. Discussion of advanced topics relating to the principles of pest insect population management.

286. Seminar in Bee Biology (2) I. Thorp, Gau, Perry
Seminar—2 hours. Prerequisite: course 119 or the equivalent. Discussions of behavior, ecology, management, and pollination of bees (Apoidea) with emphasis on the honeybee.

287. Seminar in Insect Behavior (2) II. Gary, Birch
Seminar—2 hours. Prerequisite: course 121. Review and critical analysis of contemporary advances in insect behavior, especially interpretation and description of observations, physiological mechanisms, functional kinds of behaviors and the application of conceptual frameworks to the solution of problems in the laboratory and field.

288. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
SUO grading only. (Same course as Botany 245.)

290. Research (1-12) I, II, III. The Staff (Chairperson in charge)
SUO grading only. (Same course as Botany 245.)
Environmental Horticulture

(College of Agricultural and Environmental Sciences)

Richard W. Harris, Ph.D., Chairperson of the Department
Department Office, 140 Environmental Horticulture Building (752-0130)

Faculty

Seymour M. Gold, Ph.D., Associate Professor (Environmental Planning and Management)

Wyse P. Hackett, Ph.D., Professor

James A. Harding, Ph.D., Professor

Richard W. Harris, Ph.D., Professor

Charles E. Hess, Ph.D., Professor

Ronald W. Hodgson, Ph.D., Assistant Professor (Environmental Planning and Management)

Avery C. Johnson, Ph.D., Assistant Professor (Environmental Planning and Management)

Harry C. Kohl, Jr., Ph.D., Professor Emeritus

Andrew T. Leiser, Ph.D., Professor

John H. Madison, Jr., Ph.D., Professor Emeritus

James D. MacDonald, Ph.D., Assistant Professor (Plant Pathology)

Jack L. Paul, Ph.D., Associate Professor

Michael S. Reid, Ph.D., Assistant Professor

Reid M. Reif, Ph.D., Professor

Robert L. Tidwell, Jr., M.A., Assistant Professor (Environmental Planning and Management)

Lin L. Wu, Ph.D., Assistant Professor

Related Major Programs and Graduate Study. See the undergraduate majors in Environmental Planning and Management (this page) and Plant Science (page 276), and for graduate study see page 99.

Related Courses. See Plant Science.

Courses in Environmental Horticulture

Lower Division Courses

5. Introduction to Environmental Plants (3) I, Harding Lecture—2 hours; laboratory—3 hours. Prerequisites: Botany 2 or Plant Science 2. Growth, form, and origin of plants used in landscape and home discussed in relation to their uses and climatic and cultural requirements. Students learn to identify environmental plants.

10. Landscape Horticulture for the Home and Community (3) III, Harding Lecture—2 hours; discussion—1 hour. Recommended for non-majors. Influences of climate, soil, and cultural practices on the growing of turf, flowers, and herbaceous and woody plants in the landscape.

92. Internship (1-12) II, III. The Staff (Department Chairperson in charge) Lecture—3 credits. Prerequisite: lower division standing, Botany 2 or Plant Science 1 or 2, and consent of instructor. Work-experience opportunity offered in urban and garden horticulture, landscape architecture, and park management. Internships supervised by a member of the faculty. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Harris in charge) (P/NP grading only.)

Upper Division Courses

105. Taxonomy and Ecology of Environmental Plants (4) I, II. Harris Lecture—2 hours; laboratory—6 hours. Prerequisite: course 6 or course 1. Taxonomy of the important plants used in the western landscape. Emphasis will be placed on the identification, nomenclature, characterization, and uses of woody plants in man's environment.

107. Herbaceous Environmental Plants (3) III. Madison Lecture—2 credit hours, laboratory—3 hours. Prerequisite: course 6 or course 1. Taxonomy, identification, ecology, and use of herbaceous environmental plants, with emphasis on ornamental and fleshy plants, garden annuals, and perennials.

115. Advanced Taxonomy and Ecology of Environmental Plants (4) III. Leiser Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 107 or consent of instructor. Identification, nomenclature, classification of plants for man's environment are studied in relation to environmental variations and ecological modification. Emphasis is placed on the use of plants in western climatic zones. Nomenclature codes are discussed. Offered in odd-numbered years. Even-numbered years only.

120. Management of Containerized Soils (3) I, Paul Lecture—2 hours; laboratory—3 hours. Prerequisite: Soil Science 2. Appropriate use of sand, mineral soil, and amendments to formulate container soils. Management of container soils emphasizing irrigation, sanitation control, and fertilizer practices.

125. Flower Crop Production and Marketing (4) II. Kohl Lecture—3 hours; laboratory—2 hours; one-half day field trip. Prerequisite: course 120. Plant Science 2. The technology of planning, growing, and marketing flower crops, particularly greenhouse crops, as an application of principles. Major flower crops are considered in detail.

126. Nursery Management (2) II. Hackett Lecture—2 hours; one all day field trip. Prerequisite: Plant Science 125. Plant Science 2. Principles and practices leading to successful establishment, and management of woody ornamental crops in relation to propagation, other cultural practices and marketing. Emphasis on planning and scheduling nursery production. One Saturday field trip required.

130A. General Turf Culture II (3) Madison Lecture—2 hours; laboratory—3 hours (first two-thirds of the quarter). Prerequisite: Plant Science 2 or Botany 2 and course 126. Principles and practices leading to successful establishment and management of turf. Topics include variety selection, soil mixture preparation, fertilization, irrigation, design of sprinkler systems, mowing, and pest control.

130B. Floriculture Sport Turf (2) II. Madison Lecture—2 hours; laboratory—3 hours (last one-third of the quarter). Prerequisite: courses 120 and 130A. The installation and management of fine sporting turf areas used for golf, bowling, lawn tennis, football, etc.

133. Arboriculture (4) II, Harris Laboratory—3 hours; discussion—4 hours. Prerequisite: Plant Science 2 or Botany 2. Principles and practices of selecting, planting and maintaining trees, shrubs and vines in urban and natural landscapes. Course given in Personalized System of Instruction format. Students should enroll when juniors if they wish to assist with the course next year.

155. Plant Selection for Environmental Design (3) II. Lecture—2 hours; laboratory—6 hours. Prerequisite: course 6 and Environmental Planning and Management 20. Ability, characteristics, and limitations of landscape plants and plantings to modify the environment, control traffic, reduce erosion, create amenity, etc., with emphasis on specific species.

156. Landscape Planting Design (4) III. Thayer Lecture—2 hours; laboratory—6 hours. Prerequisites: courses 105, 155, and Environmental Planning and Management 22. Application of aesthetic, functional, and horticultural principles to the composition of the landscaped plant and development and the design of planting plans. Limited enrollment.

192. Internship (1-12) II, III. The Staff (Department Chairperson in charge) Laboratory—3.6 hours. Prerequisite: completion of 64 units; two upper-division courses in Environmental Horticulture appropriate to the student's major. Work-experience opportunity offered in urban and garden horticulture, landscape architecture and park management. Internships supervised by a member of the faculty. (P/NP grading only.)

197. Tutoring in Environmental Horticulture (1-4) II, III. The Staff (Harris in charge). Hours and duties will vary depending upon tutor's experience. Prerequisite: upper division course or consent of instructor. Leading discussion sections, conducting laboratory exercises or promoting in personalized system-of-instruction format classes under faculty guidance. Weekly conferences on subject material and laboratory procedures. May be repeated once for credit if different courses are taken.

198. Directed Group Study (1-5) II, III. The Staff. (Chairperson on request) Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. Selected problems in horticulture, management, and landscape horticulture. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) II, III. The Staff (Chairperson in charge) Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. (P/NP grading only.)

Graduate Courses

241. Analysis of Horticultural Problems (3) II, Paul Lecture—1 hour; laboratory—6 hours. Prerequisite: a B.S. degree (or the equivalent) in Plant Science of consent of instructor. Diagnosis of ornamental plant disorders. Emphasis on distinguishing among disorders caused by soil, water, insects, pathogens, chemicals, climatic conditions and cultural practices using visual symptoms and circumstances for determining probable cause and laboratory methods for confirmation.

251. Modeling Productivity of Greenhouse Flower Crops (3) II, Kohl Lecture—2 hours; discussion—1 hour. Prerequisite course 125. Plant Science 101. Course will introduce students to system modeling using the DYNAMO computer program. Economically important production parameters of greenhouse flower crops will be studied and an effort will be gained in using computer models to maximize economic flower crop production.

260. Seminar I (1-3) II, III. The Staff (Chairperson in charge) Seminar—1 hour. Selected topics in horticulture, nursery management, and environmental horticulture.

262. Group Study (1-5) I, II, III. The Staff (Sachs in charge) Group study on advanced topics in horticulture, nursery management, and environmental horticulture.

292. Research (1-12) I, II, III. The Staff (Sachs in charge) Prerequisite: graduate standing. Research in horticulture, nursery management, and environmental horticulture. (S/U grading only.)

Environmental Planning and Management

(College of Agricultural and Environmental Sciences)

Program Office, Temporary Building 105 (752-6336)

Faculty

See under the Department of Environmental Horticulture.

The Major Program

The Environmental Planning and Management major provides opportunities to study the relationships between people and the environment through a common core of courses and the development of competence in one of two options. Employment opportunities in the public or private sector that may be available to graduates are illustrated below. Graduate study or experience may be essential for some occupations.

The (1) Park Administration and Interpretation option emphasizes administrative processes in the allocation, development and management of outdoor recreation systems, resources and facilities. It encompasses both administrative and interpretive principles to facilitate human-environment interactions: park and recreation director, park ranger, park naturalist, park superintendent, outdoor education specialist, conservation information officer, resort manager, recreation planner. The (2) Landscape Architecture option emphasizes the design and development of landscapes: landscape architect, landscape contractor. Students applying for this option are admitted into the Exploratory Program (see page 66).

The Environmental Planning and Management advisers recommend career experience through work-learn internships, summer jobs, or stopping out for a quarter or more to work with appropriate public agencies or private firms.

*Also see the Environmental Policy Analysis and Planning major.

202
Environmental Planning and Management

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more advanced courses may be taken with the adviser's approval. Courses shown without parentheses are required.)

Common Core Courses 72

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>Chemistry (Chemistry 1A or 10)</td>
<td>4</td>
</tr>
<tr>
<td>Physics (Physics 1A, 2A or 10)</td>
<td>3</td>
</tr>
<tr>
<td>Earth Sciences (Environmental Science 1)</td>
<td>6</td>
</tr>
<tr>
<td>Biology (Biological Sciences 1 or 10)</td>
<td>4</td>
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<tr>
<td>Mathematics (Mathematics 16A, 16B, 19, 29, 36A, Statistics 13, or Agricultural Science and Management 120)</td>
<td>6</td>
</tr>
<tr>
<td>Environmental Science (Environmental Studies 10, Environmental Toxicology 10 or Resource Sciences 100)</td>
<td>3</td>
</tr>
<tr>
<td>Landscape Architecture (Environmental Planning and Management 110 or 112)</td>
<td>4</td>
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<tr>
<td>General electives (Environmental Studies 100 or 110)</td>
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<th>Course</th>
<th>Units</th>
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<td>Park Administration and Interpretation</td>
<td>5</td>
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<tr>
<td>Biological science, Botany 2</td>
<td>5</td>
</tr>
<tr>
<td>Botany, plant science, wildlife and fisheries</td>
<td>5</td>
</tr>
<tr>
<td>Environmental plants, Environmental Horticulture 6</td>
<td>3</td>
</tr>
<tr>
<td>Recreation planning and management</td>
<td>5</td>
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Landscape Architecture Option
Botany 2 5
Natural resources, 102, Environmental Studies 118, 151, Wildlife and Fisheries 10, Zoology 2 or 116 4
Landscape architecture, Introduction to Landscape Architecture 103A, 133 4
Environmental plants, Environmental Horticulture 103, 151 7
Plant selection, Environmental Horticulture 155 3
Landscape planning and design 156 4
Two-dimensional design, Art 16, Design 21 or Engineering 119 4
Three-dimensional design, Art 5, 112, 121A 4
Design 130 or 134 4
Landscape graphics, Environmental Planning and Management 24 3
Design of recreation environments, Environmental Planning and Management 136 4
Landscape architecture, Environmental Planning and Management 154A, 154B, 154C 11
Landscape architecture, Environmental Planning and Management 158A, 158B, 158C 12
Individual requirements 17

Unrestricted Electives 27-30
Total Units for the Major 180

Major Adviser: R. L. Thayer (Environmental Horticulture)

Courses in Environmental Planning and Management

Questions pertaining to the following courses should be directed to the instructor or to the Environmental Planning and Management advising office, TB-105.

Lower Division Courses
20. Introduction to Landscape Architecture (3) I. Thayer Lecture—3 hours. Hours, history, theory, philosophy, techniques, and applications of landscape architecture in the design of outdoor spaces and land areas. Open to non-majors.
22. Landscape Architecture Studio (3) II, III. The Staff Lecture—1 hour; studio—6 hours. Prerequisite: course 20. Design 21 or the equivalent. Introduction to problems in landscape architectural analysis, design evaluation, and presentation methods. Limited enrollment.
24. Graphic Arts and Design (3) III. The Staff Lecture—1 hour; studio—6 hours. Prerequisite: Design 21 or the equivalent. Laboratory and practice in the graphic representation of landscapes and the outdoor environment, including drafting, rendering techniques, landscape architecture, lettering, color use, presentation drawings, and portfolio preparation.
98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Primarily for lower division students. P.N.P. grading only.
99. Special Study (1-3) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Primarily for lower division students. P.N.P. grading only.

Upper Division Courses
110. Urban and Regional Planning (4) II. Gold Lecture—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: upper division standing. The history, nature, scope and significance of urban studies in America, with emphasis on basic definitions and concepts, the planning process and comprehensive problem, significant problems and potential solutions, the future, innovation, and the profession.
9196. Outdoor Recreation (4) I. Gold Lecture—4 hours; discussion—1 hour. History, nature, scope, and significance of outdoor recreation in American life, with emphasis on user-resource relationships, special problems, policy issues, and innovation.
122. Park Administration (4) II. Lecture—3 hours; discussion—1 hour; Saturday field trip. Prerequisite: course 118. Description and analysis of the nature, concepts and techniques of providing leisure opportunities with emphasis on the policies, programs, and organization of park and recreation systems.
125. Technology Transfer and Innovation (4) I, II. Hodgson Lecture—3 hours; discussion—1 hour. Prerequisite: course 122. Technology transfer and innovation, diffusion, and organizational communication principles to help people develop strategies to introduce new ideas such as energy conservation, agricultural practices, etc., into social systems.
127. Leisure Behavior (4) III. Lecture—4 hours; discussion—2 hours. Prerequisite: course 118. Course 125 recommended. Investigation of selected leisure environments and resultant behavior. Analysis of leisure behavior from a motivational basis. Historical analysis of different leisure environments cross-culturally.
129. Research Methods for Planning and Management (4) I. Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Statistics 13 or 112. Description of research design and measurement methodology to collection of data needed for planning and managing the environment. Processing and analysis of data using computer facilities. Developing the ability to evaluate published research results.
134. Recreation Planning (4) III. Gold Lecture—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: courses 110 and 118. Description of concepts, principles, techniques, problems, and potentials of the design, analysis and evaluation of recreation environments with emphasis on outdoor recreation resources, form and function, quality, and the impact of design alternatives on the urban and natural landscape.
144. Park and Landscape Management (4) III. Harris Lecture—3 hours; laboratory—3 hours. One day field trip. Prerequisite: Environmental Horticulture 130A and 130B and Agricultural Economics 112 and/or course 122 recommended. Planning, implementation, and supervision of landscape and facility management and operations emphasizing management approaches including employee involvement, resource inventory, task descriptions, time standards, scheduling, and management of plan and project. Design and construction of facilities as they relate to management of parks and recreation facilities.
154A. Landscape Construction: Introduction (4) III. Lecture—4 hours; laboratory—2 hours. Prerequisite: courses 20, 22. Engineering 1 recommended. Analysis of the physical, mechanical, functional, and aesthetic properties of materials used in landscape development with emphasis on construction techniques, methods, and specifications. Limited enrollment.
154B. Landscape Construction: Site Engineering (4) IV. I. The Staff Lecture—2 hours; studio—2 hours (4-6 hour sessions which comprise lecture, discussion, and studio work). Prerequisite: course 154A. Advanced study of methods and construction methods, construction specifications, and irrigation systems. Emphasis on construction details for landscape developments. Limited enrollment.
160A. Environmental Interpretation Principles (3) I. Hodgson Lecture—4 hours. Prerequisite: Psychological 103 or 101 or 104 recommended. Applications of communication theories and principles to environmental interpretation with emphasis on park and recreation interpretation, museums, historic areas, botanical and zoological gardens. Emphasis on adapting appropriate strategies from theory and practice.
160B. Environmental Interpretation Methods (3) I. The Staff Lecture—4 hours; studio—4 hours (3 hours for discussion, 1 hour for presentation). Prerequisite: course 160A; English 104 recommended.
Environmental Policy Analysis and Planning

(College of Agricultural and Environmental Sciences)

The Major Program

Environmental Policy Analysis and Planning seeks to develop an understanding of both techniques for evaluating, and the factors affecting, governmental policy-making in important fields related to environmental quality. This major is designed to produce students with (1) a general background in the natural sciences relevant to environmental policy; (2) sufficient grounding in mathematics, statistics, and research methodology to quantitatively analyze environmental problems and policy options; (3) a strong background in the field of policy analysis, involving both the evaluation of policy alternatives and a thorough understanding of the factors affecting policy formulation and implementation by governmental institutions. In addition, students will be encouraged to develop an understanding of a specific field of environmental policy such as air pollution control, water resources management, urban and regional planning, or energy development.

The major is oriented toward both (1) terminal students who will acquire the analytical skills and broad background in the social and natural sciences needed for employment in public agencies, consulting firms, and businesses concerned with environmental affairs, and (2) preprofessionals who will go on to graduate work in law, planning, public policy, or environmental science having both a wide background in the social and natural sciences and a fairly extensive background in a functional policy area. It is anticipated, however, that most career-oriented graduates will eventually seek an advanced degree.

The course requirements are designed to provide both the basic substantive knowledge and analytical skills necessary for a quality program in environmental policy analysis and planning. Although certain course offerings are essential for all students involved in the program, the emphasis is on required units within categories of courses. This recognizes the wide variety of students’ interests and the changing content and quality of specific courses from year to year. It is very important, however, that students develop a close relationship with their own advisers in order that the preparatory and depth courses selected be appropriate to each student’s interests and desired area of specialization.

Environmental Policy Analysis and Planning

B.S. Major Requirements:

(Courses in parentheses are those normally taken. Very similar or more difficult courses may be taken with the approval of your adviser.)

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>41–46</th>
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<tbody>
<tr>
<td>Mathematics (Mathematics 16A, 21A)</td>
<td>3–4</td>
</tr>
<tr>
<td>Statistics (Statistics 13, 30)</td>
<td>3</td>
</tr>
<tr>
<td>Physics (Physics 1A, 2A, 10)</td>
<td>3–4</td>
</tr>
<tr>
<td>Chemistry (Chemistry 1A, 1B)</td>
<td>10</td>
</tr>
<tr>
<td>Agriculture (Biological Sciences 15, 21, 41–46)</td>
<td>6</td>
</tr>
</tbody>
</table>

| Environmental Science and Agriculture (Soil Science 2, Water Science 2, Botany 2, Zoology 2, Agronomy 21, Agricultural Economics 1, Geology 1) | |

Additional courses with consent of adviser |

Environmental Policy Analysis and Planning

1These are minimum requirements. Additional courses may be necessary to meet prerequisites for upper division courses in some areas of specialization.

2Units earned in satisfaction of American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.
Environmental Studies

Environmental Studies (Intercollegiate Division)

Francisco J. Ayala, Ph.D., Chairperson of the Division and Associate Dean of Environmental Studies
Peter J. Richerson, Ph.D., Associate Director
Division Office, 2132 Wickson Hall (752-3026)

Faculty

Francisco J. Ayala, Ph.D., Professor (Genetics)
Paul P. Craig, Ph.D., Professor (Engineering: Applied Science)
James C. Cramer, Ph.D., Assistant Professor (Sociology)
William G. Davis, Ph.D., Associate Professor (Anthropology)
Theodore C. Foin, Jr., Ph.D., Associate Professor (Sociology)
John H. Gillespie, Ph.D., Professor (Environmental Studies, Genetics)
Charles R. Goldman, Ph.D., Professor (Marvin Goldman, Ph.D., Professor (Radiological Sciences)
William J. Hamilton III, Ph.D., Professor (James Harding, Ph.D., Professor (Environmental HEALTH)
Robert A. Johnston, Ph.D., Associate Professor (Community Health)
Leonard O. Mvupu, Ph.D., Professor (Land, Air and Water Resources)
Benjamin S. Oriole, Ph.D. Associate Professor
Thomas M. Powell, Ph.D., Associate Professor
Peter J. Richerson, Ph.D., Associate Professor
Paul A. Sabatier, Ph.D., Associate Professor
Sebastian P. Schwartz, Ph.D., Associate Professor

NOTE: For key to footnote symbols, see page 130.

Environmental Science Option

Environmental health (Environmental Studies 136, Environmental Toxicology 101) 3-4
Soils and land use (Soil Science 11, Geology 134) 3-4
Aquatic systems (Environmental Studies 116, 151, Water Science 41, 103, 141, 180) 3-4
Meteorology and air pollution (Atmospheric Science 23, 131, Civil Engineering 149) 3-4
Science policy (Environmental Studies 165) 4

Advanced Policy Analysis Option

Political institutions (Political Science 132, 105, 109, 159, Environmental Studies 162) 4
Political behavior (Political Science 164, 166, 170) 4
Policy evaluation (Environmental Studies 168) 4
Public evaluation (Civil Engineering 153, 160, Agricultural Economics 146: Economic 130) 3-4

Unrestricted Electives 40-52

Total Units for the Major 180

Major Adviser: R.A. Johnson (Environmental Studies)

The Program of Study

The intercollege Division of Environmental Studies is a teaching and research unit offering courses, workshops, and directed group study classes that focus on the complex problems of human-environment relations. The Division offers a Bachelor of Science degree in Environmental Policy Analysis and Planning (see page 204). Courses in Environmental Studies also supplement major programs in a wide variety of established disciplines, although highly motivated undergraduates who find existing majors unsuited to their educational objectives are encouraged to contact the Chairperson and faculty of the Division regarding individual majors in the College of Letters and Science and the College of Agricultural and Environmental Sciences (see page 230).

Current Information. Through its continuing contacts with many other departments and teaching divisions on the campus, the Division develops each year a variety of special courses and workshops that cannot be listed here. Students are advised to check with the Division Office and with the expanded course description handbook of the College of Agricultural and Environmental Sciences for up-to-date information about courses.

Elective Programs in Environmental Studies. Students from a variety of majors may wish to focus their electives in Environmental Studies. To aid students in identifying coherent groups of courses that build theory and research skills and complement their disciplinary majors, three suggested elective programs appropriate for natural scientists, social scientists, and environmental professionals are listed below. These example programs are merely indicative, in order to increase the effectiveness of your program and to get the most out of your elective units, you should consult with appropriate Environmental Studies faculty before taking courses.

Ecological Analysis. This study program is intended for natural science students desiring a focus on ecology and its application in resource analysis. These courses develop theoretical and analytical skills, including laboratory or field work.

Environmental Studies 100 (general ecology)
Environmental Studies 121 (population ecology)
Environmental Studies 122 (analysis of ecological communities)
Ecology 149 (evolution of ecological systems)
Environmental Studies 123 (increase of field and laboratory in ecology) 151L (field laboratory), or Ecology 228 (experimental animal ecology)

Subspecializations are as follows
(a) Behavioral Biology
Environmental Studies 125 (social systems of animals and humans); Psychology 150 (comparative psychology); Anthropology 154A-154M (primate behavior and ecology)
(b) Aquatic Ecology
Environmental Studies 151 (marine); Environmental Studies/Geology 116 (the oceans), 150A (physical and chemical oceanography), 150C (physical oceanography); Water Science 41 (ecology of polluted waters)
(c) Ecology of Taxa
Biology 117 (plant ecology); Zoology 125 (animal ecology); and others
(d) Simulation and Modeling
Environmental Studies 128 (analysis and simulation of complex systems), 129 (the dynamics and simulation of ecological systems); Wildlife and Fisheries Biology 122 (dynamics of exploited animal populations)

Environmental Policy Analysis

This program is suitable for both natural science and social science students, as well as professionals such as those in environmental planning and management or engineering who do not wish to take the major in Environmental Policy Analysis and Planning. This set of courses develops theoretical and analytical skills in political, economic, and legal analysis of public policies, plans, and programs that affect the environment. Intermediate microeconomics should be taken before Environmental Studies 168A and Agricultural Economics 176.

Environmental Studies 160 (environmental decision-making), Political Science 107 (environmental politics and administration), 108 (policy making in the public sector), or 109 (public policy and the Government)
Environmental Studies 166 (case studies in administrative failure and reform), Political Science 151 (the American administrative system), or 162 (administrative decision making and public policy)
Environmental Studies 161 (environmental law), 173 (static mechanisms for controlling land use), or Water Science 150 (water law and water institutions)
Environmental Studies 171 (environmental planning), 179 (environmental impact reporting), or Environmental Studies 122C (principles of environmental science)
Agricultural Economics 147 (natural resource economics), or 176 (economic analysis in resource use)
Environmental Studies 168A (methods of environmental policy evaluation) and 168B (methods of environmental policy analysis)
Environmental Studies 165 (science, experts, and public policy) are for natural science and engineering students.

Cultural Ecology

This program is for social science and natural science students interested in the interactions between human populations and their environments and in cross-cultural comparisons. Students seeking future work in rural development, public health, overseas environmental management, and graduate work in human ecology, anthropology, economics, or sociology will find this program useful. Several disciplines are synthesized here.

Environmental Studies 100 (general ecology) or Zoology 125 (animal ecology)
Environmental Studies/Anthropology 101 (principles of human ecology)
Courses in Environmental Studies

10. Introduction to Environmental Studies (4) and (III).
The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Biology. An introduction to the economic and political analysis of environmental issues dealing with pollution, energy reserves, natural resources, environmental consciousness of use, diving, demand forecasts, transmission, energy-society-GNP relationships.

20. Environmental Analysis and Issues (III) and (I).
Discussion—1 hour; laboratory—3 hours. Prerequisite: course 20 (may be taken concurrently). A follow-up study of environmental issues, including: the effects of environmental regulation; conservation policy; the environmental cost of energy; and the role of the environment in national and international politics.

20. The Global Economy (III) and (I).
Discussion—1 hour. Prerequisite: introductory courses in economic or political science. An introduction to the economic and political analysis of environmental issues dealing with pollution, energy reserves, natural resources, environmental consciousness of use, diving, demand forecasts, transmission, energy-society-GNP relationships.

20. Animal Societies (III) and (I).
Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Conservation. In the past, animals have been studied primarily for their biological characteristics. More recently, the ecological significance of animal behavior has been studied in relation to the human environment. In this course, we will examine the relationships between human activities and the environment, focusing on the role of animals in maintaining ecological balance.

111. Environmental Chemistry (III) and (I).
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 1C and 99, course 10, and Biological Sciences 1 or equivalent. The course covers the chemical reactions and processes that occur in natural systems. Topics include: the chemistry of ecosystems, the role of chemical compounds in the environment, and the effects of chemical pollution.

112. Biochemical Processes of the Animal Body (III) and (I).
Lecture—3 hours; discussion—1 hour. Prerequisite: Introduction to Geology. The course covers the chemical processes that occur in the animal body, including the processes involved in energy metabolism, protein synthesis, and the regulation of cellular function.

113. Environmental Science and Policy (III) and (I).
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10, and biological sciences 1 or equivalent. The course covers the principles of ecological and environmental science, and the role of environmental policy in shaping human interactions with the environment.

114. Environmental Chemistry (III) and (I).
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10. The course covers the chemical processes that occur in natural systems. Topics include: the chemistry of ecosystems, the role of chemical compounds in the environment, and the effects of chemical pollution.

115. The Environment (III) and (I).
Lecture—2 hours; discussion—1 hour. Prerequisite: Chemistry 1B. The course covers the chemical processes that occur in the animal body, including the processes involved in energy metabolism, protein synthesis, and the regulation of cellular function.

116. Marine Ecosystems and Environmental Science (III) and (I).
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10. The course covers the chemical processes that occur in natural systems. Topics include: the chemistry of ecosystems, the role of chemical compounds in the environment, and the effects of chemical pollution.

117. Marine Ecosystems and Environmental Science (III) and (I).
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10. The course covers the chemical processes that occur in natural systems. Topics include: the chemistry of ecosystems, the role of chemical compounds in the environment, and the effects of chemical pollution.

118. Oceanography (III) and (I).
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10. The course covers the chemical processes that occur in natural systems. Topics include: the chemistry of ecosystems, the role of chemical compounds in the environment, and the effects of chemical pollution.
15A. Physical and Chemical Oceanography (4) I. Powell
Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 116, Physics 2C, Mathematics 22C, Chemistry 1C; or upper division standing in a natural science and consent of instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geo-chemical cycles. (Same course as Geology 150A).

15B. Geological Oceanography (3) II. Cowen, Lips (Geology)
Lecture—3 hours. Prerequisite: Geology 50 or 116. Introduction to basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Introduction to geologic history of the ocean floor in terms of sea-floor spreading theory. (Same course as Geology 158B).

15C. Biological Oceanography (3) III. The Staff
Lecture—4 hours. Prerequisites: Biological Sciences 1 and a course in general ecology, or consent of instructor. Survey of the ecology of major marine habitats including intertidal, shelf benthic, deep-sea and planktonic communities. Existing knowledge and contemporary issues in research. Portion of course will be devoted to man's use and impact on the ocean. (Same course as Geology 158C).

151. Limnology (4) III. C. Goldman
Lecture—3 hours; discussion—1 hour. Special project. Prerequisite: Biological Sciences 1 and junior standing. The biology of freshwater lakes and streams with emphasis on the physical and chemical environment.

151L. Limnology Laboratory (3) III. C. Goldman
Laboratory—6 hours; two weekend field trips. Prerequisite: course prerequisite for Limnology; junior, senior, or graduate standing. Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology.

Environmental Policy Analysis

165. Environmental Decision Making (4) III. Schwartz, Wandesforde-Smith
Lecture—3 hours; discussion—1 hour. Special project. Prerequisite: Biological Sciences 1 and junior standing. The biology of freshwater lakes and streams with emphasis on the physical and chemical environment.

161. Environmental Law (4) II. Wandesforde-Smith
Lecture—3 hours; discussion—1 hour. Introduction to non-law students to the major legal issues in environmental law and the judicial interpretation of some of the major environmental statutes e.g., NEPA.

182. Planning and Decision Making in Small Urban Communities (4) III. Siporin (Political Science)
Lecture—3 hours; discussion—1 hour. An examination of urban processes in small U.S. communities, with particular attention to how local governments reflect in their structure and policies the political processes and community growth, or non-growth, and development. The political consequences of excessive subdivision, development, over-zealous utility plants, and alternative taxation strategies.

165. Science, Experts, and Public Policy (4) II. Sabater
Lecture—4 hours. Factors affecting the influence of scientists, policy makers, and experts in policy making. Several cases and controversies will be examined.

166. Case Studies in Institutional Failure and Reform (4) I. Sabater
Lecture-discussion—4 hours. Prerequisite: course 160. Political Science 107, or a course in American politics recommended. Discusses selected cases of alleged failure by administrative agencies dealing with environmental problems. Examines a number of causes and alternative reforms. Course also explicitly seeks to improve the ability of students to examine empirical materials.

168A. Methods of Environmental Policy Evaluation (4) II. Schwartz
Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 13 (or the equivalent), Economics 1A or Agricultural Economics 147. Examination of issues, concepts and methods applicable to environmental policy evaluation. Topics include: the logic of evaluation needs, data availability, and research strategies appropriate for policy evaluation models; benefit/cost analysis, policy impact assessment, multi-objective evaluation, and policy implementation.

168B. Methods of Environmental Policy Analysis (4) III. Schwartz
Lecture—3 hours; discussion—1 hour. Prerequisite: course 168A. Continuation of course 168A, with emphasis on examination of the literature for application of research and evaluation techniques to problems of transport, air and land use and energy policy. Student will apply the methods and concepts by means of a major project.

Environmental Planning

171. Environmental Planning (4) II. Johnston
Lecture—4 hours. Prerequisite: course 10; one course each in biology, earth science, environmental studies, economics, social science, and humanities. Laws, institutions, procedures, design and analysis methods, and means of implementation of planning for land use, air and water quality and energy are examined. Theoretical and practical readings are used.

172. Theories of the Planning Process (4) III. Johnston
Lecture—2 hours; discussion—2 hours. Prerequisite: completion of at least one of the following: course 171, Environmental Planning and Management 110, courses 168A, 168B, 173. Competing theories of the role of planning in Western society are examined. Problems of optimal degree of economic regulation and of limited information are discussed. Applicable to land use, transportation, water, water resources, air quality, and social services planning.

173. Public Mechanisms for Controlling Land Use (4) II. Johnston
Lecture-discussion—2 hours; laboratory—3 hours. Prerequisite: introduction to course in planning. Methods of controlling land use. The techniques of the planning process will be applied to the evaluation of specific planning problems and to planning for land use, air and water quality and energy.

Environmental Impact Reporting

178. Environmental Impact Reporting (3) III. Johnston
Lecture—2 hours. Prerequisite: upper division standing. Methods of analysis useful in environmental impact reporting. Emphasis on effective writing, review and management of impact reports in the context of rational democratic planning systems.

Other Courses

190. Workshops on Environmental Problems (1-8) I, II, III. The Staff
Lecture—2-12 hours. Prerequisite: consent of instructor. Workshops feature empirical analyses of contemporary environmental problems by multidisciplinary student teams. Guided by faculty and lay professionals, the teams seek to develop an integrated view of a problem and outline a series of alternative solutions. Open to all upper division and graduate students on application. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge)
Lecture—3-36 hours. Prerequisite: completion of 104 units and consent of instructor. Work on a community project under the supervision of the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.)

199. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Directed study of a topic selected by the student and the instructor. (P/NP grading only.)

Graduate Courses

212A. Environmental Policy Analysis (4) III. Sabater
Lecture—3 hours; discussion—1 hour. Seminar paper. Prerequisite: course 160 in public policy (e.g. Political Science 108 or 108H), course in bureaucratic policy making (e.g. course 166 or Political Science 161) and course in intermediate statistics (e.g. Sociology 106 or Agricultural Economics 106). Examination of selected topics in the formulation and implementation of environmental policy, with a principal emphasis on conceptual and methodological issues. Offered in odd-numbered years. (Same course as Sociology 212A)

212B. Environmental Policy Analysis: Evaluation (4) I. Crann, Schwartz, Wines
Lecture—1 hour; discussion—1 hour. Seminar—2 hours. Independent evaluation project. Prerequisite: Economics 100 (or the equivalent), course 166A (or the equivalent course in policy analysis or resource economics), intermediate level statistics (e.g. Sociology 106 or Agricultural Economics 106). Examination of research and practice in the evaluation of environmental-related policies, programs, and plans. Ex ante and ex-post evaluation will be studied. Offered in odd-numbered years. (Same course as Sociology 212B.)
Environmental Toxicology

B.S. Major Requirements: (For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses will be accepted. Courses shown without parentheses are required.)

UNITS
Preparatory Subject Matter ........................................ 58-63
Biological sciences (Biological Sciences) .................. 5
Other preparatory courses in biology (genetics, zoology, botany, bacteriology, physiology) ................. 10-12
General chemistry (Chemistry 1A1-B) ......................... 15
Organic chemistry (8A-8B or 12A-12B) .................... 6
Environmental science (Environmental Toxicology 10 or Environmental Studies 10) .................. 4
Physics (Physics 1A-1B or 2A-2B) .................................................. 6

Depth Subject Matter .................................................. 56
Biochemistry (Biochemistry 10A, 10B) .................... 6
Organic chemistry (Chemistry 12A, 12B or 12C) ........ 3
Electives selected for area of specialization with advisor's approval ...................................................... 24

Breadth Subject Matter .............................................. 50
English 1A, 1B, 2A or elective (see College requirements) ...................................................... 6
Social sciences and humanities electives .................. 12
Electives selected with advisor's approval to complement program options: courses in agricultural economics, environmental studies, sociology, political science, and psychology are particularly recommended .................................................. 30

Unrestricted Electives ............................................. 21-26
Total Units for the Major ........................................... 180

Major Adviser, R.I. Krieger.
Information Center for the major, 122 Hoagland Hall

Related Courses. See Atmospheric Science 131, Environmental Studies 10, 121.

Courses in Environmental Toxicology

Lower Division Courses

10. Introduction to Toxicology (4) III. Krieger Lecture—3 hours; discussion, seminars, field trips, laboratory demonstrations—2 hours. Prerequisite: open to science and pre-med students. Study of some natural and man-made toxic substances in personal, occupational, community and global environments. Emphasis placed upon occurrence, properties and effects of toxic substances. Biological and physical factors which alter fate of substances are described.

19. Internship for Undergraduates (1-5) I, II, III. The Staff (Seiber in charge) Prerequisite: consent of instructor. (PNP grading only.)

Upper Division Courses

101. Principles of Environmental Toxicology (3) III. Shiba-moto Lecture—3 hours. Prerequisite: Chemistry 8B or 12B (or the equivalent). Biochemistry 101A recommended. A unified introduction to principles underlying the use and environmental consequences of pesticides, food additives, and other chemicals; their regulations; and their health significance.

102. Tutorials in Environmental Toxicology (1) I, II, III. The Staff (Seiber in charge) Hours and duties will vary depending upon course being tutored. Prerequisite: advanced standing in Environmental Toxicology, a related major, or the equivalent experience, and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (PNP grading only.)

104. Directed Group Study (1-5) I, II, III. The Staff (Seiber in charge) Prerequisite: consent of instructor. (PNP grading only.)

105. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Seiber in charge) (PNP grading only.)

Graduate Courses

200. Mammalian Toxicology (4) III. Byard Lecture—3 hours; discussion—1 hour (alternates weeks); laboratory—4 hours (alternates weeks). Prerequisite: course 111A, and consent of instructor. Basic mechanisms of action and symptomatology of toxicants in mammals. Limited enrollment; preference given to students in Pharmacology and Environmental Toxicology.

203. Environmental Toxicology (4) III. Crosby Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 128C (or the equivalent), or Chemistry 8B and consent of instructor. Toxic chemicals; selected topics illustrating their occurrence, structure, and the reactions underlying detection, toxicity, fate, and ecological importance.


220. Analysis of Toxicants (3) I. Seiber Lecture—3 hours. Prerequisite: course 101 and consent of instructor; course 203 recommended. Principles of the microbiological analysis of toxicants. Utilization of various procedures for separation, detection, and quantitative determination of toxicants using chemical and instrumental techniques.

225. Analysis of Toxicants Laboratory (2) I, II. Seiber—Laboratory—6 hours. Prerequisite: course 220 (may be taken concurrently) and consent of instructor. Laboratory techniques for microanalysis of toxicants. Separation, detection, and quantitative determination of toxicants using chemical and instrumental methods.

234. Neurophysiological Basis of Neurotoxicology (2) II. Woolley Lecture—1.5 hours; discussion—1 hour. Prerequisite: Physiology 101 or the equivalent, consent of instructor. Mechanisms of action of a number of different neurotoxins, including marine toxins, insecticides and heavy metals. Examples of ways toxins may act on the nervous system and techniques for study of neurotoxicology. (Offered in odd-numbered years.) (Same course as Physiology 234.)

290. Seminar (1) I, II, III. The Staff (Seiber in charge) Seminar—1 hour. Current topics in environmental toxicology. (SU grading only.)

297T. Tutoring in Environmental Toxicology (1-5) I, II, III. The Staff (Seiber in charge) Hours and duties will vary depending upon course being tutored. Prerequisite: advanced standing in Environmental Toxicology, a related major, or the equivalent experience, and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Seiber in charge) Prerequisite: consent of instructor. Topics such as trace analysis of toxicants, natural toxicants, and new pesticides. (PNP grading only.)

299. Research (1-12) I, II, III. The Staff (Seiber in charge) (SU grading only.)

Epidemiology and Preventive Medicine

(School of Veterinary Medicine)

Hans P. Riemann, D.V.M., Ph.D., Chairperson of the Department

Department Office, 112 Surge IV
Epidemiology and Preventive Medicine

man and animal populations for abnormalities and diseases; evaluation of their usefulness to study incidence and/or prevalence and for application in programs of prevention and control.

218. Disease Control & Eradication (4) III. Riemann Lecture—2 hours; laboratory—6 hours. Prerequisites: course 211C or consent of instructor. Discussion of various approaches used to control diseases in animals, including man. Discussion will be concerned with past successes and failures and emphasis placed on future prospects and limitations of these methods.

220. Advanced Avian Medicine (3) II. The Staff (Adler in charge). Lecture—3 hours. Prerequisite: enrollment in Avian Medicine option of MPVM program, junior or senior standing in School of Veterinary Medicine, or consent of instructor. Discussion of the economic structure of the broiler, commercial egg and turkey industries and the delivery of preventive veterinary medical services within these industries. Specific prevention and eradication programs pertaining to diseases of economic importance are covered.

240. Veterinary Medicine and Human Health (3) III. Schwabe Lecture—2 hours; discussion—1 hour; term paper. Prereq: professional veterinary or graduate standing or consent of instructor. Fulfillment of veterinary medicine's historic and newer roles as a human health profession; emphasis on zoonoses prevention, comparative medical research, monitoring environmental hazards and organized efforts to promote humane values and mental health.

242. Veterinary Medicine and the World Food Population Problem (3) III. Schwabe Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: professional veterinary or graduate standing or consent of instructor. Survey of the world food-population problem, emphasizing effects of animal diseases and their control upon production of foods and animal and plant origins; comparisons of important Third World and other situations; discussions of present and future prospects. Offered in odd-numbered years.

244. Public Health Aspects of Meat and Meat Products Technology (3) II. Riemann, Genigeorgis Lecture—2 hours. Prerequisite: consent of instructor. Study of the influence of techniques and procedures for processing meats and meat products upon their wholesomeness as food.

250. Animal Health Economics (3) III. Riemann Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: courses 103C and 210C (may be taken concurrently). Evaluation of the economic aspects of veterinary medicine, or dentistry and control or eradication programs of diseases in animal populations.

256. Advanced Food Hygiene Laboratory (3) III. Genigeorgis Lecture—1 hour, laboratory—6 hours. Prerequisite: a DVM degree or the equivalent, or consent of instructor. Techniques used in a veterinary food hygiene laboratory to detect pathogens, adulterants, contaminants, and other substances and factors affecting wholesomeness of foods of animal origin.

290. Current Topics in Avian Medicine (1) II. Yamaamoto Seminar—1 hour. Topics from the current literature in avian medicine will be assigned to students for discussion and interpretation. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Courses in Epidemiology and Preventive Medicine

Upper Division Courses

100. Preventive Veterinary Medicine: Orientation (4) I. The Staff (Farver in charge) Lecture—40 hours total. Prerequisite: enrollment in MPVM degree program. An introduction to the concepts basic to biostatistics and epidemiology. Overview of veterinary preventive medicine and epidemiology. (PHN grading only.)

101. Perspective in Veterinary Medicine (2) II. Schwabe Lecture—2 hours. This course for preveterinary and veterinary students is a cultural introduction to veterinary medicine. Discussion of the state of medicine from a contemporary scope, with the emphasis upon the social responsibilities of veterinarians and the multiple career avenues available for their fulfillment. Offered in odd-numbered years. (PHN grading only.)

102. Biomedical Information Retrieval (3) III. Kistler, Verdet Lecture—1 hour; discussion—1 hour; laboratory—3 hours. The use of bibliographic tools in the biomedical sciences; forms of biomedical literature; sources of statistical and epidemiological data; computerized systems in literature retrieval; preparation of bibliographies.

103A. Medical Statistics (3) I. Farver Lecture—1 hour; laboratory—3 hours. Prerequisite: Statistics 13 (or the equivalent) and consent of instructor. Use of statistics in clinical, laboratory, and population medicine; graphical and tabular presentation; introductory methods in regression and correlation; normal, t-, F-, and chi-square distributions; elementary nonparametric methods.

10B. Medical Statistics (3) II. Farver Lecture—1 hour; laboratory—3 hours. Prerequisite: course 103A or consent of instructor. Continuation of course 103A. Analysis of variance in biomedical sciences; time-dependent data; bioassay; introduction to mathematical epidemiology; nonparametric methods; biomedical applications of statistical methods.

10C. Medical Statistics (3) III. Farver Lecture—1 hour; laboratory—3 hours. Prerequisite: course 103B or consent of instructor. Continuation of course 103B. Analysis of covariance; multiple regression; multinomial analysis; survival data; problems in sampling and surveys; biomedical applications.

104. History of Veterinary Medicine (3) III. Schwabe Lecture—2 hours; discussion—1 hour. Veterinary medicine's role in the health care of animals (e.g., domestic animal, or livestock). (PHN grading only.)

111. Animal Hygiene (3) III. Howarth, McCapes Lecture—3 hours. Prerequisite: Biological Sciences 1 or consent of instructor. Causes, prevention, and control of animal diseases important in economic agriculture and in public health, with emphasis upon animal management factors in disease control.

150. Food-borne Infections and Intoxications (4) II. Genigeorgis, Riemann Lecture—4 hours. Prerequisite: Bacteriology 2. Prevalence and characteristics of foodborne diseases of man which are derived from food or food sources; access of disease agents to and distribution in food and food sources; exposure of man to these agents; prevention of food-borne diseases.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PHN grading only.)

Graduate Courses

210A. Advanced Epidemiology (6) I. Schwabe, Ruppanner Lecture—4 hours; discussion—4 hours. Prerequisite: a degree in veterinary medicine, veterinary medicine, or dentistry, or consent of instructor; course 103A (may be taken concurrently). Consideration of the principal approaches to the study of diseases in populations of both domestic animals and of man with critical discussion of illustrative case examples from classic and contemporary literature.

210B. Advanced Epidemiology (6) II. Riemann, Farver Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 210A, and 103B (may be taken concurrently). Continuation of course 210A with emphasis on use of models and statistical methods in epidemiology. Introduction to animal health economics.

210C. Advanced Epidemiology (3) II. Riemann, Farver Lecture—1 hour; laboratory—3 hours. Prerequisite: courses 210A and 103C (may be taken concurrently). Continuation of course 210B with attention given to case control studies, cohort studies and the use of multi-variate techniques in epidemiology.

211A. Applied Epidemiology (3) I. Meyer Lecture—1 hour; discussion—2 hours. Prerequisite: course 210A (concurrent) or consent of instructor. Application of the experimental method to solving specific epidemiological field problems involving disease of animals. Students must identify and select a problem, and complete all work necessary to the actual field collection of data or specimens.

211B. Applied Epidemiology (3) II. The Staff (Meyer in charge) Laboratory—3 hours. Prerequisite: courses 210B and 211A. Emphasis on field work and the design of appropriate epidemiological studies, and the selection of appropriate statistical, computer, or other methods for processing, analyzing, and interpreting data.

211C. Applied Epidemiology (3) III. The Staff (Meyer in charge) Laboratory—15 hours. Prerequisite: courses 210B and 211B. Completion of the course begins in course 211A, including consideration of alternative approaches to the presentation of data and conclusions and formulation of recommendations for further investigations.

212. Epidemiology of the Zoonoses (3) II. Meyer Lecture—1 hour; discussion—2 hours. Prerequisite: course 210A or consent of instructor. Biological and ecological features of infections spread by man and other animals with particular attention to those perpetuated in nature by wildlife and those which are of greater public health and economic importance.

216. Mass Screening for Diseases in Populations (3) II. Yamaamoto Lecture—2 hours; laboratory—3 hours. Prerequisite: course 210A or consent of instructor. Consideration of immunodiagnostic and other techniques for screening of human population for various infections.
Fermentation Science; Food Biochemistry; Food Science

Family Practice
See Medicine

Fermentation Science
(College of Agricultural and Environmental Sciences)

The Major Program
The Fermentation Science major is a program of study of the fundamental and applied sciences related to the upper microorganisms as production and processing agents. A broad interdisciplinary food-related education is offered which may be combined with specializations in enology (wine studies), brewing science, and fermentation of other foods and beverages. Industrial fermentations such as those used in the production of microbial cells, drugs, enzymes, solvents, acids, and vitamins, in the expansion of the food supply, and in waste management and preservation of the environment, are further opportunities for study. Courses are selected in consultation with advisors. Graduates qualify for supervisory, technical, research, sales or executive positions in the food, beverage, and allied industries, in the fermentation industries, and in governmental agencies. The major can provide preparation for graduate study in food science, microbiology, agricultural chemistry or biochemistry. It may be necessary to limit enrollment in this major due to limitations on UC/D resources.

Fermentation Science

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses will be accepted.)

UNIT
Preparatory Subject Matter
Biochemistry (Biochemistry 101A, 101B) 68
Chemistry (Biological Sciences 1) 5
Chemistry (Chemistry 1A, 1B, 1C, 5, 8A, 8B, 25) 25
Mathematics (Mathematics 16A 16B) 6
Statistics including analysis of variance (Agricultural Science and Management 150 or Statistics 102) 4
Microbiology (Bacteriology 2, 3) 4
Physics (Physics 2A-2B-2C plus a unit of laboratory, e.g., Physics 3A) 10
Written or oral expression (see College requirement) 8

Depth Subject Matter
Choose from: Viticulture and Enology 3, 123, 124, 125, 126, 140, 217, 219; Food Science and Technology 102, 102L, 104, 104L, 105, 106, 108, 110A, 110B, 111, 150, 150A, 235, 250, 251; Bacteriology 101L, 123L; Bacteriology 105, 106, 130A-130B-130C, 150, 150L, 230, 250; Agricultural Engineering 245; Environmental Toxicology 138; Epidemiology and Preventive Medicine 150; Chemistry 107A, 107B, 130; Consumer Science 135. 40

Restricted Electives
Selected according to student's educational goal and upon approval of adviser. (A related series of primarily upper division courses intended.) 28

Breadth Subject Matter
Social sciences and humanities or others as approved by adviser. 24

Unrestricted Electives 20

Total Units for the Major 180

Major Adviser. R.E. Kunkee (Viticulture and Enology).
Graduate Study. See page 99 and the Announcement of the Graduate Division.

Food Biochemistry
(College of Agricultural and Environmental Sciences)

The Major Program
The major in Food Biochemistry stresses the principles of chemistry and biochemistry as applied to the constitutions of foods and the changes which occur in the constitutions before and during storage and on processing. Particular emphasis is placed on the role of and changes in the carbohydrates, lipids, proteins, enzymes, and nucleic acids and their affect on the quality attributes of foods. Through the appropriate choice of both electives and in-depth courses in food science and technology, the major offers broad education to students planning careers in food processing, food research, and other food-related fields. The major also offers excellent preparation for graduate work in agricultural chemistry, biochemistry, nutrition, medicine, and the life sciences.

Food Biochemistry

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses may be acceptable. Courses shown without parentheses are required.)

UNIT
Preparatory Subject Matter
Preparatory Subject Matter 77-83
Biochemistry (Biochemistry 101A, 101B) 6
Biology (Biological Sciences 1) 5
Chemistry, one year general and analytical chemistry (Chemistry 1A-1B-1C, 5 or 4A-4B-4C) 15
Mathematics, including one year of calculus (Mathematics 16A-16B-16C or 21A-21B-21C) and two quarters of physics (Physics 2A-2B-2C plus a unit of laboratory, e.g., Physics 3A) 32-36
Microbiology (Bacteriology 2 and 3; Botany 2 or Zoology 2-2L may be substituted) 4-6
Physics, any course on Physics 10 and including at least one laboratory course (Physics 2A-2B-2C or 3A or 3B or 3C, 4A-4B-4C) 10
English (College requirement) 8

Depth Subject Matter
Food Science and Technology, including 103, 104, 104L, 110A or 111, 113, and 126 36

Total Units for the Major 180

Major Adviser. M. Mazelis (Food Science and Technology).
Graduate Study. See page 99.

Food Science
(College of Agricultural and Environmental Sciences)

The Major Program
Food Science applies physical, biological, engineering, and social sciences to processing, preservation, packaging, storage, evaluation and utilization of foods. Instruction emphasizes the principles of biology, chemistry, microbiology, and other sciences as they are applied to the conversion of raw materials into processed foods. General principles are stressed, not specific food commodities. Students completing this major receive excellent training and experience for employment in the world's largest industry, the food industry. Opportunities for employment include positions in the food and allied industries where graduates can engage in processing, sensory evaluation, quality assurance, product development, research, and management functions; in education as teachers; and in research, extension, and administration. Local, state and federal governments offer opportunities for employment as research supervisors, in regulatory agencies, in policy and management positions. Graduate study for the Food Science student may lead to the M.S. degree in Food Science or the Ph.D. degree in related fields such as agricultural chemistry, biochemistry, microbiology and nutrition.

Food Science

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses may be acceptable. Courses shown without parentheses are required.)

UNIT
Preparatory Subject Matter
Biology and microbiology (Bacteriology 2.3) 62-67
Chemistry and biochemistry, including analytical chemistry (Chemistry 1A-1B-1C-5 or 4A-4B-4C, 8A-8B; Biochemistry 101A-101B) 27-31

1Units earned in satisfaction of the American History and Institutions requirements may be used in partial satisfaction of the Social Sciences and Humanities requirements.
Food Science and Technology

(College of Agricultural and Environmental Sciences)

Bernard S. Schweigert, Ph.D., Chairperson of the Department

Department Office, 126 Crues Hall (752-1465)

Faculty

Ericka L. Barret, Ph.D., Assistant Professor
Richard A. Bernhard, Ph.D., Professor
A. Wade Brant, Ph.D., Lecturer
W. Duane Brown, Ph.D., Professor
John Bruhn, Ph.D., Lecturer
Paul A. Carroo, Ph.D., Assistant Professor
(FOOD SCIENCE AND TECHNOLOGY, AGRICULTURAL ENGINEERING)

Ervin B. Collins, Ph.D., Professor
Walter L. Dunkley, Ph.D., Professor
Robert F. Feeley, Ph.D., Professor
Dieter W. Gruenwedel, Ph.D., Professor
Jerald M. Henderson, D.Eng., Professor
(FOOD SCIENCE AND TECHNOLOGY, MECHANICAL ENGINEERING)

Eugene L. Jack, Ph.D., Professor Emeritus
Walter G. Jennings, Ph.D., Professor
Sherman J. Leonard, B.S., Lecturer
Michael J. Lewis, Ph.D., Professor
Bar S. Luhs, Ph.D., Lecturer
George L. Marsh, M.S., Professor Emeritus
Merdle Mazzulis, Ph.D., Professor
R. Larry Merson, Ph.D., Professor (FOOD SCIENCE AND TECHNOLOGY, AGRICULTURAL ENGINEERING)

Martin W. Miller, Ph.D., Professor
Emil M. Mirak, Ph.D., Professor Emeritus
David M. Oguzidziak, Ph.D., Assistant Professor
Michael A. O'Mallon, Ph.D., Assistant Professor
Rose Marie Pangborn, M.S., Professor
Hermon J. Paff, Ph.D., Professor
Robert J. Price, Ph.D., Lecturer

NOTE: For key to footnote symbols, see page 130.

Gerald F. Russel, Ph.D., Associate Professor
Barbara O. Schneeman, Ph.D., Assistant Professor (FOOD SCIENCE AND TECHNOLOGY, NUTRITION)
Bernard S. Schweigert, Ph.D., Professor
C.F. Shoemaker, Ph.D., Assistant Professor
R. Paul Singh, Ph.D., Assistant Professor (FOOD SCIENCE AND TECHNOLOGY, AGRICULTURAL ENGINEERING)
J.M. Smith, Sc.D., Professor (FOOD SCIENCE AND TECHNOLOGY, CHEMICAL ENGINEERING)
Lloyd M. Smith, Ph.D., Professor
Clarence Sterling, Ph.D., Professor
George F. Stewart, Ph.D., Professor Emeritus
Aloys L. Tappel, Ph.D., Professor
Nikola R. Tvarasauskis, Ph.D., Professor Emeritus
Reese H. Vaughn, Ph.D., Professor Emeritus
John R. Whitaker, Ph.D., Professor

Major Program and Graduate Study: See the major in Food Science and page 99 for graduate study.

Related Courses: See courses in Biochemistry and Biophysics, Consumer Science, Nutrition, and Viticulture and Enology; Environmental Toxicology 101; Epidemiology and Preventive Medicine 150; Plant Science 112, and 112L.

Courses in Food Science and Technology

Lower Division Courses

1. Introduction to Food Science (3) I, II. Jennings, Schweigert

Lecture—2 hours: discussion—1 hour. Development and maintenance of an adequate food quality and its measurement; scientific and technological aspects of converting raw material and produce into a large variety of processed and preserved foods; production and maintenance of the acceptability and nutritional value of foods. Course not open for credit to students who have completed courses 100A, 100B, or 111.

20. Food and Culture: An Introduction to Culture, Diet, and Cuisine (4) II. Grivetti (Nutrition, Geography)

Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 2, Geography 2 and Nutrition 10 recommended. Historical and contemporary overview of culture, food habits, and diet; exploration of the major themes in food habits research; minority food habits, origins and development of dietary practices. Some course as Nutrition 20.

49. Processing Plant Studies (1) I. Leonard

Prerequisite: course 1, Field trips to observe processing, distribution, quality control and regulatory control of foods and related materials.

Public Issues in Nutrition and Food Science (1) II. Weis (Nutrition, Schweigert)

Lecture—1 hour. Faculty and invited guest speakers will present topics in the area of nutrition and food science which are currently subjects of public debate. Intended as an introduction to nutrition and food science for students new to the campus. (P/NP grading only.) (Same course as Nutrition 92.)

Special Study for Undergraduates (1-5) I, II, III. The Staff

Schweigert in charge (P/NP grading only)

Upper Division Courses

100A. Principles of Food Composition and Properties (3)

Russell

Lecture—2 hours. Prerequisite: Chemistry 6A and 6B. Fundamental chemical, physical, and sensory aspects of food composition as related to physical and processed foods, acceptability, and nutritional value of fresh and processed foods.

100B. Principles of Food Composition and Properties (3)

Kavanagh

Lecture—2 hours. Prerequisite: Chemistry 6A and 6B. Fundamental chemical, physical, and sensory aspects of food composition as related to physical properties, acceptability, and nutritional value of fresh and processed foods.

101A. Principles of Food Composition and Properties Laboratory (2) I, Shoemaker

Lecture—1 hour; laboratory—1 hour. Prerequisites: course 101A (may be taken concurrently). Course designed to give laboratory experience with the food systems and properties described in course 101A.

101B. Principles of Food Composition and Properties Laboratory (2) II

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100B (may be taken concurrently). Course designed to give laboratory experience with food systems and properties described in course 100B.

102. Melting and Baking Technology (3) I, Lewis

Lecture—3 hours, field trips and pilot-scale baking by arrangement. Prerequisite: permission in biochemistry, microbiology, and chemistry advised. Technology of the melting, baking, and fermentation processes is integrated with the chemistry, biochemistry, and microbiology that determines industrial practices and products quality.

102L. Melting and Baking Science Laboratory (3) I, Lewis

Discussion—1 hour; laboratory—6 hours. Prerequisite: permission in biochemistry, microbiology, and chemistry advised. Technology of the melting, baking, and fermentation processes is integrated with the chemistry, biochemistry, and microbiology that determines industrial practices and products quality.

103. Physical and Chemical Methods for Food Analysis (5)

Bernard

Lecture—3 hours; laboratory—6 hours. Prerequisite: Chemistry 5 and 6A. Biochemistry 101B (may be taken concurrently). An introduction to the theory and application of physical and chemical methods for determining the characteristics of foods. Modern separation and instrumental analytical techniques are stressed.

104. Food Microbiology (3) I, Collins

Lecture—3 hours. Prerequisite: Bacteriology 2; Chemistry 6, or equivalent courses. Taxonomy, physiology, ecology, and control of beneficial microorganisms important in the manufacture and ripening of foods, undesirable microorganisms that produce defects in spoilage foods, and harmful microorganisms associated with foodborne infections and intoxications.

104L. Food Microbiology Laboratory (3) I, Barrett, Collins, Oguzidziak

Laboratory—6 hours. Prerequisite: Bacteriology 2 or the equivalent; course 104 (should be taken concurrently). Laboratory exercises illustrate selected subject matter discussed in course 104. COURSE 104: Laboratory experience with characteristics of bacteria involved in food spoilage and in foodborne-illness. Analysis of microbiological quality of foods.

105. Food Microbiology Laboratory (3) II, Barrett, Collins, Oguzidziak

Discussion—1 hour; laboratory—5 hours. Prerequisite: courses 104, 104L. Cultural and morphological characteristics of bacteria and fungi involved in food fermentations and food production. Laboratory methods in the use of microbes for food production.

106. Industrial Fermentations (3) I, Carroo, Oguzidziak, Paff

Lecture—3 hours. Prerequisite: Biochemistry 101A-101B and Bacteriology 2 or the equivalent; familiarity with en- gineering courses 100A, 100B, 110A, 110B, 110C recommended. Microbiological, biochemical and engineering fundamentals of industrial fermentations.

106L. Food and Industrial Microbiology Laboratory (3) Extra-session summer. Lewis

Laboratory—90 hours total. Prerequisite: a course in industrial fermentation (e.g., course 106). Microorganisms and their activities in relation to industrial processes such as baking, brewing, production of industrial alcohol, yeasts, solvents, vitamins, enzymes, antibiotics, and other drugs. Offered in odd-numbered years.

137. Principles of Sensory Evaluation of Foods (3) I, Pangborn

Lecture—3 hours. Prerequisite: Agricultural Science and Management 103. Nature of sensory responses with emphasis on aroma, taste, and texture of foods; critical use of analytical laboratory methods; relation of sense of taste with chemical and instrumental measurement; statistical analysis and interpretation of sensory data.

137L. Principles of Sensory Evaluation of Foods Laboratory (2) I, Pangborn

Discussion—1 hour; laboratory—3 hours. Prerequisite: Agricultural Science and Management 103; course 107 (must be taken concurrently). Laboratory demonstrations and student participation in the preparation and administration of experimental food samples, collection and statistical analysis of data, and interpretation of results from sensory tests.
Food Science and Technology: Food Service Management

108. Food Processing Plant Sanitation (3) III. Lewis Lecture—3 hours. Prerequisite: Chemistry 88 and Bacteriology 2. Discussion of factors relating to sanitary control of food, including: the nature of food spoilage, contamination, and physical sanitizing agents, principles of cleaning and hard surface detergency, metal corrosion, concepts in the disposal of wastes and the operation of government control agencies.

110A. Physical Principles in Food Processing (3) I, III. Merson Lecture—2 hours; laboratory—2 hours. Prerequisite: Physics 8A. An introduction to calculations and principles of heat distribution, mass, and energy transfer processes. Not open for credit to students enrolled in College of Engineering.

110B. Heat and Mass Transfer in Food Processing (3) II. Singh Lecture—2 hours; laboratory—2 hours. Prerequisite: course 110A or the equivalent. Rate processes; conduction, convection, and radiation heat transfer; refrigeration principles; psychrometry; mass diffusion and interphase mass transfer.

111. Introduction to Food Processing (4) I. Miller Lecture—3 hours; discussion—demonstration—2 hours. Prerequisite: Bacteriology 2, Chemistry 88A and 89B, and Physics 2A, 2B, or the equivalent. Food processing from farm to package. Characteristics of raw materials, fresh produce handling. Review of food processing and packaging, basic additives. Demonstration and field trips.

113. Structure of Food Materials (3) III. Sterling Lecture—3 hours. Overview of chemical and structural properties of foods; histochemical tests of food tissues; rheological characteristics; food texture.

117. The Senses and Sensory Measurement (4) I. Mamon Lecture—4 hours. Prerequisite: Biological Sciences 1. Statistics 13 or Agricultural Science and Management 150 (may be taken concurrently). Structure and function of sensory receptor systems; psychophysical and psychological variables affecting sensory responses. Critical examination of modern psychophysics and problems of sensory measurement and their relation to food flavor.

119A. Principles of Dairy Processing (4) II. Durkin Pseudonymized text of instruction. Prerequisite: Bacteriology 2. Technical principles related to the commercial processing of milk from the farm to the consumer. Includes fluid cony-entrapped, dried and frozen products, butter, and cheese. Theory and practical applications.

120. Muscle as Food (2) III. Lecture—2 hours, demonstrations (occasional). Prerequisite: Biochemistry 101B and Bacteriology 2 or equivalent. Biochemical, physiological, microbiological, psychophysical, and sensory principles underlying the conversion of meat to meat. Man's most expensive food includes processing, preservation, cooking, smoking, and curing of meat, poultry, and sausage.

121. Birds and Their Eggs as Food (3) I. - Brant Lecture—3 hours; demonstrations. Prerequisite: consent of instructor. Biochemistry 101B recommended. Avian products will be considered from the physical, chemical, and nutritional aspects. Factors affecting processing, preservation, and quality.

122. Marine Food Science (3) III. Brown, Ogrydziak Lecture—3 hours. Prerequisite: Bacteriology 2, Biochemistry 101B (may be taken concurrently). Biochemical, microbiological, and ecological principles unique to fish; where fish are collected and bred; fishing and landing techniques as they influence quality; processing, storage, and public health aspects of marine organisms; resource development including artificial rearing systems.

125. Metals and Metal Complexes in Foods (3) II. Gruesewid Lecture—3 hours. Prerequisite: Biochemistry 101B, Chemistry 107B or the equivalent. Structure, reactions, and physical properties of metal complexes, particularly those of importance to food science. The biochemistry of metal ions and complexes.

130. Chemistry of Milk and Dairy Products (3) II, III. Smith Lecture—3 hours. Prerequisite: Biochemistry 101A. The chemistry of milk constituents, physical and chemical properties of milk and dairy products, factors that influence processing and storage of dairy products, with emphasis on quality.

131. Packaging Processed Foods (3) III. Henderson Lecture—3 hours; laboratory—1 hour. Prerequisite: course 1 or 111, Chemistry 88B, Bacteriology 2 and Physics 2A, or consent of instructor. Technical aspects of packaging processed foods. Definitions and functions of packages for food. Packaging materials and properties. Public health problems associated with packaging. Food packaging interactions for major commodities and their control.

150. Thermal Processing of Foods (3) III. Leonard Lecture—2 hours; laboratory—2 hours. Prerequisite: courses 104 and 110B; or the equivalent. Theory and practical considerations of thermal processing by canning, pasteurization, and aseptic processing. Process calculations of microbial inactivation and chemical changes to safeguard public health, nutritional value, and consumer acceptance. Description and engineering analysis of thermal processing equipment.

150L. Thermal Processing Laboratory (2) II. Leonard, Cardroad Laboratory—2 hours. Prerequisites: courses 104 and 110B, course 150 (may be taken concurrently). Laboratory exercises and students participating in the use and application of thermal processing methods and related procedures, and the interpretation of results, including evaluation of can closures, operation of thermal processing equipment, and the development and testing of sterilization processes.

160. Senior Seminar (1) I, II, III. Schweigert, Carroad Seminar—1 hour. Prerequisite: senior standing or consent of instructor. Selected topics presented by students on recent advances in food science and technology. Reports and discussions concerning oral and written presentations, literature sources and career opportunities.

162. Internship for Advanced Undergraduates (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—3-36 hours. Prerequisite: consent of instructor. Work experience at or off campus. The practical application of food science. (P/NP grading only)

184. Directed Group Study (1-5) I, II, III. The Staff (Schweigert in charge) Prerequisite: consent of instructor. (P/NP grading only)

185. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Schweigert in charge) (P/NP grading only)

Graduate Courses


207. Advanced Sensory-Instrumental Analyses (3) III. Noble (Viticulture and Enology), Pangborn Lecture—2 hours; laboratory—3 hours. Prerequisite: course 107L and consent of instructor. Basic principles of measurement of color, texture, and flavor of foods by sensory and instrumental methods. Advanced statistical analysis of relation of colorimetry, textureometry and chemistry of volatile compounds to perception of appearance, texture, flavor.


211. Chemistry of the Food Lipids (3) III. I, III, Smith Lecture—3 hours. Prerequisite: Biochemistry 101A. Chemical constitution, molecular structure, and stereochemistry of the fats, phospholipids, and related compounds. Methods of isolation, characterization, and synthesis. Relation of molecular structure to physical properties.

213. Macromolecular Gels (2) III. Sterling Lecture—2 hours. Prerequisite: Biochemistry 101A. Structural interrelationship of water with typical biological polymers in gels: aerogels and xerogels; gel properties and methods of study. Offered in odd-numbered years.

225. Mycology of Food and Food Products (3) III. Miller Lecture—3 hours. Prerequisite: course 104 and consent of instructor. Morphology and physiology of fungi associated with food. Degradative activity of fungi: food fermentation, single-cell protein production, mushroom culture. Undesirable activities: preharvest and postharvest deterioration, food spoilage, and food products.

250. Isolation and Characterization of Trace Volatiles (2) I. Jennings Lecture—3 hours. Prerequisite: at least one introductory course in organic chemistry, physiochemistry, gas chromatography, preparation, evaluation and use of columns, sample preparations and recovery, qualitative and quantitative analysis, ultraviolet, infrared and mass spectrometry.

251. Isolation and Characterization of Trace Volatiles (2) I. Jennings Discussion—1 hour; laboratory—3 hours. Prerequisite: course 250 (must be taken concurrently). Laboratory demonstrations and discussions of methods for optimizing gas chromatographic performance: treatment of retention data, preparation and evaluation of packed, 3%Q1 and open tubular glass capillary columns, sample preparation and trapping, microcolumn coupled with gas chromatography infrared and mass spectrometer.

250. Seminar (1) I, II, III. The Staff (Schweigert in charge) Seminar—1 hour. (SU graded only)

250. Group Study (1) I, II, III. The Staff (Schweigert, in charge) Directed study on food chemistry, food microbiology, food processing, or sensory evaluation.

251. Research (1-2) I, II, III. The Staff (Schweigert in charge) Prerequisite: graduate standing. (SU graded only)

Food Service Management

(College of Agricultural and Environmental Sciences)

Faculty

See the Department of Nutrition.

The Major Program and Graduate Study

Food Service Management has been incorporated as an option within the major in Dietetics (page 170). If you are interested in preparing for a career in commercial organizations such as hotels, restaurants, industrial cafeterias, and contract food services, as well as in public and private institutions such as hospitals, correctional institutions, schools, and colleges, consult the Department of Nutrition regarding the Management specialization listed under the Unrestricted Electives of the Dietetics major.

Rented Courses. See Food Science and Technology, and Nutrition.

Courses in Food Service Management

Questions pertaining to the following courses should be directed to the instructor or to the Nutrition Department Office, 129 Everlon Hall.

Upper Division Courses

120. Principles of Quantity Food Production (3) III. Proppet Lecture—3 hours. Prerequisite: Food Science and Technology 108 and 108B. Fundamental principles of food service management including quantity food preparation, institutional equipment, receiving and storage, service, menu planning, merchandising, and sanitation.

120L. Quantity Food Production Laboratory (2) I, II. Proppet Laboratoty—6 hours. Prerequisite: course 120B. Laboratory experience in quantity food production and service.

121. Quantity Food Purchasing and Sanitation (3) I, II, III. Proppet Lecture—3 hours. Prerequisite: Bacteriology 2; course 120 Principles of quantity food purchasing and sanitation.

122. Food Service Systems Management (3) I. Proppet Lecture—3 hours. Prerequisite: Agricultural Economics 112, courses 120, 120L, 121. Principles of quantity food production management: production schedules, portion control, financial management, layout and equipment planning, evaluation of alternative systems, and computer applications.
French

French (College of Letters and Science)
Claude Abraham, Ph.D., Chairperson of the Department
Department Office (French and Italian), 513 Sproul Hall

Faculty
Claude Abraham, Ph.D., Professor
Max Bach, Ph.D., Professor
Marc Eli Blanchard, Agrégé de Lettres, Professor
Edward M. Bloomberg, Ph.D., Associate Professor
Richard N. Coo, Ph.D., F.A.H.A., Professor
Ruby Cohn, Ph.D., Professor (Comparative Literature, Dramatic Art)
Gerald Herman, Ph.D., Associate Professor
Margo R. Kauflin, M.A., Lecturer
Manfred Kusch, Ph.D., Associate Professor
Marshall Lindsay, Ph.D., Professor
Maria Marcelli-Manea, Ph.D., Professor
Ruth B. York, Ph.D., Lecturer

The Program of Study
The Program offers courses in language, culture, and literature (the latter on or off campus and in translation), most of which may be taken to satisfy the Humanities Area Requirement.

Although a major or minor in French is excellent preparation for prospective teachers or for those contemplating careers in government or business, it has broader applications and is designed for those wishing to obtain solid training in a humanistic discipline and to enrich themselves through the study of a foreign culture, thus enabling themselves to play a more enlightened and influential role in the international picture. It is an excellent preparation for professional schools.

The UCD facilities and activities supporting these programs are manifold: up-to-date language laboratories, French Club, Pi Delta Phi National French Honor Society, departmental reading room, and a superb research library to name a few. There are, of course, close ties to several French campuses, thanks to the Universitywide Education Abroad Program.

French

French Language and Civilization
French 104 or 105, 1104, 1105, 1113 or 1128

Two additional courses chosen in consultation with undergraduate adviser: in French language or literature, on traditional or alternative courses offered outside the department.

Prerequisite Credit: Credit will normally be given for a course if it is prerequisite to a course already successfully completed. Exceptions can only be made by the Department Chairperson.

Graduate Study: The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in French.

The Master of Arts degree is available to students who have an undergraduate major in French or its equivalent. Students, in special circumstances, may make up work deficient to the major requirements and then continue with an advanced degree. Candidates will be recommended for admission to graduate study in French provided the requirements of the Graduate Division and the Department of French and Italian have been met. Basic requirements are: a minimum residence of three quarters, 36 quarter units, and a passing score in the comprehensive examination.

The doctoral program stresses individualized study suited to the student's interest. Particularly encouraged are programs that involve the use of resources in allied departments and programs such as Dramatic Art, Comparative Literature, English, etc. The Department regularly sponsors an exchange program with French institutions of learning. Basic requirements include demonstration of linguistic competence, passing of preliminary and qualifying examinations, completion of an acceptable dissertation, and one year of teaching in the department as a Teaching Assistant.

Graduate Advisers: R.B. York (M.A. degree); M.E. Blanchard (Ph.D. degree).

Teaching Credential Subject Representative, R.B. York. See page 105 for Tisketter Education Program.

Courses in French

Lower Division Courses
Students offering high school language preparation as a prerequisite must take a placement test.

Course Placement. Students with two years of high school French normally take French 2, those with three years take French 3 and those with four years take French 4.

1. Elementary French (6) II, III, IV. The Staff
Discussion—5 hours. Laboratory—2-hour sessions. Students who have successfully completed French 2 or 3 in the 10th or higher grade in high school may receive full credit for this course on a Pass/No-Pass grading basis only. Although a passing grade will be assigned, this course will not count toward the French major.

2. Elementary French (6) III, IV. The Staff
Discussion—5 hours. Laboratory—2-hour sessions. Prerequisite: course 1 or the equivalent. Continuation of course 1.

115A. Medieval Literature: Epic and Romance (4) I, Herman Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. La Chanson de Roland, Tristan et Iseult, and selected works of Chretien de Troyes. Texts to be read in modern French.

115B. Medieval Literature: Satiric and Didactic Poetry (4) I, III. Herman Lecture-discussion—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Study of lyric poetry of the eleventh century from Mon Ami D'Abagn, with emphasis on the Pèlerinage.

116A. Literature of the Sixteenth Century (4) I, III. Lindsay Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. The lyric poetry of the sixteenth century from Marot to d' Aubigny, with emphasis on the Pèlerinage.

116B. Literature of the Sixteenth Century (4) II, III. Lindsay Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Study of Works of Pascal, La Rochefoucauld, etc.

117C. Poetry and the Novel in the Seventeenth Century (4) II, III. Abraham Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Study of representative novels and poets of the eighteenth century. La Fontaine, Rabelais, and Voltaire.

118A. "Les Philosophes" (4) II, III. Kusch Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Readings from Montesquieu, Voltaire, Diderot, Rousseau and the Encyclopaedists.

118B. The Novel in the Eighteenth Century (4) I, II. Kusch Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Novels of Le Sage, Prévost, Diderot, Rousseau, LaFayette, and Voltaire.

119C. The Theater in the Eighteenth Century (4) II, III. Cohn Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Poetry of the Pre-Romantics to Baudelaire.

120. The Nineteenth Century (4) I, II, III, IV. Lindsay Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Symbolism: the poetry and novels of Baudelaire, Mallarmé, Verlaine, Rimbaud, Corbière, Louis, and Lacramon.

120A. Twentieth-Century Drama (4) I, II. York Literature—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Representative plays from Jarry to Giraudoux.

120B. Twentieth-Century Drama (4) II. York Literature—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Representative plays from Anouilh to Ionesco.

121. Twentieth-Century Novel (4) I, II. Lindsay Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Selected works from Faulkner to Bellow.

122. Twentieth-Century Poetry (4) II, III. Lindsay Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Selected poetic texts from Apollinaire to the present.

130. Critical Reading of Poetry (4) I, III. Lindsay Lecture—3 hours. Prerequisite: course 45 or consent of instructor. Analysis and evaluation of poems representing major works of French poetry. Study of poetic conventions and rendition.

131. Critical Reading of Fiction (4) I, II, III. Lindsay Lecture—3 hours. Prerequisite: course 45 or consent of instructor. Analysis and evaluation of short stories and novels representing the major works of French fiction, with emphasis on narrative structure and technique.

132. Critical Reading of Drama (4) III. Cohn Lecture—3 hours. Prerequisite: course 45 or consent of instructor. Analysis and evaluation of plays and dramas representing the major works of French drama, with emphasis on dramatic structure and technique.

133. Advanced Literary Translation (4) III. Bloomberg Lecture-discussion—3 hours; term paper. Prerequisite: course 104 or 105. Modern French, technical, symbolic, and stylistic aspects of English-French translation.

140. Study of a Major Writer (4) III. York Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Concentrated study of a single oeuvre. May be repeated for credit with consent of instructor.

150. Masterpieces of French Literature (4) I, II. Lindsay Lecture-discussion—3 hours; term paper. Prerequisite: course 104 or 105. Major works of French literature, with emphasis on dramatic structure and technique.

152. Medieval French Prose (3) II, III. Menage Lecture-discussion—3 hours; laboratory—1 hour. Prerequisite: course 6 or the equivalent. Comparative analysis of the sources, usage, and influence of medieval French prose in the pronunciation of modern French, with special emphasis on the problems of English-speaking students.

160. The Structure of French Language (4) III. Menage Lecture-discussion—4 hours. Prerequisite: course 104 or 105. The relationship between language and speech, concentrating on grammar and phonology as the underlying structure of language.

197T. Tutoring in French (2-4) I, II, III. Kaufman Seminar—2 hours. Prerequisite: course 104 or 105. Tutoring in undergraduate courses including work with teaching assistants and with departmental faculty.

198. Directed Group Study (1-5) I, II, III, IV. The Staff Prerequisite: consent of instructor. (P.N.P. grading only.)

199. Special Study for Undergraduates (1-5) I, II, III, IV. The Staff Chairperson in charge. (P.N.P. grading only.)

Graduate Courses

200A. "Analyse Littéraire" (4) I, II. Lindsay Seminar—3 hours; seminar. Prerequisite: graduate standing. Analysis of methodology of literary criticism. Textual reading and group study of one selected work.

200B. "Analyse Littéraire" (4) II, III. Blanchard Seminar—3 hours; term paper. Prerequisite: graduate standing. Further introduction to methodology. Theory of literature and philosophy of criticism, writing and reading, in the context of today's controversy. Study of selected critical approaches against such."
202A. Medieval French Literature: The Epic Tradition (4) III. Herman, Seminar—3 hours. Prerequisite: course 201A recommended. Literary and stylistic study of selected chansons de geste. Readings in Old French. May be repeated for credit with consent of instructor when different topic is studied.

202B. Medieval French Literature: The Romance Tradition (4) III. Herman, Seminar—3 hours. Prerequisite: course 201A recommended. Chretien de Troyes and the doctrine of courtly love. Literary and stylistic study of Chretien’s major works. Readings in Old French. May be repeated for credit with consent of instructor when different topic is studied.

205A. Sixteenth-Century Literature: The Humanists (4) III. Blashfield, Seminar—4 hours. French humanism in its most varied forms. Although at different times Rabelais and Montaigne will be primarly studied, other leading intellectual: and religious writers will also receive attention. May be repeated for credit when different topic is studied.

205B. Sixteenth-Century Literature: Pre-Renaissance and Renaissance Poets (4) IV. Lindsey, Seminar—3 hours. The poetry of the Ecole lyonnaise and of the Paissade. May be repeated for credit when different topic is studied.

206A. Seventeenth-Century Literature: Theater (4) I, Abraham, Seminar—3 hours. The works of Corneille, Racine, Moliere, and minor dramatists. One or more authors may be covered. May be repeated for credit with consent of instructor when different topics are studied.

206B. Seventeenth-Century Literature: Prose (4) III. Blanchard, Seminar—3 hours; term paper and/or exposure. The works of such as Pascal, Descartes, Mme de La Fayette. One or more authors may be covered. May be repeated for credit with consent of instructor when different topics are studied.

206C. Seventeenth-Century Literature: Poetry (4) III. Abraham, Seminar—3 hours; term paper and/or exposure. Studies of the works of one or more poets of the period. May be repeated for credit with consent of instructor.

207A. Eighteenth-Century Literature: Philosophes (4) II. The Staff, Seminar—3 hours; term paper and/or exposure. Not a course in philosophy, but an examination of the role of philosophy in the design and content of the literary works. Study of one or more authors. May be repeated for credit.

207B. Eighteenth-Century Literature: Novel (4) III. Kusch, Seminar—3 hours. “Rites of the novel.” A study of narrative experiments in the context of the philosophical and novel literary values. Course may treat one or more novels of the period. May be repeated for credit when different topics are studied.

208A. Nineteenth-Century Literature: Fiction (4) II. Blanchard, Seminar—3 hours. Study of the works of one or several novelists and of short-stories of the period. May be repeated for credit with consent of instructor when different topics are studied.

208B. Nineteenth-Century Literature: Theater (4) II. The Staff, Seminar—3 hours. Study of the works of one or more dramatists of the period. May be repeated for credit with consent of instructor when different topics are studied.

208C. Nineteenth-Century Literature: Poetry (4) III. Lindsay, Seminar—3 hours. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor when different topics are studied.

209A. Twentieth-Century: Prose (4) III. The Staff, Seminar—3 hours; term paper and/or exposure. Study of the works of one or several writers of the period.

209B. Twentieth-Century: Theater (4) I, Cohn, Seminar—3 hours; term paper and/or exposure. Study of the works of one or several dramatists of the period. May be repeated for credit with consent of instructor.

209C. Twentieth-Century: Poetry (4) II. The Staff, Seminar—3 hours; term paper and/or exposure. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor.

210. Studies in Narrative Fiction (4) III. The Staff, Seminar—3 hours; term paper and/or exposure. Study of the works of one or several novelists of the period. May be repeated for credit with consent of instructor when different topic is studied.

211. Studies in Criticism (4) III. The Staff, Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

212. Studies in the Theater (4) I, Cohn, Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

213. Studies in Poetry (4) II. The Staff, Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

214. Study of a Literary Movement (4) III. Bloomberg, Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

238. Problems in French Composition and Syntax (4) III. Bloomberg, Seminar—3 hours. Prerequisite: graduate standing, problems and techniques of English-French translation, morphological, syntactical, and stylistic.

297. Individual Research (1-5) I, II, Ill. The Staff, Seminar—1-5 hours. May be repeated for credit with consent of instructor.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only)

300. Teaching of a Modern Foreign Language (3) III. Kaufman, Lecture-discussion—3 hours, Prerequisite: senior or graduate standing; a major in a modern foreign language.

300A. The Teaching of French in College (1) I, Kaufman, Lecture—1 hour, discussion—1 hour. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the University (SU grading only).

300B. The Teaching of French in College (1) I, Kaufman, Lecture—1 hour, discussion—1 hour. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the University (SU grading only).

300C. Teaching of Modern Foreign Languages (3) III. Kaufman, Lecture—1 hour, discussion—1 hour. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the University (SU grading only).

Genetics

(College of Agricultural and Environmental Sciences)

S. Richard Snow, Ph.D., Chairperson of the Department

Department Office, 357 Briggs Hall (752-0200)

Faculty

Robert W. Allard, Ph.D., Professor (Genetics, Agronomy and Range Science)

Francisco J. Ayallo, Ph.D., Professor

James B. Boyd, Ph.D., Professor

Saxon J. Edlin, Ph.D., Professor

John H. Gillespie, Ph.D., Professor (Genetics, Environmental Studies)

Leslie D. Goldstein, Ph.D., Professor

Melvin M. Green, Ph.D., Professor

Paul E. Hansche, Ph.D., Professor (Genetics, Pomology)

John A. Kiger, Jr., Ph.D., Associate Professor

Timothy Proulx, Ph.D., Professor (Genetics, Entomology)

Raymond L. Rodriguez, Ph.D., Assistant Professor

S. Richard Snow, Ph.D., Professor

G. L. E. Stebbins, Ph.D., Professor Emeritus

Michael A. Torelli, Ph.D., Assistant Professor

The Major Program

The Genetics major is designed to provide a broad background in the biological, mathematical, and physical sciences basic to the study of heredity and evolution. The major is sufficiently flexible to accommodate students interested in the subject either as a basic discipline in the biological sciences or in terms of its applied aspects in improving domestic plants and animals.

Choice of College

Students may elect this major either in the College of Agricultural and Environmental Sciences or in the College of Letters and Science.

Students majoring in Genetics in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to matriculation at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis. Further information can be obtained from the Division of Biological Sciences office, 160 Mirk Hall.

Genetics

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parenthesis are required)


genetics

Preparatory Subject Matter

Biology (Biology 10).......................................................... 5

Two of the following courses or course sequences:

Bacteriology: 2 and 3 or 102

Botany 2, 2A, 2B

Chemistry (Chemistry 1A/1B or 4A/4B-4C)

Botany 126

Physics (Physics 2A-2B-2C).......................... 9

Mathematics (Statistics 15; Math 1B-1A or 162A-162B or 21A-21B-21C)..... 13-16

Biology Subject Matter

Phenetics (Biology 101A-101B).......................... 6

Genetics 100A-100B-100L or 110-100L or 110-110L or 111-110L or 116-110L or 9-12

Three additional courses in genetics

Breadth Subject Matter

Any course adequate for the major department

English and/or rhetoric (see College requirement).................. 8

Social sciences and/or humanities................. 28

Additional requirements as specified on page 70

College of Letters and Science students:

Refer to page 93 for a description of requirements to be completed in addition to the major.

Restricted Electives

Up to four upper division courses in biological sciences or other fields relevant to genetics and related to student’s interest, chosen with approval of adviser........ 15-30

Unrestricted Electives

Total Units for the Major

180

Majors Advisor: G. J. Edlin

Graduate Study

The Graduate Group in Genetics offers study and research leading to the M.S. and Ph.D. degrees in Genetics. For detailed information contact the Chairperson of the Graduate Group (see page 216) and the Announcement of the Graduate Division.

Tuition earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.
Courses in Genetics

Lower Division Courses

10. Heredity and Evolution for the People (4) I, Edin; II, Gottlieb Lecture—3 hours; discussion—1 hour. Course intended for liberal arts students. Examines principles and recent developments in genetics and evolution in context of their social implications.

99. Special Study for Undergraduates (1-3) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Individual study for undergraduates. (P/NP grading only)

Upper Division Courses

Courses 100A and 100B form a two-quarter, 6-unit sequence (prerequisites: one biology course; genetics in contrast to the one-quarter, 4-unit course 120). The level of the courses is the same.

100A. Principles of Genetics (3) I, Boyd Lecture—3 hours; or autotutorial—2 hours and general assembly—1 hour. Prerequisite: Biological Sciences 1 and either Bacteriology 2 (especially Botany), or Zoology 2. An introduction to genetics, covering the areas of differentiation, molecular and biochemical, and developmental genetics. Not open for credit to students who have received credit for Genetics 115 or 120.

100B. Principles of Genetics (3) II, Prout Lecture—3 hours; or autotutorial—2 hours and general assembly—1 hour. Prerequisite: course 100A; a course in statistics. Continuation of course 100A, covering topics of cytogenetics, quantitative, population, and evolutionary genetics. Not open for credit to students who have received credit for Genetics 115 or 120.

100L. Principles of Genetics Laboratory (1) I, II, III. Green Laboratory: course 100A, 115, or 120; Bacteriology 3. Laboratory work in basic genetics to supplement courses 100A, 100B, 115, and 120.

101. Cytogenetics (3) III, Rick (Vegetable Crops), Dvorak (Agronomy and Range Science) Lecture—3 hours. Prerequisite: course 100B, 115, or 120. Gross and fine-structure of chromosomes and associated cell nuclear activities. Process of cell reproduction, behavior of chromosomes as related to genetics and evolution in plants, eukaryotes, and structural heterozygotes. Offered in odd-numbered years.

101L. Cytogenetics Laboratory (2) II, Prout, Dvorak (Agronomy and Range Science) Laboratory—8 hours. Prerequisite: course 101 (may be taken concurrently). Laboratory study of chromosome structure and behavior. Offered in odd-numbered years.

102. Molecular and Biochemical Genetics (3) I, Kiger Lecture—3 hours. Prerequisite: course 100A or 120. Bio-chemistry 101B. Study of gene structure, mutation, and the biochemical basis of gene function.

103. Organic Evolution (3) III, Ayala Lecture—3 hours. Prerequisite: course 100B, 115, or 120. Evolution in higher organisms.

104. Developmental Genetics (4) II, Kiger Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A, 115, or 120, Biochemistry 101B; Zoology 100 recommended. Study of the development and differentiation of vertebrates and other higher organisms. Emphasis is placed on genetic and biochemical approaches to the study of the mechanisms operative at the various levels of gene action.

105. Population Genetics (4) I, Allard Lecture—4 hours. Prerequisite course 100B, 115, or 120. A course in statistics and Mathematics 168 recommended. An introductory course in the analysis and interpretation of quantitative genetic systems. Course covers Mendelian populations, with emphasis on the factors affecting the genetic organization of mult locus systems.


115. Human Genetics (5) III. The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: introductory course in zoology, botany, or biology; a course in statistics. Conduction of discussion groups with individuals with special emphasis on man. Course will fulfill the needs of preprofessional students and those in other areas of human biology. Not open for credit to students who have received credit for Genetics 100A-100B or 120.

120. General Genetics (4) I, Rodriguez, Honischer II, Snow, Gillespie, III, Boyd, Hansche Lecture—4 hours. Prerequisite: Biological Sciences 1; Bacteriology 2, Botany 2, or Zoology 2; a course in statistics. Course is designed to provide an intensive treatment of the science of genetics for students in the biological sciences who require only a short course in general genetics. Not open for credit to students who have received credit for Genetics 100A-100B or 115.

191L. Advanced Molecular Genetics Laboratory (3) I, Rodriguez Lecture—9 hours. Prerequisite: courses 100L, 102 may be taken concurrently. Genetics 191L recommended. Instructor: Bacteriology 190L recommended. Genetic analysis of gene structure and function using recombinant DNA technology. Experiments will include the isolation of prokaryotic genes for the purpose of demonstrating the genetic principles of complementation, mutation and suppression.

197. Tutoring in Genetics (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: upper division standing and consent of instructor. Conducting of discussion groups affiliated with one of the department's regular courses. (P/NP grading only)

198. Group Study (1-3) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Directed group study of special topics in genetics. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor based on adequate preparation of the student in allied fields. (P/NP grading only)

Graduate Courses

202. Plasmodia, Recombinant DNA, and Genetic Engineering (3) III, Edin Lecture—3 hours. Prerequisite: course 102 or Bacteriology 130A-130B, or consent of instructor. Presentation of recent experiments in recombinant DNA technology. Description of fundamental concepts of bacterial manipulation and molecular systems. (SU grading only.) Offered in odd-numbered years.

203. Advanced Evolution (3) III, Gottlieb Lecture—1 hour; discussion—2 hours. Prerequisite: graduate status. Adaptation, ecological differentiation, and specialization in plants and animals with emphasis on the approach of different ways of methods of analysis. Offered in odd-numbered years.

205. Theoretical Population Genetics (3) III, Turelli Lecture—3 hours. Prerequisite: course 105, Mathematics 22A, and 130A or 131A, or consent of instructor. Mathematics 25B recommended. Mathematical theory of population genetics with emphasis on the assumptions underlying the standard models and the mathematical techniques used to derive conclusions. (SU grading only.) Offered in odd-numbered years.

206. Current Topics in Genetics (3) III. Lecture—2 hours; laboratory or discussion—2 hours. Prerequisite: course 100B or 115 or consent of instructor. Selected topics of current interest in advanced genetics. May be repeated for credit.

207. Genetic Control of Insect Pests (3) I, Prout Lecture—3 hours. Prerequisite: elementary genetics plus population genetics or evolutionary theory; graduate or upper division standing in biological science; some knowledge of insect ecology and model construction recommended. The application of population genetic theory to ways of altering the genetic constitution of pest populations, including sterile male release, delayed identity method, sex ratio distortion, the use of various cytogenetic procedures and mating drive to transform population. Offered in odd-numbered years. Same course as Entomology 207. (SU grading only.)

268. DNA Replication, Recombination, and Repair (3) III. Boyd, Snow Lecture—2 hours; discussion—1 hour. Prerequisite: Genetics 102; Biochemistry 101B. An integration of information from genetic and biochemical studies of DNA replication and recombination, and from studies of recombination, with the aim of forming a framework for understanding these phenomena as aspects of DNA metabolism. Offered in even-numbered years.

269. Group Study (1-5) I, II, III. The Staff Prerequisite: consent of instructor. Directed group study of special topics in genetics. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (SU grading only)

Genetics (A Graduate Group)

S. Richard Snow, Ph.D., Chairperson of the Group Office, 357 Briggs Hall

Graduate Study. The Graduate Group in Genetics offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding the programs, address the chairperson of the group.

Graduate Advising. Consult Genetics Graduate Group Office, 357 Briggs Hall.

Related Courses. See Genetics and Animal Genetics.

Courses in Genetics

Graduate Courses

291. Seminar in History of Genetics (2) II. The Staff Seminar—2 hours. Prerequisite: Genetics 100B, 115, or 120. The development of modern genetic theories beginning with Mendel. (SU grading only.)

292. Seminar in Gene Structure and Action (1-3) III. The Staff Seminar—1-3 hours. Prerequisite: Genetics 115, or consent of instructor. Topics of current interest related to the structure of genes, mutation, and the mechanisms of gene action. Offered in odd-numbered years. (SU grading only.)

293. Seminar in Cytogenetics and Evolution (1-3) I, II. The Staff Seminar—1-3 hours. Prerequisite: Genetics 101 or consent of instructor. Topics of current interest related to chromosomal changes, mutation, and other genetic changes in natural populations, and the application of genetics to the study of organic evolution. Offered in odd-numbered years. (SU grading only.)

294. Seminar in Populational, Ecological, and Behavioral Genetics (1-3) II. The Staff Seminar—1-3 hours. Prerequisite: Genetics 103 and 105 or consent of instructor. Topics of current interest relating to genetics problems of populations, ecology, and behavior. Offered in even-numbered years.

296. Group Study (1-5) I, II, III. Members of Group (Chairperson in charge) Prerequisite: consent of instructor. Directed group study of special topics in genetics. (SU grading only.)

299. Research (1-12) I, II, III. Members of Group (Chairperson in charge) (SU grading only.)
Geography

(College of Letters and Science)

Stephen C. Jett, Ph.D., Chairperson of the Department

Department Office, 280 Kerr Hall

Faculty

Conrad J. Bahre, Ph.D., Assistant Professor
Dennis J. Dingemans, Ph.D., Assistant Professor
Howard F. Gregor, Ph.D., Professor
Louis E. Grivetti, Ph.D., Assistant Professor
Geography, Nutrition
David M. Heigren, Ph.D., Assistant Professor
Stephen C. Jett, Ph.D., Professor
Marilyn L. Shelton, Ph.D., Assistant Professor
Frederick J. Simons, Ph.D., Professor
Kenneth Thompson, Ph.D., Professor

The Major Program

Geography is the study of the forms, origins, locations, and distributions of phenomena on the earth's surface. Its emphasis is spatial, and it is concerned with the processes and events involved, over time, in the development of the earth's natural and human geography. Geography draws information from many other academic fields in its attempts to describe and explain the earth's diverse regional character and spatial patterns. It is, then, a broad, interdisciplinary field, but students are encouraged to develop, in upper division work, a degree of specialization in one of geography's subfields—physical, cultural, historical, or urban/economic—supplemented by related courses in other departments. Programs are planned in consultation with the major adviser.

Geography's approach is largely academic, but provides background for students interested in careers in teaching, planning, and international affairs.

Geography

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Units</th>
<th>Geography 1, 2, and 5</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth Subject Matter</td>
<td>39-42</td>
<td></td>
</tr>
</tbody>
</table>
| Choose one emphasis from the following four:
| Emphasis I (Geological) | 28 |
| One course from each of the following three groups:
| a. Geography 170 and 171 |
| b. Geography 141 and 155 |
| c. Geography 106 and 115 |
| Four additional upper division geography courses | |
| Emphasis II (Cultural/Historical) | 28 |
| Geography 170, 171, plus one course from Geography 108, 115, 141, 155 |
| Four additional courses chosen from Geography 103, 110, 143, 152, 154, 172, 173, 174, 175 |
| Emphasis III (Economic/Urban) | 27-28 |
| Geography 110, 141, 155, plus one course from Geography 108, 115, 170, 171 |
| Three additional courses chosen from Geography 104, 142, 143, 154, 156, 161, 162 |

NOTE: For key to footnote symbols, see page 130.

Emphasis IV (Physical) | 30 |
| Geography 3, 108, 117, 113, 162, 173, plus one course from Geography 141, 155, 170, 171 |
| One additional course from Geography 102, 111, 112, 117, 161 |

Total Units for the Major | 51-54 |

Recommended

Geography 4.

Geography

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Units</th>
<th>Preparatory Subject Matter</th>
<th>56-60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geography 1, 2, 3, and 5</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Statistics 1 or the equivalent</td>
<td>4</td>
<td></td>
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<tr>
<td>Mathematics 16A, 16B, and 16C, or Mathematics 21A, 21B, and 21C</td>
<td>12-12</td>
<td></td>
</tr>
<tr>
<td>Mathematics 19-29</td>
<td>1-3</td>
<td></td>
</tr>
<tr>
<td>Chemistry 1A-19-1C or 4A-49-1C</td>
<td>15</td>
<td></td>
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<tr>
<td>Biological Sciences 1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Zoology 2-2B, or Botany 2 or Geology 60-60, or Physics 24A-28</td>
<td>5-6</td>
<td></td>
</tr>
</tbody>
</table>

Depth Subject Matter | 43-45 |
| Two courses from Geography 102, 103, 112, 119, 117, 162, 173 | 20 |
| One course from Geography 121, 122A, 122B, 125A, 125B, 126A, 126B, 126C | 6 |
| Four additional upper division, letter-graded units in Geography | 4 |
| Nine additional upper division units chosen in consultation with undergraduate adviser | 9 |

Total Units for the Major | 99-105 |

Recommended

Geography 4; Physics 8A-8B-8C; Chemistry 8A, 8B; Mathematics 15 or the equivalent.

Addendum

The B.S. major provides a wide diversity of possible themes, including cartography, climatology, zoogeography, plant geography, historical geography, water-resource studies, and mathematical geography. An individual's program may emphasize one or more of these themes and is planned in consultation with the major adviser.

Minor Program Requirements:

Letters and Science students who do not major in Geography may satisfy the requirements for a minor in the field by successfully completing the minimum units as follows:

<table>
<thead>
<tr>
<th>Units</th>
<th>Geography</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper division units in geography chosen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>in consultation with major adviser</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

Major Adviser. See Class Schedule and Room Directory.

Teaching Credential Subject Representative. D.J. Dingemans. See page 105 for the Teacher Education Program.

Graduate Study. The department offers programs of study leading to the M.A. and Ph.D. degrees. Information concerning these programs may be obtained from the Graduate Adviser, Department of Geography.

Graduate Adviser. See Class Schedule and Room Directory.

Courses in Geography

Lower Division Courses

1. Physical Geography (4) I, III. Heigren. Lecture—4 hours. Laboratory—2 hours. Basic physical elements of the human habitat, especially climate, landforms, soils, and natural vegetation.


3. Climate and Weather (3) I, II. Heigren. Lecture—3 hours. Basic concepts of climate and weather: energy and moisture exchanges, atmospheric pressure, circulation and winds; interrelationships of climate and weather; data; climate maps; severe storms, global, regional, and local climate and weather; climatic change. Credit: 3 hours.


5. Introduction to Urban and Economic Geography (4) I, III. Gregor, II. Dingemans. Lecture—4 hours. Discussion—1 hour. The location of economic and urban activities. Patterns and theories of spatial organization: resource development, agricultural and manufacturing regions, urban systems, and urban structure.


7. Problems in Regional Ecology (4) I. Simmons. Lecture—4 hours. Seemathematical and historical and contemporary ecological problems from various parts of the world. Emphasis on interaction between cultural physical environment. Regions selected from areas of faculty specialization.

8. The World's Regions (3) I. The Staff (Chairperson in charge). The major geographic regions of the world: their origins, physical environments, cultures and economies; their interactions and global roles. Designed for non-majors.

9. Cultural Geography of Black America (4) I. Lecture—4 hours. Historical and contemporary geographical problems from various parts of the world. Emphasis on interaction between cultural physical environment. Regions selected from areas of faculty specialization.

50. Geography and Environmental and Regional Planning (3) I. Dingemans. Lecture—4 hours. Principles of spatial planning for regional planning. Policies for environmental, economic, and social conditions. Illustrated case studies include U.S. city planning. JISB industrial and population shifts, European regional plans, Chinese agricultural and environmental programs.

86. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

99. Independent Study (1-5) I, II, III. The Staff (Chairperson in charge). (P/NP grading only.)

Upper Division Courses

102. Field Course in Physical Geography (4) II, IV. Lecture and field trip—one day per week. Prerequisite: courses 1 and 2 and consent of instructor. Research methodology and field study. Systematic mapping and analysis of elements of the physical landscape.

103. Field Course in Human Geography (4) III. Lecture and field trip—one day per week. Prerequisite: courses 1 and 2 and consent of instructor. Research methodology and field study. Systematic mapping and analysis of elements of the cultural landscape.

104. Field Course in Urban Geography (4) II. Dingemans. Lecture—1 hour; full day; full field trip. Field analysis of selected urban problems in California. Special attention given to regional interactions, functional structure, and land use changes specific to specific areas related to the social characteristics of the city, housing, residential and commercial patterns, and the effects of urban development on agriculture and land use.
generalization of base-map data, symbolization and pro-
reproduction of map data, cartographic design and lettering techniques, map reproduction.

106. Interpretation of Aerial Photographs (4). II. Bahre
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or consent of instructor. Basic stereographi-
amy, analysis of landscape from conventional aerial Photographs, and remote sensing.

107. Advanced Cartography (4). III. Bahre
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 105. Advanced cartographic representation of statistical and field data. New and innovative techniques in mapping systems.

108. Analysis of Landforms (4). III. Helgren
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to landforms and geomorphic processes. Topics include structural land-
forms, rock weathering and soil genesis, hillside processes, and fluvial, glacial and coastal landscapes.

110. Quantitative Spatial Analysis (4). II. Dingemans
Lecture—3 hours; term paper. Prerequisite: courses 1, 102, 5 and Statistics 131 or 102 recommended. Methods for geo-
graphic research and location planning; quantitative sum-
maries and analysis of spatial data patterns and trends; opti-
nal location solutions; includes correlation, regression, and use of pre-packaged computer programs.

111. Rivers and Alluvial Landscapes (4). III. Helgren
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 106, or consent of instructor. Examination of the morphologi-

cal, sedimentological, and genetic of alluvial landscapes. Analysis of alluvial deposits and processes, paleoecology and dating methods. Offered in odd-numbered years.

112. Coastal Landforms and Landscapes (4). II. Helgren
Lecture—3 hours; discussion—1 hour. Prerequisite: course 108. Examination of the landforms and geomorphic processes found at coasts. Analysis of coastal processes in a variety of tectonic, climatic, and wave climate settings. The role of coastal sediments in the history of coastal landscapes. Offered even-numbered years.

113. Mesoclimatology (4). III. Shelton
Lecture—3 hours; term paper. Prerequisite: course 3. Ex-
imination of problems and moisture exchanges at the earth atmosphere interface: physical controls, spatial and temper-
tional variations, measuring and modeling the exchange processes, classification of mesoclimates. Climate and rel-
ated processes in areal systems. Man's alteration of mesoclimates.

175. Quaternary Environments (5). I. Helgren
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, or Biological Sciences 1 or consent of instructor. Introduction to character, timing and magnitude of environmental changes during the Quaternary; interspersion and Holocene. Analysis of methods of palo-environment identification. Survey of Quaternary record for selected regions.

118. Arid Lands (4). I. Jett
Lecture—3 hours; term paper. Prerequisite: course 1 or consent of instructor. Physical characteristics and human utilization of rain-deficient regions. 121. North America (4). I. Gregor
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Natural and eco-

nomic regions of the United States and Canada.

122A. Middle America (4). I. Bahre
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Environment, cult-

ure, and economy from Mexico to Panama and in the Caribbean.

123B. South America (4). I. Bahre
Lecture—3 hours; term paper. Prerequisite: courses 1 and 2 or consent of instructor. Environment, culture, and econ-

omy in the South American countries.

123A. Western Europe (3). I. Thompson
Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Geographic:

conconditions and their relation to the economic, social and political problems of the countries of Western Europe.

123B. Eastern Europe (4). II. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Geographic conditions and their relation to the economic, social and political problems of the countries of Eastern Europe.

124. The Soviet Union (4). II. Dingemans
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Physical land-

scapes and cultural regions of U.S.S.R.
Geology

(College of Letters and Science)

Jere H. Lips, Ph.D., Chairperson of the Department
Department Office, 175 Physics-Geology Building

Faculty
Richard Cowen, Ph.D., Professor
Howard W. Day, Ph.D., Assistant Professor
Cordell Duren, Ph.D., Professor Emeritus
Ruby W. Green II, Ph.D., Professor
Anthony Halim, Ph.D., Visiting Professor
Charles G. Higgins, Ph.D., Professor
Bruce Hobbs, Ph.D., Visiting Professor
Jere H. Lips, Ph.D., Professor
Ian D. MacGregor, Ph.D., Professor
Robert A. Matthews, A.B., Lecturer
Eldridge M. Moore, Ph.D., Professor
Jeffrey F. Mount, Ph.D., Assistant Professor
Dennis P. Ojakangas, Ph.D., Lecturer
Bruce E. Taylor, Ph.D., Assistant Professor
Kenneth W. Troxel, M.A., Lecturer
Robert J. Weiss, Ph.D., Associate Professor
Kenneth L. Verosub, Ph.D., Associate Professor
Peter D. Ward, Ph.D., Assistant Professor

The Major Programs

Students interested in becoming professional geologists and continuing their geological studies at the graduate level should elect the program leading to the Bachelor of Science degree. Students desiring a less intensive program in geology as part of their general education or as preparation for nonprofessional careers in geology may elect the program leading to the Bachelor of Arts degree. High school students should note that the preparation for either degree is simplified if their high school programs include chemistry and four years of mathematics. In either program additional courses may be selected for emphasis in physical or environmental geology.

Geology

A.B. Major Requirements:

Preparatory Subject Matter: 36-40

Zoology 2 or Zoology 3-40

Chemistry 1A-1B or AA-1AB

Geology 50, 50L, 50L1

Mathematics M3, M4, M4A, M4B

Physics 2A, 2A1, 2B, 2B1

Geology 101, 115, 117B, 120, 120L, 120L1

Geology 115, 117A, 117B, 120, 130, 170

One course chosen from: Civil Engineering 10, 111A, 111B

Civil Engineering 151, Chemistry 126, 127, 130A

Chemistry 113, 114, 115

Geosciences 223

Chemistry 101A

Environmental Geoscience 2-24

Environmental Geoscience 163, 170

Note: Chemistry majors must substitute one of the elective courses for Chemistry 110C.

Depth Subject Matter: 36


Additional upper division units in geology and related fields approved by the major advisor: 7

Total Units for the Major: 76-78

Recommended: Chemistry 1C or 4C, Geology 2, 2L, 3L, 3L


Geology

B.S. Major Requirements:

Preparatory Subject Matter: 56

Zoology 2 or Zoology 3-40

Chemistry 1A-1B or AA-1AB or 1A1B

Geology 50, 50L, 50L1

Mathematics 21A, 21B, 21C

One course from: Mathematics 122, 222, 223

Physics 1A-1B, 2A-2B and 3A-3B

Depth Subject Matter: 40


Geology 190 (repeat course at least once) 2

Total Units for the Major: 105

Recommended: Geology 2L, 3L, 3L


Major Advisers: C. G. Higgins (A.B. and B.S. degrees); and R. A. Matthews, K. L. Verosub (B.S. degrees).

Minor Program Requirements:

Letters and Science students in other disciplines may elect to complete a minor in one of the geological subjects listed below. Such minors may be posted on transcripts to show competence in the ancillary field chosen.

Geology (General): 23

Geology 50, 50L, 105, 105L, 106, 106L, 107, 107L, 108 or 150

Minor Advisers: C. G. Higgins, K. L. Verosub

Geology

Economic Geology: 21-23

Geology 115, 117A, 117B, 120, 130, 170

One course chosen from: Economics 123, Engineering 160, Geology 152, 190, 191

Minor Adviser: B. E. Taylor.

Engineering Geology: 21

Civil Engineering 171, 172

Geology 117A, 117B, 134, 175

One course chosen from: Physics 11B, Water Science 118

Minor Adviser: R. A. Matthews.

Environmental Geoscience: 23-24

Geology 130, 134, 152, 175

Soil Science 118

Water Science 141

One course chosen from: Environmental Studies 160, 171, 179

Minor Adviser: R. A. Matthews.

Geography

Soil Science 120, 120L

At least one course chosen from: Civil Engineering 171, Geology 111, 112, 117, Soil Science 121

Minor Adviser: C. G. Higgins.

Geophysics

Geology 117A, 117B

At least one course chosen from: Geology 106, 134, 152, 153

At least one course chosen from the following: 9-12

At least one course chosen from: Geology 106, 134, 152, 153


Paleontology

Geology 116, 117A, 117B, 150A, 150B, 150C

One course chosen from: Environmental Studies 100, 151, Geology 111A, 111B, S119, Water Science 180

Minor Adviser: P. D. Ward.

Botany

Geology 107, 107L, 111A, 111B

At least one course chosen from: Botany 142, 143, Genetics 103, Geology 136, 150C, S119, Zoology 112A, 112B, 125, 147, 148, 149

Minor Adviser: P. S. D. Ward.

Theological Subject Representative: C. G. Higgins. See page 105 for the Theological Education Program.

Graduate Study. The Department of Geology offers a program of study and research leading to the M.S. and Ph.D. degrees. For information regarding graduate study in geology, address the Graduate Adviser, Department of Geology.

Graduate Advisers: H. W. Green, I. D. MacGregor.

Courses in Geology

Lower Division Courses

1. Evolution of Earth (3) I. Cowen. III, Ward

Lecture—3 hours. Intended for those not majoring in geology or associated sciences. Origin and physical development of the Earth through geologic time and the processes and materials that formed it.

1L. Evolution of the Earth Laboratory (1) I. Cowen, III, Ward

Laboratory—3 hours. Prerequisite: course 1 (concurrently). Intended for those not majoring in geology or associated sciences. The materials (rocks and minerals), structures (faults and folds), and processes (sea floor spreading and continental drift) that formed the Earth, illustrated by laboratory and field exercises.

2. Landforms (3) I. Higgins

Lecture—3 hours. Prerequisite: course 1 recommended. Landforms and landscapes—the sculpture of the Earth's surface by natural processes.

2L. Landforms Laboratory (1) I. Higgins

Laboratory—3 hours. Prerequisite: courses 1L and 2 (preferably taken concurrently). How to study and interpret landforms geologically; an introduction to some of the geomorphologist's tools—maps, models, aerial photographs, and the landscape around us.

3. History of Life (3) I. Cowen

Lecture—3 hours. Prerequisite: course 1 recommended. The history of life during the three billion years from its origin to the present day. Origin of life and processes of evolution; how to visualize and understand living organisms from their fossil remains.
107L Principles of Paleobiology Laboratory (2) III. Cowen, Lipsky Laboratory—6 hours (including two all-day field trips). Prerequisite: Zoology 2; course 107 (concurrently). Exercises in determination of ecological functions and evolution of individuals, populations, and communities of fossil organisms in field and laboratory.

108L Regional Structure and Stratigraphy (3) III. Moores Lecture—1 hour; laboratory—2 hours; one two-day field trip. Prerequisite: course 108 (previously taken concurrently). Illustration of topics covered in course 108. Emphasis on the interpretation of geologic history using geologic maps selected from a variety of structural and stratigraphic provinces.

11A. Paleobiology of Invertebrates (4) I. Ward Lecture—4 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematics, evolution, and ecology of the major phyla of invertebrates.

11B. Paleobiology of Plants (4) II. Lipsky Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Introduction to the classification and recognition of minerals and rocks, and on reading topographic and geologic maps.

16. Geology of California (3) II. Matthews Lecture—3 hours. Emphasis on the geologic history of California, the origin of rocks and the environments in which they were formed, the structure of the rocks and the interpretation of structural history, mineral resources, and appreciation of the California landscape.

50. Physical Geology (3) III. Moores Lecture—3 hours. Prerequisite: high school physics and chemistry. A rigorous introduction to physical geology for majors in geology and associated sciences. History of the earth and solar system; geologic time; Earth’s interior; plate tectonics; rock deformations; rocks and minerals; weathering, erosion, and sedimentation; volcanism, plutonism, and metamorphism.

50L. Physical Geology Laboratory (2) III. Moores Laboratory—6 hours: one or two one-day field trips. Prerequisite: course 50. Laboratory work to illustrate topics in course 50. Emphasis on interpolation to classification and recognition of minerals and rocks, and on reading topographic and geologic maps.

60. General Mineralogy (3) III. Day Lecture—3 hours. Prerequisite: high school chemistry. Crystallography: physical and chemical structure and properties of minerals; mineral genesis.

60L. General Mineralogy Laboratory (2) III. Day Laboratory—6 hours: two one-day field trips. Prerequisites: course 50 (previously taken concurrently). Morphological characteristics; stereographic projection; identification of the common rock-forming minerals.

99. Special Study for Undergraduates (1–5) I, II, III. The Staff Prerequisite: consent of instructor; lower division standing. (P/NP grading only)

Upper Division Courses

102. Field Geology (5) III. Trail, Matthews Lecture—1 hour; field work—8 full days; final report. Prerequisite: courses 105L, 106L, 123, 124 (may be taken concurrently). Introduction to field geology: field techniques, tools, methods, geologic mapping, and preparation of reports.

105. Structural Geology (3) III. Green Lecture—3 hours. Prerequisites: courses 50, 50L, Physics 2A, 5A, 21A, 21B, 218 recommended. Description and origin of deformed features of the earth’s crust. Brittle deformation, stress, faults and fractures, ductile deformation, strain, folds and foliations. Experimental rock deformation.

105L. Structural Geology Laboratory (2) I. Green Lecture—1 hour; laboratory—3 hours; two or three one-day field trips and reports. Prerequisite: course 105 (concurrently), high school trigonometry and geometry. Graphical solutions to structural problems, introduction to field methods and field mapping, interpretation of geologic maps.

106. Ancient Environments (3) III. Mount, Ward Lecture—3 hours. Prerequisite: course 50, background in sedimentology, or consent of instructor. Study of modern and ancient environments, processes and geographic records of mountains, plains, coasts, shallow seas, and deep oceans. Ecology and the fossil record as a key to past environments; introduction to stratigraphic principles and methods.

108L Ancient Environments Laboratory (2) II. Mount, Ward Laboratory—6 hours: two or three one-day field trips. Prerequisites: course 50 (previously taken concurrently). Introduction to stratigraphic procedures, identification of environmentally diagnostic rocks and fossils, problems of marine geologic maps, recognition of ancient environments in the field.

107. Principles of Paleobiology (3) III. Cowen, Lipsky Lecture—3 hours. Prerequisite: Zoology 2. The evolution and ecological history of the biota from the origin of life to the present, with special emphasis on the oceanic environment during the last 600 million years.

107L Principles of Paleobiology Laboratory (2) III. Cowen, Lipsky Laboratory—6 hours (including two all-day field trips). Prerequisite: Zoology 2; course 107 (concurrently). Exercises in determination of ecological functions and evolution of individuals, populations, and communities of fossil organisms in field and laboratory.

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50L. Physical Geology Laboratory (2) III. Moores Lecture—6 hours: one or two one-day field trips. Prerequisite: course 50. Laboratory work to illustrate topics in course 50. Emphasis on interpolation to classification and recognition of minerals and rocks, and on reading topographic and geologic maps.

60. General Mineralogy (3) III. Day Lecture—3 hours. Prerequisite: high school chemistry. Crystallography: physical and chemical structure and properties of minerals; mineral genesis.

60L. General Mineralogy Laboratory (2) III. Day Laboratory—6 hours: two one-day field trips. Prerequisites: course 50 (previously taken concurrently). Morphological characteristics; stereographic projection; identification of the common rock-forming minerals.

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107L Principles of Paleobiology Laboratory (2) III. Cowen, Lipsky Laboratory—6 hours (including two all-day field trips). Prerequisite: Zoology 2; course 107 (concurrently). Exercises in determination of ecological functions and evolution of individuals, populations, and communities of fossil organisms in field and laboratory.

108L Regional Structure and Stratigraphy (3) III. Moores Lecture—1 hour; laboratory—2 hours; one two-day field trip. Prerequisite: course 108 (previously taken concurrently). Illustration of topics covered in course 108. Emphasis on the interpretation of geologic history using geologic maps selected from a variety of structural and stratigraphic provinces.

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11B. Paleobiology of Plants (4) II. Lipsky Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Introduction to the classification and recognition of minerals and rocks, and on reading topographic and geologic maps.

16. Geology of California (3) II. Matthews Lecture—3 hours. Emphasis on the geologic history of California, the origin of rocks and the environments in which they were formed, the structure of the rocks and the interpretation of structural history, mineral resources, and appreciation of the California landscape.

50. Physical Geology (3) III. Moores Lecture—3 hours. Prerequisite: high school physics and chemistry. A rigorous introduction to physical geology for majors in geology and associated sciences. History of the earth and solar system; geologic time; Earth’s interior; plate tectonics; rock deformations; rocks and minerals; weathering, erosion and sedimentation; volcanism, plutonism, and metamorphism.

50L. Physical Geology Laboratory (2) III. Moores Lecture—6 hours: one or two one-day field trips. Prerequisite: course 50. Laboratory work to illustrate topics in course 50. Emphasis on interpolation to classification and recognition of minerals and rocks, and on reading topographic and geologic maps.

60. General Mineralogy (3) III. Day Lecture—3 hours. Prerequisite: high school chemistry. Crystallography: physical and chemical structure and properties of minerals; mineral genesis.

60L. General Mineralogy Laboratory (2) III. Day Laboratory—6 hours: two one-day field trips. Prerequisites: course 50 (previously taken concurrently). Morphological characteristics; stereographic projection; identification of the common rock-forming minerals.

99. Special Study for Undergraduates (1–5) I, II, III. The Staff Prerequisite: consent of instructor; lower division standing. (P/NP grading only)
216. **Tectonics** (3) II. Moores  
Seminar—3 hours. Prerequisite: course 108 or consent of instructor. Nature and distribution of tectonic features of the Earth. Causes, consequences, and evolution of plate motion, with selected examples from the Earth’s deformed belts.

217. **Topics in Geophysics** (3) III. Verosub  
Lecture—1 hour; seminar—2 hours. Prerequisite: consent of instructor. Discussion and evaluation of current research in a given area of geophysics. Topic will change from year to year. May be repeated for credit.

218A. **Structural Analysis I: Macrophysics** (3) II. Weiss  
Seminar—3 hours. Prerequisite: consent of instructor. Geometric and kinematic analysis and interpretation of mesoscopic and macroscopic geologic structures and fabrics: geometry of folding, superposed faulting, and folded inclusions; strain symmetry and kinematics in the interpretation of fabrics: determination of slip lines of deformation; regional structural synthesis. Offered in odd-numbered years.

218B. **Structural Analysis II: Micro fabrics** (3) III. Green  
Seminar—3 hours. Prerequisite: course 218A recommended. Microscopic structural analysis of deformed metamorphic rocks, emphasizing deformation features and the origin and significance of preferred crystallographic orientation. Offered in odd-numbered years.

220. **Mechanics of Geologic Structures** (3) II. Twiss  
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 162, or consent of instructor, and 105. Application of principles of continuum mechanics to understanding development of geologic structures such as folds, thrusts, faulting, cleavage, and boudinage. Offered in even-numbered years.

226. **Advanced Sedimentation and Sedimentary Petrology** (4) I. Mount  
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 126 or consent of instructor. Topical study of major sedimentary rock types; selected studies of stable platform areas and of regions of crustal instability with respect to depositional environments, depositional processes, and provenance. Laboratory study of selected rock types.

230. **Geologic Report Writing** (2) II. Twiss  
Lecture—2 hours. Prerequisite: graduate standing in Geology and consent of instructor. Organization, style, format and content of reports for geologic journals. Conversion of theses to geologic reports. Writing informative abstracts. Participants make analyses of published reports, write the synopses of published reports and write articles.

236. **Physical Geography of California** (2) II, III. Durrell  
Seminar—2 hours.

250. **Advanced Geochemistry Seminar** (3) III. Taylor  
Seminar—3 hours. Prerequisite: course 115 or consent of instructor. Critical review of selected topics in geochemistry including: ore genesis, hydrothermal and geothermal fluids, recent and ancient sediments, isotopic geology, and chemistry of the ocean.}
German

German speaking world. The program is designed in such a way as to accommodate students whose interest lies either in the pursuit of literary or linguistic studies. Accordingly the department offers a major program with emphasis on the literary movements from the beginnings to the present time as well as a program which focuses on the acquisition of language skills (reading, writing, speaking, understanding) within the framework of theoretical and historical courses in German linguistics. Both programs open possibilities for advanced study at the graduate level as well as career opportunities in fields such as international relations, business, the sciences and the arts.

A.B. Major Requirements:

Preparatory Subject Matter (for both German Language and Literature) 4-22
German 1-2 or 1AT-2AT (or the equivalent) 0-16
German A-4-62 4
Recommended: Linguistics 1.

Depth Subject Matter 40

German Literature Emphasis

German 101, 121A, 121B, 121C 16
German 102, 103 (must be taken in residence) 6
Additional upper division units in literature 16
include one course in comparative literature, another national literature, or in translation.

German Language Emphasis

German 101, 102, 104A, 104B 8
German 105 or 106 4
German 107 or 108 4
German 120, 121C 4
Additional upper division units chosen in consultation with the advisor 8

Total Units for the Major (both emphases) 40-62

Minor Program Requirements:
The Department offers a German Language minor and a German Literature minor. In addition, individualized minor programs may be designed upon consultation with the undergraduate advisor.

The minor program can be of particular importance to students who wish to round out their training in other fields through a foreign language or literature degree.

German Language 18-24
Choose courses numbered from German 110-119 10 18-24
German Literature 18-24
Choose courses numbered from German 110 and above 18-24
Or choose upper division course from German 50 to 52 may be counted.

Undergraduate Adviser. W. A. Banwarth.

Honors and Honors Program. The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination. See also page 10.

Teaching Credential Subject Representative. W.M. Estabrook. See page 105 for the Teacher Education Program.

The Master of Arts Degree. The Department offers programs of study leading to the M.A. degree. A minimum of 36 units is required. Further information may be obtained by writing to the Graduate Adviser.

The Degree of Doctor of Philosophy. The Department offers programs of study and research leading to the Ph.D. degree. Detailed information may be obtained by writing to the Graduate Adviser.

Graduate Adviser. K. R. Menges.

Courses in German

Lower Division Courses

Course Placement. Students with two years of high school German normally continue in German 2, those with three years, German 3, those with four years, German 4 or 6A-6B.

1. Elementary German (6) I, II, III. Estabrook Discussion—5 hours; laboratory—two 55/2-hour sessions per week. Course 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed. 1ATA-1ATB-1ATC. Individualized German (2-2.2) I-II-III. McConnell

The three segments of course 1AT correspond to course 1. Student-instructor contact consisting of individual tutoring and testing students may start at any point and complete one or more two-unit segments in a given quarter.

2. Elementary German (6) I, II, III. Estabrook Discussion—5 hours; laboratory—two 55/2-hour sessions. Prerequisite: course 1.

1ATA-2ATB-2ATC. Individualized German (2-2.2) I-II-III. McConnell

The three segments of course 2AT correspond to course 2. Student-instructor contact consisting of individual tutoring and testing students may start at any point and complete one or more two-unit segments in a given quarter.

3. Intermediate German (6) I, II, III. Estabrook Discussion—5 hours; laboratory—two 55/2-hour sessions. Prerequisite: course 2. General discussions of events and life in Germany and present and past. Reading of modern short stories with idiomatic reviews of grammar.

4. Intermediate German (4) I, II, III. The Staff Lecture—3 hours; translation project—1 hour. Intensive course for non-majors to provide reading proficiency with texts containing basic sentence patterns and standard general vocabulary. Completion of three-course sequence, 10 and one segment each of 11H, 11N, or 12H, 12N, or 12S, satisfies the Language and Science Core foreign language requirement. Students who have successfully completed the second or more advanced year of high school level course work in the 10th or higher grade may receive unit credit for this course on a P/NP grading basis only.

11H, 11N, 11S. Reading German (4) I. II. Hoemann Lecture—1 hour; discussion—2 hours; translation project—1 hour. Prerequisite: successful completion of course 10 or the equivalent. Continuation of course 10, with specialized focus for upper division and graduate students in arts and humanities (11H), natural sciences (11N), or social sciences (11S). Lecture and translation projects will be appropriately representative. (P/NP grading only.)

12H, 12N, 12S. Advanced Reading German (4) III. Hoemann Lecture—1 hour; discussion—2 hours; translation projects—1 hour. Prerequisite: successful completion of course 11H, 11N, or 11S. Continuation of course 11H, 11N, or 11S with specialized focus on more advanced texts. Outside reading and translation projects in students' fields of specialization constitute the central element of the course. (P/NP grading only.)

46. Freshman Seminar (2) II. Hoemann Discussion—2 hours. Knowledge of German not required. Inquiry into the intellectual roots of problems confronting today's student, particularly those highlighted by such modern German literary figures as Nietzsche, Kafka, Hesse, Brecht, and Günter Grass. Enrollment limited. (P/NP grading only.)

50. Survey of German Culture in English Translation (2) II. Fetzer Lecture—2 hours. Knowledge of German not required. Characteristic themes in the mainstream of German culture, from medieval intellectual and artistic achievements to the modern period. Study of major trends in Arts and Literature.

51. Masterworks of German Literature in English Translation (2) II. Hoemann Discussion—2 hours. Knowledge of German not required. Representative masterworks in English translation, beginning with such heroic epics as the Nibelungenlied and courtly romances such as Parzival and Tristan and Isolde, through the baroque period, Enlightenment, Storm and Stress, Weimar classicism, and ending with literary fairytales of Romanticism (1830).

52. Masterworks of German Literature in English Translation (2) II. III. Hoemann Discussion—2 hours. Knowledge of German not required. Representative masterworks in English translation, beginning with the psychological realism of Büchner's Wayward Sons, weaving through Naturalism and its manifestations in works by Mann, Kafka, Rilke and Brecht, and terminating with existentialist and absurdist perspectives on Germany (1950). 

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100A. Advanced German Conversation (2) I. The Staff (Chairperson in charge) Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

100B. Advanced German Conversation (2) II. The Staff (Chairperson in charge) Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

100C. Advanced German Conversation (2) II. The Staff (Chairperson in charge) Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

101. Composition and Conversation (4) I, II, III. The Staff Discussion—3 hours; written reports. Prerequisite: course 101 or consent of instructor. Practice in short essay writing. Discussion based on readings from a variety of German texts.

102. Composition and Conversation (4) I, II, III. The Staff Discussion—3 hours; written reports. Prerequisite: course 102 or consent of instructor. Advanced essay writing and discussion of selected texts.

104A. Translation and Composition (4) I, II, III. The Staff (Chairperson in charge) Discussion—3 hours; written reports. Prerequisite: course 103 or the equivalent. Exercises in German/English translation using literary and non-literary texts of different styles and linguistic difficulties. Exercises in German composition.

104B. Advanced Translation and Composition (4) I. The Staff (Chairperson in charge) Discussion—3 hours; written reports. Prerequisite: course 104A or the equivalent. Exercises in English/German translation of literary and non-literary texts. Essay-writing and development of written mastery of the language.

105. German Phonology-Morphology (4) III. Berwin Discussion—3 hours; written or oral report. Prerequisite:
course 4: Linguistics 1 recommended. Modern German phonetics and the structure of the phonological system. Elementary morphological analysis. Offered in odd-numbered years.

106. History of the German Language (4) III. Bernw Seminar—3 hours. Development of the German language with special emphasis on the early periods, from Indo-European to Middle High German. (Same course as Linguistics 205.)

206A-206B. 206C. Morphology and Syntax of Modern German (1-1) II-I-I. Bernw Seminar—3 hours. Examination of morphological processes and syntactic rules in the standard language. Emphasis on methods of analysis. [Deferred grading only; pending completion of sentence.]

210. Techniques of Literary Scholarship (4) I. Mercap Seminar—3 hours. The bibliographical, organizational, and methodological tools and resources for advanced, independent research.

240. Forms of German Verse (4) I. Sannem-Frankenberg Seminar—3 hours. The development of German forms from the Middle Ages to Gottfried Benn, with special emphasis on different techniques of poetic analysis and interpretation. [May be repeated for credit with consent of instructor.]

241. The German Drama (4) I. Menges Seminar—3 hours. The major forms of German drama from the late eighteenth century to the twentieth.

242. The German "Novelle" (4) II. Bernd Seminar—3 hours. The major German Novellauten, with particular emphasis on the formative period of the novel in the nine teenth century. May be repeated for credit with consent of instructor.

249. Medieval Epic Literature (4) I. McColl Seminar—3 hours. A critical study of selected epic poetry of the "Staufferzeit," such as Parzival, Tristan und Isolde, and the Niebelungenlied. All texts read in Middle High German.

250. Medieval Lyric Literature (4) III. McColl Seminar—3 hours. A critical study of selected lyric poetry of the "Staufferzeit," such as Parzival, Tristan und Isolde, and the Niebelungenlied. All texts read in Middle High German.

251. Seminar in a Major Author (4) III. Bernd Seminar—3 hours. Reading of a major author's work will concern the work of a major German author. May be repeated for credit with consent of instructor.

262. The Writing of a Thesis (1-3) I. Sannem-Frankenberg Seminar—3 hours. Writing a thesis in German; special attention will be given to the peculiar hermeneutic problems in modern German, French, and English American literature.

265. The Novels of Thomas Mann (4) II. Menges Seminar—3 hours. Reading of selected novels with emphasis on aesthetic techniques, originality, ethical and social views, and influence on the contemporary literary scene in Germany.

266. Studies in Kafka (4) I. Hoermann Seminar—3 hours. A study of Kafka's creative techniques with special emphasis on the ideas which impelled the development of new literary forms and concepts.

278. Survey of Eighteenth-Century German Literature (4) I. Bernw Seminar—3 hours. Readings of major works with special emphasis on the relationship of the works to their social context. [Deferred grading only; pending completion of sentence.]

NOTE: For key to footnote symbols, see page 130.
History

281. Survey of Nineteenth-Century German Literature (4) II. Sammern-Frankenberg Seminar—3 hours; written reports—1 hour. A survey of the main trends and topical elements in nineteenth-century German literature from 1815 until the rise of naturalism with special emphasis on a developing concept of realism and its reflection in representative works by authors from Germany, Austria, and Switzerland.

282. Survey of Twentieth-Century German Literature (4) III. McLennan Seminar—3 hours; written reports—1 hour. A survey of the main trends and principal works or topical elements of twentieth-century German literature from Naturalism (Hauptmann), through Symbolism (Rilke, Hofmannsthal), to Neue Sachlichkeit to literary developments after 1945 in East Germany, Switzerland, Austria, and West Germany.

285. Middle High German Literature (4) III. McConnell Seminar—3 hours. Prerequisite: course 202 or consent of instructor. An extensive reading of Middle High German texts in the original language. Examines linguistic and literary problems.

288. The Renaissance and Reformation in German Literature (4) I. Schaeffer Seminar—3 hours. The parodic and didactic style in Germany's literature during the sixteenth century. May be repeated for credit with consent of instructor.

289. German Literature of the Baroque (4) III. Schaeffer Seminar—3 hours. The "Elegianderail" and the varying methods used to portray in seventeenth-century German literature. May be repeated for credit with consent of instructor.

290. The Enlightenment in German Literature (4) II. Neres Seminar—3 hours. The revolt against the excesses of the "Elegianderail," and the evolution of a new literatur based on reason and wit. May be repeated for credit with consent of instructor.

292. Sentimentality and "Sturm und Drang" in German Literature (4) II. Neres Seminar—3 hours. The overemphasis on Reason: the theories of Hamann and Herder and the words of poets such as Lenz, Leise, and Goethe and Schiller. May be repeated for credit with consent of instructor.

293. The Classical Age of German Literature (4) I. Neres Seminar—3 hours. Inquiry into the aesthetic and humanistic qualities of Germany's greatest literary epoch. May be repeated for credit with consent of instructor.

294. The Romantic Period in German Literature (4) I. Fezer Seminar—3 hours. Survey of the works of early nineteenth-century authors in reaction against the age of classicism. May be repeated for credit with consent of instructor.

295. Poetic Realism in German Literature (4) I. Bernd Seminar—3 hours. Outstanding figures in German literature between 1840 and 1869: important phases in their development will be treated. May be repeated for credit with consent of instructor.

296. Twentieth-Century German Literature (4) II. Menges Seminar—3 hours. Considers the revolt of the Hauptmann generation against Expressionism, the chief currents of the contemporary scene. May be repeated for credit with consent of instructor.

297. Special Topics in German Literature (4) I. Schaeffer Seminar—3 hours. Written report. The course will be concerned with special topics in German Literature, which may cut across the more usual period and genre rubrics. May be repeated for credit. Actual content will vary from year to year.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only).

299D. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) Discussion; directed reading. (SU grading only).

Professional Courses

309A. The Teaching of German (I) I. Estabrook Lecture—1 hour. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Intended primarily for graduate teaching assistants. (SU grading only)

309B. The Teaching of German (II) I. Estabrook Lecture—1 hour. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Intended primarily for graduate teaching assistants. (SU grading only)

309C. Practical Phonetics of German (II) II. Berware Discussion—1 hour. An introduction to the sounds and sound patterns of modern German with laboratory exercises. (SU grading only)

400. Tutorial and Instructional Internship (3) I, II, III. The Staff (Chairperson in charge)

400B. Tutorial and Instructional Internship (3) I, II, III. The Staff (Chairperson in charge)

Greek

See Classics

Hebrew

See Religious Studies

History

(College of Letters and Science)

Rolfie E. Poppino, Ph.D., Chairperson of the Department
Department Office, 176 Voorhies Hall (762-0776)

Faculty

Luis L. Arroyo, Ph.D., Assistant Professor
Arnold J. Bauer, Ph.D., Professor
William M. Bowsky, Ph.D., Professor
Cynthia L. Bradley, Ph.D., Associate Professor
David Brody, Ph.D., Professor
Daniel R. Brower, Jr., Ph.D., Professor
Daniel E. Cahoun, Ph.D., Professor
Robert O. Crammey, Ph.D., Professor
Manfred P. Fleischer, Ph.D., Professor
Paul Goodman, Ph.D., Professor
William W. Hague, Ph.D., Associate Professor
William T. Jackson, Ph.D., Professor
David L. Jacobson, Ph.D., Professor
Earl H. Kimmo, Ph.D., Assistant Professor
Norma B. Landau, Ph.D., Assistant Professor
Kwang-Ching Liu, Ph.D., Assistant Professor
Jung-Pang Lo, Ph.D., Professor Emeritus
Eugene Lunn, Ph.D., Associate Professor
C. Roland Marchand, Ph.D., Professor
Ted W. Margandant, Ph.D., Associate Professor
Robert G. Moeller, M.A., Visiting Lecturer
Rolfie E. Poppino, Ph.D., Professor
Don C. Price, Ph.D., Associate Professor
Ruth E. Rosen, Ph.D., Assistant Professor
Richard N. Schwab, Ph.D., Professor
Morgan B. Sherwood, Ph.D., Professor
James H. Schuler, Ph.D., Professor
Wilson Smith, Ph.D., Professor
Stylianos Spyrakos, Ph.D., Professor
Donald C. Swan, Ph.D., Professor
Joe W. Trotter, Jr., M.A., Acting Assistant Professor
F. Roy Willis, Ph.D., Professor
Walter L. Woodfill, Ph.D., Professor Emeritus

The Major Program

This major is designed to develop critical intelligence and to foster an understanding of ourselves and our world through the study of the past—both remote and recent. The Department offers a variety of approaches to history, each emphasizing basic disciplinary skills: weighing evidence, analyzing historical problems, and presenting conclusions with clarity and logic. The Department thus can give basic support to the education of all undergraduates, whatever their major.

History is also a practical major if one is considering a professional career such as teaching, law, journalism, public administration, or business management. Professional schools in these and related fields are looking for students who can weigh conflicting evidence, evaluate alternative courses of action or divergent points of view, and express conclusions logically in everyday language. These analytical skills are stressed in many history classes, and their mastery gives the history student a solid preparation for subsequent training in a specialized career.

A student electing a major in History may complete Plan I, Plan II, or Plan III. Plan I enables students to concentrate chiefly on the history of one geographic area or time period of their choosing. The purpose of Plan II is to encourage interested students, including those preparing for graduate work in history, to enroll in a seminar, to undertake independent work, and to study the history of part of the major. Students preferring more active engagement in research and writing are encouraged to follow Plan III. The purpose of Plan III is to enable students to study in depth the field of nineteenth-century history, whose common problems of political conflict, social development, and cultural creativity cut across the several geographical fields of concentration which the department now offers.

History

A.B. Major Requirements:

Preparatory Subject Matter (Plans I, II, and III)

Five lower division courses, including at least two from each of two of the following fields:

- Western Civilization: History 44, 46, 4C, 1, 2, 3, 10, 30
- Asian Civilization: History 8A, 8B

Depth Subject Matter—Plan I

At least five upper division courses from one of the fields of concentration* listed below include a two-quarter sequence of courses

- At least three upper division courses from one of the other fields listed

- At least one course from the following: History 101, 102 (in field of concentration), or 103 (in field of concentration)

Total Units for the Major, Plan I

60-61

Depth Subject Matter—Plan II

At least four upper division courses from one of the fields of concentration listed below include a two-quarter sequence of courses

- At least three upper division courses from one of the other fields listed

- History 101

- History 102 in field of concentration

- History 103 in field of concentration

Total Units for the Major, Plan II

62
### History

| UNITS | History | Lower Division Courses | Examples of minor with thematic emphasis | A. Pre-Law (British and American Political and Constitutional Development) — twenty units chosen from History 151A, 151B, 151C, 176A, 176B, 176C, 190A, (102) or (102), (with approval of advisor) | a. The Twentieth Century — twenty units selected from History 146A, 146B, 174A, 174B (at least 8 of the units to be 102D, 102F, 102G, 102J, 102K, 102N, or 102O, 116, 137C, 141, 143C, 144A, 144C, 147B, 147D, 147E, 157A, 157B, 157C, 166B, 166C, 172, 174C, 175C, 175B, 176C, 177, 179, 180, 181A, 189B, 194D, 194K, 194L, 194M, 194N, 194O, 194P) | b. The History of Ideas in Society — twenty units selected from History 101, 102A-P (with approval of advisor), 130A, 130B, 130C, 133, 134A, 144B, 147A, 147A, 147C, 176A, 175B, 175C, 175E, 176B, 191A, 191B, 194B | Minor Advisers. Same as for major advisers. Honors and Honors Program. A student may become eligible for graduation with highest honors by meeting the minimum grade-point average required by the College of Letters and Science. By participating in seminars, taking courses with creativity, and writing imaginative or creative work in history. Such creative work may be demonstrated in various ways: in undergraduate seminars, in independent study, in special projects, or by distinguished work in Plan II of the major program. Departmental recommendation, based on clear evidence of distinction and originality, is a prerequisite for the awarding of highest honors. Teaching Credential Subject Representative. D.L. Jacobson, page 105 for the Teacher Education Program. Waiver Program for Single-Subject Teaching Credential in History. The Department of History offers a program of study for students seeking a secondary teaching credential in history. The program consists of 45 units of coursework, including courses 17A and 17B, two lower-division courses in Western Civilization (I, 3, 4A, 4B, 4C) of which one must be 3 or 4C, or upper-division seminar (course 101 or 102), and six additional courses, of which four must be at the upper division level. Successful completion of this program will allow the student to receive a waiver from examinations for the History Single-Subject Credential. Graduate Study. The Department of History offers programs of study and research leading to the M.A., M.A.T., and Ph.D. degrees in history. Detailed information may be obtained by writing to the Graduate Adviser, Department of History. Graduate Advisers. A.J. Bauer, D. Brody, K.C. Liu, E. Lunn, W. Smith, F.R. Willis. American History and Institutions. This University requirement can be satisfied by passing any one of the following courses in History 17A, 17B, 27A, 27B, 27A, 27B, 78A, 78B, 78A, 170A, 170B, 170A, 170B, 170C, 171A, 171C, 171C, 175A, 175B, 175C, 175D, 175B, 177, 179A, 190A, 193B, 193A, 183B. The upper division courses may be used only with the consent of the instructor. (See also page 61.)

#### Courses in History

##### Lower Division Courses

1. **The Bible and Ancient History** (L, I) Schwab Lecture—3 hours; discussion—1 hour. An examination of Judaeo-Christian tradition as it met ancient Near Eastern and classical ideas and institutions through New Testament times. Emphasis on the Bible as a historical document and on the historical-critical interpretation of the ancient literature.

2. **Ancient Civilizations** (L) Fleschinger Lecture—3 hours; discussion—1 hour. The growth of ancient civilizations from the Sumerians to the Fall of the Roman Empire.


4. **History of Western Civilization** (L) The Staff (Chairperson in charge) Lecture—3 hours; discussion—1 hour. The growth of western civilization from late antiquity to the Middle Ages.

5. **History of Western Civilization** (L) The Staff (Chairperson in charge) Lecture—3 hours; discussion—1 hour. Development of western civilization from the Renaissance to the Eighteenth Century.

6. **History of Western Civilization** (L) The Staff (Chairperson in charge) Lecture—3 hours; discussion—1 hour. Development of Western Civilization from the Eighteenth Century to the present.

7. **Latin American Civilization** (L) Bauer Lecture—3 hours; discussion—1 hour. An introduction to Latin America from the Mayas, Incas, and Aztecs to the present. The course presents a microcosmic picture of a single individual (ranging from an Aztec chief to a Peruvian) each week drawn from documentary and photographic evidence. Supplementary sessions explain the individual's social context and(structure).

8. **History of East Asian Civilization** (L) Liu Lecture—3 hours; discussion—1 hour. Surveys traditional Chinese civilization and its modern transformation. Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary Japan are provided.

9. **History of East Asian Civilization** (L) Kim Lecture—3 hours; discussion—1 hour. Surveys traditional Japanese civilization and its modern transformation. Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary Japan are provided.

10. **World Leaders: An Introduction to the Twentieth Century** (L) Brower Lecture—3 hours; discussion—1 hour. Twentieth-century history through biography (Wilson, Linn, Hitler, Roosevelt, Stalin, Mao, Nehru, Castro, and others).

11. **Introduction to African History** (L) I., II., III. Bratton Lecture—3 hours; term paper. An examination of the long-range historical context as background to current conditions in Africa. The survey includes a survey of African civilizations through the twentieth-century colonization by Europeans.

12. **History of the United States** (L) I., II., III. The Staff Lecture—3 hours; discussion—1 hour. The growth of the American people from colonial times through the Civil War.

13. **History of the United States** (L) I., II., III. The Staff Lecture—3 hours; discussion—1 hour. The growth of the American people from colonial times through the Civil War.

14. **Introduction to United States History Through Film** (L) Goodman Lecture—discussion—4 hours: use of films. An introduction to United States history using approximately nine films with parallel readings on selected themes, such as the American Indian, the Civil War, the Great Depression, the effects of war, and the role of the government.

15. **Violence and Law in America** (L) Cahoon Lecture—3 hours; discussion—2 hours. Movements of protest, social, and political development of the United States from Reconstruction to the present.


17. **African-American History** (L) Trotter Lecture—3 hours; discussion—1 hour. The history of black people in the United States from the African background to Reconstruction.

18. **American Cultural History** (L) Cummins Lecture—3 hours; written reports. A survey of American history over the last thousand years as reflected in the lives of...

Home Economics (College of Agricultural and Environmental Sciences)

The Major Program

The Home Economics major, through the study of the humanities, the biological, physical and social sciences, and the specialized subject matter, provides an excellent background for professional home economists. Employment opportunities exist in governmental, industrial, and community agencies dealing with social services, private industry, extension services, and teaching at the secondary and community college levels after completion of a one-year, professional program. The major encompasses the broad field of family and consumer sciences combining laboratory work with academic theory in such areas as human (child) development, food science, nutrition, and textiles.

Graduates are qualified to enter graduate programs in Child Development and Textiles, or with additional courses in biological sciences, the program in Food Science or Nutrition. This major also provides academic preparation for those who plan to pursue a teaching credential.

Home Economics

B.S. Major Requirements:

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equal or more comprehensive courses are acceptable. Courses without parentheses are required.)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>55-57</td>
</tr>
<tr>
<td>Anthropology, cultural or general sociology</td>
<td>4</td>
</tr>
<tr>
<td>Biological science</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry, including organic (Chemistry IA 1A, 1B, 8A, 8B)</td>
<td>16</td>
</tr>
<tr>
<td>Economics (Economics IA 1A, 1B)</td>
<td>10</td>
</tr>
<tr>
<td>Psychology (Psychology 2, 110)</td>
<td>4.5</td>
</tr>
<tr>
<td>Psychology, general psychology</td>
<td>4</td>
</tr>
<tr>
<td>Statistics (Statistics 13, Economics 12)</td>
<td>4.5</td>
</tr>
<tr>
<td>Written expression and oral expression</td>
<td>4.5</td>
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Depth Subject Matter | 53-57

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics</td>
<td>12</td>
</tr>
<tr>
<td>Consumer Economics 141, 142</td>
<td>10</td>
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<tr>
<td>Consumer Science 140</td>
<td>10</td>
</tr>
<tr>
<td>Food and nutrition</td>
<td>14-15</td>
</tr>
<tr>
<td>Food Science and Technology 100A, 100B</td>
<td>10</td>
</tr>
<tr>
<td>Nutrition 101-102 or 110-111</td>
<td>10</td>
</tr>
</tbody>
</table>

Home Economics Education

See Agricultural and Home Economics Education
Courses in Human Development
Questions pertaining to the following courses should be directed to the instructor or to the Department of Applied Behavioral Sciences, 119 AOB-4.

104. Infancy and Early Childhood (4) I, Harper; II, Lynn
Lecture—3 hours; discussion—1 hour; field observations of preschool children. Prerequisite: introductory psychology and biology. Analysis of the biological, social, and cultural influences in the psychological growth and development of children, preschool through age six.

108. Middle Childhood and Adolescence (4) II, Harper; III, Lynn
Lecture—4 hours; 3 brief observations of school-aged children. Prerequisite: course 104 or the equivalent. Introduction to the interplay of biological and social-cultural factors in the emotional, cognitive, and social development of children from middle childhood through adolescence.

100C. Adulthood (4) II, Kraft; III, Hawkins
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory psychology. Biological, cognitive, and social psychological aspects of development.

101. Cognitive Development (4) III, Kraft
Lecture—4 hours. Prerequisite: courses 104-108B or Psychology 112. Theories of cognitive development including developmental views of perception, learning, memory, concept formation, and language.

102. Social and Personality Development (4) II, Bryant
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory psychology. Theories of the development of a child's personality through his interactions with children and adults. Emphasis on development of interpersonal and culturally valued skills.

103. Cross-Cultural Study of Children (4) I, Werner
Lecture—4 hours. Prerequisite: course 104A or consent of instructor. Cross-cultural studies of children in developing countries and among minority groups in the U.S.

110. Contemporary American Family (4) I, Crockenberg; III, Lynn
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory psychology. Concern for the future of American families, including changes in sex roles, changing sexual mores, and parenthood.

120. Research Methods in Human Development (4) II, Harper
Lecture—2 hours; discussion—2 hours. Prerequisite: courses 104-108B or the equivalent: elementary statistics. Research methods in human development (e.g., infancy, learning, cognition, socialization, personality).

121. Psychological Assessment (4) II, II, III, Barton, Werner
Lecture—4 hours. Prerequisite: courses 104-108B; elementary statistics. Current issues and methodology related to the process of psychological assessment with children.

130. Emotionally Disturbed Children (4) II, Bryant; III, Bach
told
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 104A-108B or consent of instructor. Discussion of behavior, neuroses, behavior disorders, and learning disabilities in children.

131. Developmental Disabilities (4) II, Werner, III, Barton
Lecture—4 hours. Prerequisite: course 104A or consent of instructor. Mental retardation and special learning disabilities, etiology, diagnosis, education, and socialization. Introduction to community resources.

132. The Gifted (3) I, Bachfeld
Lecture—3 hours. Prerequisite: courses 104A-108B or consent of instructor. Conceptualization, identification, and education of the intellectually and creatively gifted individual.

140A. Laboratory in Early Childhood: Communication and Interaction (4)
Lecture—2 hours; discussion—1 hour; laboratory—5 hours. Prerequisite: course 30A and consent of instructor. Communication and interaction modes with children six months to five years of age. Linkage of communication theory with behavior.

140B. Laboratory in Early Childhood: Child-Care Programs (4)
Lecture—2 hours; discussion—1 hour; laboratory—5 hours. Prerequisite: course 140A and consent of instructor. Interaction with children six months to five years of age in a preschool program. Linkage of child development theory with behavior. Sec 1, infancy; Sec 2, program planning and analysis. May be repeated for credit with the instructor.

141. Field Studies with Children and Adolescents (4-6) II, III, The Staff (Crockenberg in charge)
Field—3 hours; field study—6-12 hours. Prerequisite: course 100B or the equivalent and consent of instructor. Study of children's affective, cognitive and social development within the context of family/school environment and foster group homes. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.

142. Field Studies with Exceptional Children (4-6) I, II, III, Bryant, Barton, Bachfeld
Discussion—1.5 hours; field study—6-12 hours. Prerequisite: consent of instructor and one course from courses 130, 131, or 132 may be taken concurrently. Field study with children who are identified as developmentally disabled, emotionally disturbed, or intellectually gifted. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.

150. Supervision and Administration of Early Childhood Education Programs (4) Summer in charge.
Lecture—40 hours total. Prerequisite: course 140A or prior experience in an early childhood education program. History of early childhood education; birth to age three; federal, state, and local regulations. Implications of different regulations for funding and budgets; policy making mechanisms; professional and legal responsibilities; staff development; and professional attitudes and issues. Offered in odd-numbered years.

156. Directed Group Study (1-3) I, II, III. The Staff (Pilskul in charge)
(PNP grading only)

159. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Pilskul in charge)
(PNP grading only)

Graduate Courses

211. Physiological Correlates of Behavioral Development (3) III, Harper
Seminar—3 hours. Prerequisite: consent of instructor. An overview of mechanisms of organismic development and the implications of developmental biology for the analysis of behavioral oromancy; consideration of parallels between processes of organismic development and behavioral development in children and infra-human mammals.

213. Cross-Cultural Study of Children (3) III, Werner
Seminar—3 hours. Prerequisite: graduate standing. Current theory and research concerned with cross-cultural class differences in children's development. Methods of cross-cultural research, patterns of child rearing, achievement motivation, cognitive and social development among children in the developing countries and ethnic subcultures in the U.S.A.

214. Clinical Child Development (3) II, Bryant
Seminar—3 hours. Prerequisite: consent of instructor. Clinical child development based on developmental competencies model rather than a mental-health/psychopathology model. Theory and research focusing on acquisition of interpersonnal skills (e.g., social sensitivity) and individual differences. Opportunities, environments, and relationships encouraging intra- and interpersonal growth and satisfaction emphasized.

215. Social and Moral Development (3) I, Crockenberg
Discussion—3 hours. Prerequisite: consent of instructor. Theories of social and moral development and related research. Emphasizes social learning and cognitive-developmental approaches to development of altruism, concern for others, resistance to temptation, social responsibility, control of aggression and moral judgment from infancy through adolescence.

221. Psychological Assessment of Children (4) III, Bachfeld
Lecture—2 hours; discussion—2 hours. Prerequisite: courses 131 or consent of instructor. Study of children's behavior through examination, analysis and evaluation of perceptual-motor, cognitive, affective and social development. Problems in assessment of exceptional children considered. Assignments focus on preparation of a comprehensive report on one child.

231. Issues in Cognitive and Linguistic Development (3) II, Kraft
Seminar—3 hours. Prerequisite: consent of instructor; upper-division course on the family recommended. Current trends and research. Emphasis on parental behavior in other animals and other cultures, child-rearing practices, the child's perception of parents, the differential influence of each parent on the child's psychological well-being, role development, and moral development. Offered in odd-numbered years.

240. Seminar (3) I, II, III, Werner, III, Barton
Seminar—4 hours. Discussion and evaluation of theories, research, and issues in human development. Different topics each quarter.

249. Group Study (1-5) I, II, III, The Staff (Pilskul in charge)

259. Research (1-12) I, II, III, The Staff (Pilskul in charge)
(SAU grading only)

Individual Major

(230)

Individual Major: College of Agricultural and Environmental Sciences, Engineering, and Letters and Science

The Major Program
The Individual Major, an integrated program composed of courses from two or more disciplines, is designed by the student and is subject to approval by faculty advisers and appropriate college committees. This major enables a student to pursue a specific interest which cannot be accommodated within the framework of an existing major. It must clearly and specifically meet the student's educational goals and provide a basis for the applicant's career objectives as well as meet University and College academic standards.

Proposals for individual majors must be submitted before the fourth quarter prior to graduation for students registered in the Colleges of Agricultural and Environmental Sciences and Letters and Science, and before the third quarter prior to graduation for the students in the College of General Studies. Specific requirements for each college are shown below. Application forms are available in program offices.

Individual Major: College of Agricultural and Environmental Sciences
(Academic Advising Center)
Program Office, 122 Hoagland Hall
B.S. Major Requirements:

Preparatory Subject Matter ........................................... (variable)
Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

Depth Subject Matter .................................................. 45
An individualized program of 45 upper division units taken from two or more areas of study (at least one of the areas must be within the College). At least 20 of the upper division units must be taken from courses provided by the College.

Unrestricted Electives .................................................. (variable)

Total Units for the Degree ........................................... 180

Additional requirements
At least 54 of the 180 units needed for graduation must be upper division. The College also requires that at least 8 units must be in English and/or Rhetoric courses that emphasize written or oral expression (see page 70).

Major Adviser
The course of study must be developed in consultation with the Major Adviser, 122 Holmgren Hall, and two or more faculty members prior to final review by the Individual Major Committee for the College.

Students applying for an Individual Major will be admitted into the Exploratory Program.

Individual Major: College of Letters and Science
(Dean's Office)
Program Office, 150 Manh Hall

Committee in Charge
Dennis J. Dingemans, Ph.D. (Geography)
Committee Chairperson
Joel E. Kreuger, Ph.D. (Chemistry)
Robert L. Rudd, Ph.D. (Zoology)
T. Y. Shen, Ph.D. (Economics)
Marion S. Ury, Ph.D. (Comparative Literature: Religious Studies)

A.B. and B.S. Major Requirements:

Preparatory Subject Matter ........................................... (variable)
Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

Depth Subject Matter .................................................. 45-54
Upper division units must include:
A. Interdisciplinary and complementary courses from two or more departments which provide a unified pattern and focus,
B. At least 30 units from Letters and Science teaching departments or programs,
C. No more than 10 units in courses numbered 194H, 198, and 199.

Total Units for the Degree ........................................... 180

Student Proposal
A student submits to the Dean's Office his or her major proposal and an essay, discussing educational purposes, personal and/or professional objectives, along with faculty letters of recommendation. After initial review, the Faculty Committee on Individual Majors evaluates the proposal and provides final action.

Major Adviser
A faculty member in a teaching department or program in the College of Letters and Science in major field of emphasis. Secondary Adviser: a faculty member from secondary area of interest.

Honors Program
Toward the end of their junior year, students potentially eligible for highest honors at graduation (see page 97), may petition the Individual Majors Committee for tentative acceptance into an honors program.

Final admission will depend upon the Committee's approval of a senior thesis prospectus that has been agreed upon by the student and faculty adviser. The prospectus must be presented to the Committee during the first quarter of the senior year. Graduation with highest honors will be conditional upon both the maintenance of the required grade-point average and the completion of the senior thesis project. The Committee will consider alteration of the student's original major proposal to allow up to 3 units of independent study during each of the last two quarters of the senior year for work on senior honors thesis.

Individual Major: College of Engineering
(Graduate Office)
Program Office, 2132 Bailer Hall

B.S. Major Requirements:

Subject Areas ......................................................... (minimum) UNITS
Mathematics (calculus, differential equations, vector analysis) ........................................... 18
Physical and biological sciences (including at least 10 units of general chemistry and 12 units of physics for engineering and science students) ............... 27
Analytic mechanics and strength of materials .................................................. 6
Applied thermodynamics ............................................... 3
Applied electricity and magnetism ......................................... 5
Properties of materials ................................................. 4
Engineering design (courses selected from a list developed for Individual Engineering Majors by the Undergraduate Engineering Committee) .................. 5
Additional upper division engineering courses, exclusive of 199 courses .................. 24
Written and oral expression (courses equivalent to English 1 and either Rhetoric 1 or 3) ............... 9
Humanities-social sciences (from a list of courses and course groups approved by the Undergraduate Study Committee) ........................................... 23
Additional units to complete 180-unit program (Unrestricted electives, 10 units maximum) .......... 57

Total Units for the Degree ........................................... 180

Student Proposal
To follow this alternative, your complete program of study and a statement of objectives must be received by the College Undergraduate Office prior to the official beginning date of the third quarter preceding graduation. It is to your advantage to submit your proposal well in advance of this deadline (during your junior year) so that any modifications requested by the Committee can be made before the beginning of your senior year. Once your curriculum has been approved, changes may be made only for good cause and with the further approval of the Committee. Additional information may be obtained from the Engineering Undergraduate Office. (Also see pages 76-77.)

Integrated Studies
(College of Letters and Science)
Alan A. Stambusky, Ph.D., Program Director
Program Office, 4208 Storer Hall (752-1219)

Committee in Charge
Arthur E. McGuinness, Ph.D. (English)
Committee Chairperson
Robert S. Bouch, M.A. (Music)

Robert M. Murphy, Ph.D. (Psychology)
G. Thomas Sallee, Ph.D. (Mathematics)

Faculty
Daniel B. Brower, Jr., Ph.D., Professor (History)
Richard T. Curley, Ph.D., Associate Professor (Anthropology)
Gordon J. Edlin, Ph.D., Professor (Genetics)
Kenneth R. Greider, Ph.D., Professor (Physics)
Nancy Lieber, Ph.D., Lecturer (Integrative Studies)
David A. Robertson, Ph.D., Associate Professor (English)

Alan A. Stambusky, Ph.D., Professor (Dramatic Art)

The Program of Study
Integrated Studies introduces students to a variety of disciplines in humanities, natural sciences, and social sciences, as these disciplines relate to a common historical period or a common theme. The program encourages cross-disciplinary interests in its faculty and students. It values close contact between student and professor both in the classroom and in the residence hall. Integrated Studies offers an intelligent model for the fulfillment of the College breadth requirements as all of these courses count toward the completion of that requirement. Integrated Studies courses are open to all students but enrollment is limited in order to keep the class sizes small.

There is, in addition, a program for a limited number of freshmen who take four Integrated Studies courses during the year as well as the Integrated Studies Seminar each quarter, and who live in the Tercero dormitory complex. An Integrated Studies House, Building 8, Tercero Hall, is the focal point for the freshman program activities.

Courses in Integrated Studies
Lower Division Courses
1A, 1B, 1C, 1D. Ideas and Issues in the Sciences (4) I, II, III. The Staff (McGuinness in charge)

2A, 2B, 2C, 2D, 2E. Ideas and Issues in the Arts (4) I, II, III. The Staff (McGuinness in charge)
Lecture—4 hours. Exploration of major themes and/or major figures in the humanities. Emphasis on the interrelation of history and the arts. Themes and fields vary from year to year. Themes for 1980-81: "tradition, revolution, and modern society." Fields selected for 1980-81 are: drama history, literature, and theology.

8. Colloquium (1) I, II, III. The Staff (McGuinness in charge)
Discussion—1 hour. Lectures, films, film strips and readings on one arts and sciences. May be repeated for credit. (P/NP grading only.)

9. Seminar (1) I, II, III. The Staff (McGuinness in charge)
Conference—1 hour. Preparation of a research report. Normally to be taken with course 8. May be repeated for credit. (P/NP grading only.)

Internal Medicine
See Medicine
International Agricultural Development

(College of Agricultural and Environmental Sciences)

The Major Program

Today there is a need for trained individuals who can translate and apply recently developed agricultural knowledge and technology to problems of food production, nutrition, health, income generation, marketing, and asset redistribution in less developed nations. Students interested in contributing to the solution of these problems associated with world hunger and health, as well as growth with equity, may wish to investigate the major in International Agricultural Development. Courses in International Agricultural Development are taught by faculty with extensive experience in developing nations.

The International Agricultural Development major provides opportunities to develop competence in a technical field in agriculture or a social science specialization, and, in addition, to acquire those special qualities of mind and spirit requisite for effective performance in underdeveloped and developing areas of the world. For a career in international Agricultural Development, you must be perceptive, sensitive, tolerant and understanding, and possess knowledge of the social-political-economic relationships which characterize developing societies and economies.

Graduates concerned with issues and problems in international development may find job opportunities in government, service, private voluntary organizations, with commercial and consulting firms, and in multinational development companies working overseas.

International Agricultural Development

B.S. Major Requirements:

For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.

UNITS

Preparatory Subject Matter .................................................. 49-50

Social Sciences core .......................................................... 10

Physical science (Chemistry 1A, 1B) .................................... 10

Mathematics (Mathematics 19, Agricultural Science and Management 100) .......................................................... 7

Biological sciences (Biological Sciences 1, Plant Science 2, Animal Science 1, Genetics 1A-100B or 120) ........................................ 12-13

English (see College requirement, page 70) ......................... 8

Social sciences (Applied Behavioral Sciences 19, Political Science 2, Sociology 1, History 4C) .............................................. 12

Natural Sciences and Physical Sciences core .......................... 16

Chemistry (Chemistry 1A, 1B, 2A, 2B, 2BB) ......................... 16

Physics (Physics 1A or 2A) ...................................................... 3

Mathematics (Mathematics 18A or 21A, Agricultural Science and Management 150) .......................................................... 7-8

Biological sciences (Biological Sciences 1, Botany 2, Plant Science 2, Animal Science 2, Zoology 2-2L, Bacteriology 2 and Genetics 1A-100B or 120) .................................................. 15

English (see College requirement, page 70) ......................... 8

Depth Subject Matter ......................................................... 42-44

International Agricultural Development: 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110 .................................................. 8-10

International Agricultural Development 110A, 110B, 110C ........................................... 9

International Agricultural Development 190 plus at least two upper division courses relevant to development (Economics 100, 100B, 115A, 115B, 116, 118, 119, Agricultural Economics 100A, 100B, 113 or 136, 144, or 157, 125, 140, 147, 148, 151, 155. For students who wish to emphasize statistical applications: Agricultural Economics 106A, 106B, or Agricultural Science and Management 150) .......................................................... 16

Primary Field of Specialization .............................................. 60

Natural Sciences or Social Sciences: Courses chosen by student, with an advisor in that specialization, to include additional preparation required for a particular specialization, depth subject matter, and supporting disciplines.

Natural Sciences: Student should include some coursework in social sciences appropriate to the geographic area of personal interest (e.g., anthropology, geography, history or political science area studies courses)

Unrestricted Electives .......................................................... 26-29

Students not possessing a reading knowledge of a foreign language will be encouraged to use these electives for language study or to attend an intensive language school.

Total Units for the Major ................................................... 180

Specialization Advisers

A listing of faculty in various areas of specialization and with interests in International Agricultural Development is available from the Major Adviser.

Major Adviser. O.E. Thompson (Applied Behavioral Sciences)

Graduate Study.

A program of study and research leading to the M.S. degree is available in International Agricultural Development. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser.


Related Courses.

See Agricultural Economics 125, 148, 215C; Agronomy 21, 111, 210; Animal Science 117; Anthropology 221; Economics 115A-115B, 115F; General 215B-215C; Geography 142; Nutrition 20; Political Science 182; Sociology 144; Vegetable Crops 150.

Courses in International Agricultural Development

Questions pertaining to the following courses should be directed to the instructor or to the Department of Applied Behavioral Sciences. 119 AOB-4

Lower Division Courses

10. Population, Food, and Life; Quality or Subsistence? (3) II. Jolly (Agricultural Economics)

Lecture—3 hours. Food requirements versus self-realization as the limiting force in population growth; the interaction of changing technology and new technology through successive stages in economic development; agriculture's contributions to development.

92. Internship (1-12) II. III. The Staff (Thompson in charge)

Field placement—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings.

Upper Division Courses

101. Crop Production under Tropical Conditions (4) II. Mikelsen (Agronomy)

Lecture—3 hours. Discussion—1 hour. Prerequisite: Plant Science 2 or Botany 2. Climatic and soil adaptation; varieties and varietal improvement in annual and perennial crops: pests, diseases, their control, fertilization and other management practices.

Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.

122. Livestock and Poultry Production in Developing Areas (4) I. Vore (Agricultural Sciences)

Lecture—3 hours. Discussion—1 hour. Prerequisite: consent of instructor. Ecological considerations of developing, areas including food resources, pests, diseases and their control; kinds of livestock, wild game, poultry and fish suited to these areas and their management; uses of animals and their by-products.

110A. Agricultural Development: Micro (3) I. Joy (Applied Behavioral Sciences)

Lecture—3 hours. Prerequisite: upper division standing and consent of instructor. The process of agricultural development and the role of analysis in its management. Focuses on the understanding of the behavior of farmers as members of communities.

110B. Agricultural Development: Regional (3) II. Joy (Applied Behavioral Sciences)

Lecture—3 hours. Prerequisite: course 110A. The process of agricultural development and the role of analysis in its management. Focuses on national and international level views.

141. Technology for Agriculture's Developing Regions (2) I. Chanceller (Agricultural Engineering)

Lecture—1 hour: laboratory-discussion—2 hours. Prerequisite: Physics 1A. Equipment used in tropical agriculture. Man, animal, and engine-powered devices. Energy requirements, size-scale costs, support/infrastructure development, and productivity (same course as Agricultural Engineering 141).

190. Seminar in International Agricultural Development (3) III. Thompson (Applied Behavioral Sciences)

Lecture—1 hour: seminar—2 hours. Prerequisite: consent of instructor. Coordination of concepts, principles, and information drawn from technical agriculture and the social sciences presented in the context of economic development. Special emphasis on the problems of program design and implementation.

192. Internship (1-12) I. II. III. The Staff (Thompson in charge)

Field placement—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings.

195. Field Study in Mexican Agricultural Development (3) III. Hansen (Agricultural Economics)

Field trip—8 days, semina—four 2-hour sessions. Prerequisite: consent of instructor. Knowledge of Spanish not required. Observation of agricultural development strategies and impact on Northwestern Mexico. Discussion with farmers and agency staff members. Study of unique Mexican institutional arrangements and experiences in dealing with agricultural development problems. United States influences on Mexican agriculture. (PINF grading only.)

198. Directed Study Group Study (1-5) I. II. III. The Staff (Major Adviser in charge)

Prerequisite: consent of instructor. (PINF grading only.)

199. Special Study for Advanced Undergraduates (1-5) I. II. III. The Staff (Major Adviser in charge)

(PINF grading only.)

Graduate Courses

280A-280B. Social, Technological, and Economic Factors; Strategies, Planning Procedures and Case Studies (3-3-3) III. McClain (Agricultural Economics)

Seminar—3 hours. Prerequisite: consent of instructor. Problems and analysis in agricultural development; cultural, political, economic, and institutional factors in relation to resource use and technology; strategies and planning procedures in agricultural development; case studies of development programs in individual countries.

298. Directed Group Study (1-5) I. II. III. The Staff (Graduate Adviser in charge)

Selected topics relevant to advanced study in International Agricultural Development. (SU grading only.)

299. Research (1-12) I. II. III. The Staff (Graduate Adviser in charge)

(SU grading only.)
International Relations

Program Office, 351 Vocelles Hall (752-3063)

Committee in Charge
Paul E. Zinner, Ph.D. (Political Science)
Committee Chairperson
Conrad J. Bahre, Ph.D. (Geography)
Arnold J. Bauer, Ph.D. (History), Winter-Spring Quarters
William K. Domke, Ph.D. (Political Science)
W. Eric Gustafson, Ph.D. (Economics)
James P. Hewley, Ph.D. (Sociology), Winter-Spring Quarters
H. Guenther Neres, Ph.D. (German)
Rolf E. Poppino, Ph.D. (History), Fall Quarter

The Major Program

Cultural, economic, and political ties bind the world together more closely today than ever before. Problems of security, human rights, energy and mineral resources, and the environment are increasingly confronted at a global, rather than a national level. The challenge of world politics and the growth of international business have created dynamic opportunities for individuals with a background in international affairs. With its theoretical models and real world application, the study of International Relations has become an exciting, rapidly expanding, and highly relevant interdisciplinary major.

The International Relations Program at UC Davis provides a comprehensive approach to the study of today's complex world. This flexible and diverse undergraduate major is the only one of its kind in the nine-campus University of California system.

Graduation with a degree in International Relations requires completion of introductory courses in political science, economics, and history. Upper division work is composed of a "core" or "clusters" (including a seminar in the senior year) required of all majors, and an additional set of courses chosen from one of three emphasis groupings or "clusters": political, economic, or regional. Working knowledge of a modern foreign language is also a requirement (approximately 26 units of course credit or the equivalent in course coverage). One program of special interest to International Relations majors is the Education Abroad Program ("junior-year abroad"). Students of international affairs have found EAP an invaluable experience, providing insights into the life and culture of individuals in another country.

The work-lab program assists students in obtaining internships for academic credit related to their field of study. Legislative, legal, and business internships have proved to be the most popular among International Relations students. The "Davis in D.C." program arranges summer internships in Washington, D.C.

International Relations gives the student a wide range of opportunities for advanced study and for careers in agencies of the federal government in the U.S. or abroad, state agencies, international or nongovernmental organizations, foundations, newspapers and companies with interests in international business, trade or finance. The stringent language requirement of the major program enhances career prospects in jobs which demand knowledge of the language and culture of other countries.

NOTE: For key to footnote symbols, see page 130.

International Relations

A.B. Major Requirements:

Preparatory Subject Matter: 26-32
Economics 1A, 1B: 10
Political Science 1A, 1B: 4
One course from Political Science 1, 2 or 9
(class 2 recommended if selecting Regional cluster below): 4
Two courses from History 3, 45, 4C, 7, 9A, 9B, 10, 15, 17B: 8
 Approximately 26 units for the equivalent in one modern foreign language: 8
Recommended: one course in statistics, (e.g., Economics 12, Sociology 46A, 46B, Statistics 13)

Depth Subject Matter: 48
Political Science 127: 4
Economics 115A, 163 or 162: 8
One course from History 137C, 143C, 146B, 161B, 168, 169C, 194C: 4
One course from Political Science 122, 123, 124, 125, 190, 192C, 194C, 195: 4
Interdisciplinary seminar, Political Science 190 (normally taken in senior year): 4
Cluster emphasis: 24
Choose one from three clusters defined below, selecting six courses divined among at least three departments including at least two courses from each of two clusters.

Total Units for the Major: 74-100

Course List for Cluster Emphasis

(1) Economics Emphasis (two courses in Economics required)
Anthropology 115B: 116, 117, 118, 119, 123, 161
Geography 141, 142, 143
Political Science 117, 124, 125, 137, 139, 140, 178: 118, 139, 141, 170:
Sociology 118, 120, 129, 141, 170, 185

(2) Political Emphasis (two courses in Political Science required)
Anthropology 123, 128
Economics 115B, 116, 117, 118, 119, 123, 161
Geography 141, 142, 143
Political Science 112, 117, 121, 122, 123, 124, 125, 126, 137, 138, 139, 140, 141, 142, 144, 146, 147, 148A, 148B, 149B, 149C, 176, 177, 178:
Sociology 118, 130, 139, 141, 170, 175

(3) Regional Emphasis Latin America, Europe, East Asia, Soviet Union and Eastern Europe, or Africa (two courses in History required in the selected region)
Anthropology 128, 139A, 139B, 143, 146, 147A, 147B, 162, 190, 191, 192:
Economics 115B, 115C, 116, 117, 118, 123, 161, 173
Geography 119, 121, 122A, 122B, 123A, 123B, 124, 125, 126, 127B:
163B, 165, 166B, 169C, 192C, 194C, 195:
Political Science 131, 132, 134, 138, 139, 141, 144, 146, 147A, 148B, 149B, 149C:
Sociology 139, 147, 170

Major Adviser: P. E. Zinner (Political Science)

Italian

(A College of Letters and Science)

Department Office, (French and Italian), 513 Sprout Hall (752-0830)

Faculty
Alfonso D. de Petris, Dottore in Filosofia, Associate Professor
Dennis J. Dutschke, Ph.D., Assistant Professor
Gustavo Foscari, M.A., Lecturer
Maria Manlio-Manea, Ph.D., Professor

The Major and Minor Programs

The major in Italian is designed to provide a solid language background which will enable the student to pursue specific international job opportunities and to develop an appreciation for Italian language and culture. The program of Italian Studies at UC Davis is small and geared to the individual needs of the student. A full range of courses is offered which satisfies the humanities and fine arts area requirement. The use of Italian is stressed on all levels and a knowledge of the language is required for literature courses which are taught only in Italian. Also offered are literature courses in translation which are intended for those students not majoring in Italian. A course on Italian culture and civilization is also taught in English. Practical experience in education is provided through a teaching program offered in conjunction with the Davis Unified School District. Students majoring in Italian are able to teach the language at the high school, under the supervision of a University faculty member.

A degree in Italian provides a well-rounded liberal arts background for graduate studies in the humanities and for a wide range of careers in such areas as civil service, business, travel, library science, and education. Above all, however, it gives the student an opportunity to read some of the greatest literature ever written and to study a country and people which have a uniquely rich culture and history.

A minor in Italian is available to those aware that a knowledge of foreign languages is of vital importance in today's increasingly international world. In every sector of society, language skills enhance our chances of getting jobs and successfully keeping them. In a more general sense, our understanding and appreciation of other cultures is dependent on our ability to perceive them clearly. There is no better means of perceiving a foreign culture than through its own language. Specific career opportunities for those students who have a background in foreign languages are abundant. In addition to the Foreign Service, jobs are available in business and education, both overseas and in the U.S. For example, those wishing to live (for brief or longer periods of time) and work in Italy have a choice of cities: Milan for business, Rome for international concerns in agriculture and nutrition in the F.A.O., and Florence for retail commerce and the arts, just to name a few. In the U.S., foreign owned companies or American companies with interests in the foreign market need qualified people who are also fluent in a foreign language.

A.B. Major Requirements:

Preparatory Subject Matter: 0-21
Italian 1, 2, 3, 104 or 105 (or the equivalent): 0-21

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Courses in Italian

Lower Division Courses

Students offering high school language preparation as a prerequisite must take a placement test.

1. Elementary Italian (6) I, II, III. The Staff
   Lecture-discussion—3 hours. Laboratory—1 hour. Basic Italian vocabulary and structure, aimed at enabling the student to understand and use standard Italian. Students who have successfully completed Italian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. A passing grade will be charged to the student's P/NP option. No petition is required. All other students will receive a letter grade unless a P/NP petition is filed for credit.

2. Elementary Italian (6) I, II, III. The Staff
   Lecture-discussion—3 hours. Laboratory—1 hour. Prerequisite: course 1. Continuation of course 1.

3. Intermediate Grammar (6) I. Foscarini
   Lecture-discussion—5 hours. Laboratory—1 hour. Prerequisite: courses 1 and 2 or the equivalent. Continuation of course 1 and 2 series. Basic language preparation.

4A. Italian Conversation (3) I, II. The Staff
   Lecture-discussion—3 hours. Prerequisite: course 2A. A course designed to offer practice in speaking Italian. May be repeated once for credit. (P/NP grading only)

4B. Italian Conversation (3) I, II. The Staff
   Lecture-discussion—3 hours. Prerequisite: course 2A. A course designed to offer practice in speaking Italian. May be repeated once for credit. (P/NP grading only)

10A. Intermediate Italian (3) I, II. The Staff
   Lecture-discussion—3 hours. Prerequisite: courses 1 and 2. Reading and discussion of Italian short stories, newspaper articles, etc., providing an introduction to contemporary Italian culture and culture while strengthening the student's command of the standard Italian.

10B. Intermediate Italian (3) I, II. The Staff
   Lecture-discussion—3 hours. Prerequisite: course 10A. Continuation of course 10A. Considered the minimum prerequisite for participation in Education Abroad Program.

25. Italian Literature in Translation (3) I. The Staff (Chairperson in charge)
   Lecture—1 hour. Discussion—2 hours. Course intended to acquaint the student with representative examples of Italian literature. Selected topics will include major authors, genres, literary periods, movements, or special themes.

Upper Division Courses

101. Advanced Conversation, Composition, and Grammar (4) I. De Petris
   Lecture-discussion—3 hours; weekly papers. Prerequisite: course 10B or consent of instructor.

102. Advanced Conversation, Composition, and Grammar (4) II. De Petris
   Lecture-discussion—3 hours; weekly papers. Prerequisite: course 101 or consent of instructor.

107. Survey of Italian Culture and Institutions (4) Foscarini
   Lecture-discussion—3 hours; term paper. An assessment of the impact of the royal family on Italian cultural life from the Middle Ages to the present. Special emphasis will be placed upon achievements in literature, the arts, philosophy, and socio-political institutions. To be taught in English.

113A. Italian Literature before the Renaissance: From St. Francis to Arniero, with an excursion on Galilei's role in the formation of the modern Italian literature.
   Lecture-discussion—3 hours; term paper. Prerequisite: course 112B or consent of instructor. Study of the origins of the typical forms of Italian literature from the thirteenth and fourteenth centuries. The development of an Italian standard of poetry, with emphasis on the Sicilian school of Poetry, the Dolce Stil Novo and Petrarchism.

113B. Italian Literature before the Renaissance: Dante's Divine Comedy and Boccaccio (4) I. Dutschke
   Lecture-discussion—3 hours; term paper. Prerequisite: course 113A or consent of instructor. Study of the origins of the typical forms of Italian literature from the thirteenth and fourteenth centuries. The development of an Italian standard of poetry, with emphasis on the Sicilian school of Poetry, the Dolce Stil Novo and Petrarchism.

113C. Italian Literature in English: Modern Italian Literature (4) II. Dutschke
   Lecture-discussion—3 hours; term paper. The Romantic Movement in Italy and its relationship to European Romanticism, with emphasis on the works of Leopardi and Manzoni (offered in even-numbered years); twentieth century Italian authors: offering emphasis according to the needs of the students. Offered in odd-numbered years.

150. Comparative Analysis of Italian and English (4) I, II. Marea Lecture—3 hours; term paper. Prerequisite: course 3 or the equivalent. Contrasting the linguistic structures (morphology, phonology, syntax), of the two languages, with particular emphasis on the problems of speakers of either language with the learning of the other. To be taught in English. Offered in odd-numbered years.

194H. Special Study for Honors Students (5) I, II, III. The Staff (Abraham in charge)
   Prerequisite: open only to honors students. Guided research leading to an honors thesis.

197TC. Community Tutoring in Italian (1-5) I, II, III. Foscarini
   Discussion—1-2 hours. Laboratory—1-2 hours. Prerequisite: consent of instructor. Field experience as Italian tutors or teacher's aides. May be repeated for credit for a total of 10 units. (P/NP grading only.)

199 Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (De Petris in charge)
   Prerequisite: consent of major. Directed individual study for advanced undergraduate students. (P/NP grading only.)

Japanese

See Oriented Languages and Civilizations

Land, Air, and Water Resources

[College of Agricultural and Environmental Sciences]

Faculty

Hoagland Hall Faculty Office
139 Hoagland Hall (752-1406)

Resource Sciences Teaching Center, 122
Hoagland Hall (752-1669)

Daniel G. Aldrich, Ph.D., Professor (Soil Science)
Eugene L. Begg, B.S., Lecturer (Soil Morphology)
Francis E. Broadbent, Ph.D., Professor (Soil Microbiology)
A. Lloyd Brown, Ph.D., Lecturer (Soils and Plant Nutrition)
Richard G. Burau, Ph.D., Professor (Soil Science, Environmental Toxicology)
John C. Carroll, Ph.D., Associate Professor (Meteorology)
Kinsell L. Coulson, Ph.D., Professor Emeritus (Meteorology)
C.C. Delwiche, Ph.D., Professor (Geology)
Emmanuel Epstein, Ph.D., Professor (Plant Nutrition, Botany)
Robert G. Flocchini, Ph.D., Lecturer (Solar Energy)
Law, School of

Latin

See Classics

Law, School of
Florian Bartosic, B.C.L., LL.M., Dean of the School
Daniel L. Simmons, J.D., Associate Dean of the School
Mary Jane Hamilton, J.D., Ph.D., Assistant Dean of the School
Mortimer D. Schwartz, J.D., LL.M., M.S., Associate Dean (Law Library)

Dean’s Office, 1011 Martin Luther King, Jr. Hall (752-0243)

Faculty

Homer G. Angelo, J.D., LL.M., Professor
John D. Ayer, J.D., LL.M., Professor
Edward L. Barrett, Jr., J.D., Professor
Florian Bartosic, B.C.L., LL.M., Professor
David F. Crotty, J.D., Visiting Lecturer
Brigle M. Bodenheimer, J.U.D., LL.B., Professor Emeritus
Edgar Bodenheimer, J.U.D., LL.B., Professor Emeritus
Carol S. Bruch, J.D., Professor
Hamer C. Clark, Jr., LL.B., LL.M., Visiting Professor
Charles B. Craver, J.D., Professor
Joel C. Dobris, LL.B., Acting Professor
Harrison C. Dunning, LL.B., Professor
Daniel J. Dyakstra, LL.B., S.J.D., Professor
Floyd F. Fennell, LL.B., Professor
Daniel W. Feissler, J.D., S.J.D., Professor
Susan F. French, J.D., Professor
Gary S. Goodpaster, J.D., Professor
Theodore W. Graham, LL.B., Visiting Senior Lecturer
Sarah D. Gray, Ph.D., Visiting Lecturer (Human Physiology, UC Davis School of Medicine)
Frederick M. Hart, J.D., LL.M., Visiting Professor
James E. Hogen, LL.B., Professor
Margaret Z. Johns, J.D., Visiting Lecturer
Emma Coleman Jones, J.D., Professor
Friedrich K. Juenger, J.D., Professor
Cecilia D. Lannon, J.D., Visiting Lecturer
Ronald F. Lipp, J.D., Visiting Lecturer
Pierre R. Lussiaux, LL.B., LL.B., Professor
Jean C. Love, J.D., Professor
David W. Miller, LL.B., Acting Professor
John B. Oakley, J.D., Professor
Raymond I. Parmalee, J.D., LL.B., S.J.D., Professor
John W. Poulos, J.D., Professor
Edward H. Rablin, LL.B., Professor
Mortimer D. Schwartz, J.D., LL.M., M.S., Professor
Daniel L. Simmons, J.D., Professor
James F. Smith, J.D., Visiting Lecturer
Edward M. Stadum, LL.B., Visiting Lecturer
Jerald L. Wilkerson, J.D., Acting Professor
Bruce A. Wolk, M.S., J.D., Acting Professor
Richard C. Wylick, LL.B., Professor

Courses of Instruction

The following courses for students enrolled in the School of Law are set up for the semester-system basis only. Instruction dates can be found on page 117. The symbols are (i) for Fall Semester and (ii) for Spring Semester.

Major Programs and Graduate Study. See the majors listed under Resource Sciences and Engineering on page 69. For graduate study see page 219 and the Announcement of the Graduate Division.

Related Courses. See course listings under Atmospheric Science, Resource Sciences, Soil Science, Water Science.

NOTE: For key to footnote symbols, see page 130.

Courses in Law

Professional Curriculum

First Year Courses

200. Introduction to the American Legal Process (1.0) Discussion (introduction week) - 1 hour. An introduction to American Legal Process through study of how courts resolve disputes in selected areas. Emphasis will be placed upon the operation of the case law system, the law-making roles of the courts and the legislature, and the acquisition of the skills of a lawyer. (SUI grading only.)

2016A-2018. Property (3.0) L. Dobson, Rabin Discussion - 3 hours. Study of doctrines and institutions which govern allocation and use of land and improvements thereon. Emphasis is placed upon estates in land system, landlord-tenant relationship, conveyancing, and private and public means for land use control (Deferred grading only, pending completion of sequence.)

2021A-2021B. Contracts (3.3) K. Fissell, Graham, K. Fissell, Hart
Discussion - 3 hours. Course examines the sorts of promises that are enforced at law and the nature of promissory estoppel. Material to be taken from the text. (Deferred grading only, pending completion of sequence.)

2024A. Civil Procedure (3.3) I. Hogan, Lipp, Miller, Oakley
Discussion - 3 hours. The methodology of presenting a civil controversy for adjudication in a state or federal court. (Deferred grading only, pending completion of sequence.)

2024B. Tort (3.3) III. Dyakstra, Juenger, Love, Wilkerson
Discussion - 3 hours. Course in tort law is designed to familiarize the students with the basic concepts which apply to actions brought by persons who seek relief for injury. It is thus concerned with intentional invasion of personal and property and with the unintentional invasion of these same interests. More specifically the course seeks to analyze civil actions based upon wrongs carrying labels such as assault, battery, false imprisonment, negligence, defamation, invasion of privacy, misrepresentation, and nuisance. (Deferred grading only, pending completion of sequence.)

2027A. Criminal Law (3.0) Craver, Poulos
Discussion - 3 hours. A study of the elements and policies of selected criminal offenses.

207. Legal Research (1) L. Johns, Parnas
Discussion-laboratory - 1 hour. Description of the variety of sources of law and secondary authority. Instruction in their location and use. Graduate basis of course. Students must register for both the 1-hour seminar and the laboratory component.

Second and Third Year Courses

The second- and third-year courses fall into subject areas as shown here:

(a) General courses: Law 209, 250, 254, 258, 263
(c) Commercial Law: Law 216, 237, 243
(d) Constitutional Law: Law 217, 218, 288
(e) Consumer Law: Law 252, 269, 264
(f) Criminal Law: Law 226, 227, 233, 273, 275, 276, 290
(g) Estate Planning: Law 221, 222, 223
(h) Family Law: Law 223, 230, 234, 267, 272, 281
(i) Health Law: Law 266
(j) International Comparative and Foreign Law Law 246, 249, 255, 257, 290
(k) Labor Law: Law 251, 259, 260, 278, 279, 295
(l) Procedure and Jurisdiction: Law 219, 247, 248, 283
(m) Property and Environmental Law: Law 232, 256, 264, 285, 293, 294
(n) Public Law: Law 231, 235, 240, 261
(o) Skills and Litigation: Law 210, 211, 212, 263, 291, 297, 410, 415
(p) Taxation: Law 220, 229, 232, 238, 245, 247, 269, 271

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against; construction and enforcement of the various types of policies; statutory and regulatory controls.

240. Law of Elections and Political Campaigns (2) Dvorak—2 hours. This course covers constitutional, statutory, administrative and case law aspects of federal and state elections, including laws relating to primaries, general elections, ballot access requirements, financial disclosures and conflicts of interest.

241. Legal Accounting (2) Discussion—2 hours. Course considers the application of accounting principles and procedures to a variety of situations arising from financial, tax, business, and legal transactions. Basic concepts will be stressed to ensure that assurance services are not confused with accounting services.

242. Conflicts of Laws (4) (II) Bruch Discussion—4 hours. A study of transactions with multiple contacts and conflicts arising from varying legal systems, foreign jurisdictions, and choice of applicable law. Special attention will be given to the influence of varying theoretical considerations on the resolution of conflicts problems.

243. Debtor and Creditor (3) (II) Graham Discussion—3 hours. Prerequisite: Commercial Law recommended. Course focuses on the rights of debtors and creditors. The first part concentrates upon remedies of un- paid creditors under state law and the protection of debtors through limitations on creditors such as exemption laws. The second part focuses on the Federal Bankruptcy Act with emphasis upon ordinary bankruptcy.

244. Basic Human Physiology (2) (II) Gray Discussion—2 hours. An overall view of the principles of physics and the laws governing the function of the human body. Emphasis will be placed on the understanding of the normal functioning of the various organ systems of the human body. (SU grading only.)

245. Estate and Gift Taxation (3) (III) Wolk Discussion—3 hours. Prerequisite: course 220. A study of the federal taxation of gifts, trusts, and estates.

246. Federal Jurisdiction (3) (III) Oakey; II. Love Discussion—3 hours. Survey of federal court system and examination of sources and substance of federal jurisdiction. Attention will be devoted to: (1) parameters of appellate and collateral review of state court decisions in federal courts; (2) the distinction among the various theories of federal jurisdiction; (3) the doctrine of diversity jurisdiction; (4) the doctrine of res judicata; and (5) the doctrine of comity.

247. Federal Taxation (8) (III) Simmons Discussion—3 hours. Prerequisite: course 220. Emphasis on income tax principles of corporations and their shareholders. Topics include tax aspects of corporate decisions on the organization, financing, operation, dissolution and reorganization of corporate entities.

248. Comparative Law (3) (I) Jueger Discussion—3 hours. Comparison of the methods and sources of common and civil law background and structure of civil law systems; classification of legal rules; analysis and study of problems arising in the context of foreign legal systems.

250. Jurisprudence (2) (I) Goodpastor Discussion—2 hours. The aim of this course is to offer a view of the post-modern system as a whole from a philosophical, psychological, and sociological perspective. The problems connected with the taming of power and control of aggression will be reviewed. The metas of law as an institution will be debated against the background of influential anti-law theories, and the relation of law to fundamental social institutions will be analyzed. Various viewpoints concerning the nature and functions of the law will be tested with respect to their practical implications and the administration of justice.

251. Labor Law (4) (II) Crawley Discussion—4 hours. A study of the law, primarily statutory, relating to employee organization and the establishment of the collective bargaining relationship, the negotiation and administration of the collective bargaining agreement; the exercise of primaries and secondary economic pressure, and the rights of individual employees vis-a-vis their employer and their union.

253. Products Liability (2) (I) Dykstra Discussion—2 hours. The civil action for harm to the consumer resulting from product defects.

254. Developmental Legal History (2) Discussion—2 hours. While some fifteen-, sixteenth- and seventeenth-century English materials will be used, course will focus on concepts of law, including the Anglo-American legal doctrine during the period 1780-1880. The emergence of a conscious concept of law as an instrument of wealth regulation and its prevention by the Church will be examined by review of selected facets of the relationship between economic development and transition to the law in the nineteenth century. Related topics include: changes in legal doctrine due to the emergence of competitive economic using; the relationship of feudal and doctrinal limitation upon the absoluteness of rights in real property; and the early experience with the promotion, regulation and evolution of a transportation monopoly with emphasis upon the security of private investment vs. the demands of public convenience and necessity.

255. Transnational Law Seminar (2) Seminar—2 hours. Study of selected problems presented by transactions that cross national boundaries, including legal conflicts of regulatory laws and transnational institutions.

256. Land Use Planning (2) (I) Beatty Discussion—2 hours. This course will examine regulatory, judicial, and administrative methods used to facilitate the rational use of land. Legal topics encompassed in this context will include zoning, subdivision regulation, nuisance, eminent domain, and city planning.

257. Law and Institutions of European Communities (3) Discussion—3 hours. A study of legal problems of European integration, including the transfer of power to supra-national institutions, their decision making, the role of the Court of Justice and selection of areas of Community law.

258. Legal Profession (1) (I), Goodpastor; II, Schwartz, Wyckoff Discussion—1 hour. Study of the ethical duties and responsibilities of attorneys under the American Bar Association Code of Professional Responsibility, the California Rules of Professional Conduct, and the Code of Judicial Conduct. Prerequisite: 220. All students for graduation. (SU grading only.)

259. Social Legislation in Employment (3) Discussion—3 hours. This course explores the rights of employees and the duties of employers under modern social programs including workers' compensation, unemployment compensation and related hour regulations, social security legislation, and anti-discrimination laws.

260. Employment Discrimination (2) (II) Cramer Discussion—2 hours. Consideration of employment discrimination based on race, color, religion, national origin, sex, ancestry, age, handicap, and sexual preference. The course will focus upon Title VII of the Civil Rights Act of 1964, the Civil Rights Act of 1991, and the California fair employment and reporting act. The course will be a seminar and study of the Supreme Court cases and regulatory authorities.

261. Local Government (2) Discussion—2 hours. Examination of a number of recurring issues concerning the organization and structure of governmental units. Why have local governments at all? What functions are appropriate for local governments, and which can best be left to private persons? What standards are "fair" for the organization and operation of local governments? Who should pay to support them, and what should the supporters be accountable for? They are covered in separate courses, are land use control and public employee bargaining.

262. Antitrust (3) (II) Wyckoff Discussion—3 hours. Study of the federal antitrust laws including price fixing, limits on distribution, tying arrangements, monopolization and mergers.

263. Trial Practice (3) (I) Stimson Lecture—3 hours. A theory and practice course. Prerequisite: course 219. Course features lectures, videotapes and demonstrations aimed at exposing a student to the litigation process in its entirety, but with special emphasis on the trial itself.

264. Water Law (3) II. Dunn Discussion—3 hours. Emphasis is placed upon appropriative and riparian rights to surface waters and upon the rules used to allocate groundwater. Also included are water pollution control, water distribution organizations, interstate allocation, federal water projects, water improvement programs, environmental protection in water resources development and Indian water rights.

265. Law and Medicine (2) Seminar—2 hours. Prerequisite: second-year medical student. Today's course involves fundamental concepts of the law and their role in the practice of medicine. Prerequisites: Medical Student.


268. Taxation of Foreign Income (2) Seminar—2 hours. The manner in which the United States taxes foreign source income and income of foreign corporations and aliens. Special emphasis will be given to the use of the control theory of foreign corporations as an avoidance device and to tax incentives for the export of U.S. products (i.e., domestic international sales corporations). Corporation taxation will also be given to the issues of Hemisphere Trade Corporations, income from U.S. possessions, the foreign tax credit and tax treaties. Problem approach will be followed.

269. Consumer Protection (2) (II) Discussion—2 hours. A study of selected consumer law problems, including a survey of state and federal regulatory effort. Course coverage may include the following: First Amendment protection of commercial speech, common law and statutory remedies for fraudulent or deceptive prac- tices, consumer credit, regulation of credit, consumer protection legislation, preservation of consumer defenses, product safety, and attorney fees for representing consumers.

270. International Business Transactions (1) (I) Anderson Seminar—1 hour. Seminar—1 hour. Sampling of problems and techniques in international trade and investment, with emphasis on documents from actual transactions. Participants will be encouraged to participate in export and import transactions, including preparation of goods and services and documentation and financing of such transactions; establishing branches in foreign jurisdictions; taxation in more than one country; legal reaction to boycott and ethical problems; antitrust regulation and international organizations such as the GATT and the GATT.


272. Family Law (Long Course) (II) Clark Discussion—6 hours. Designed for the student with a substantial interest in Family Law and Children and the Law. It covers in depth material offered in the basic (short course) and in addition treats the child and education, child labor, emancipation, and child abuse.

273. The Law and the Police (2) Discussion—2 hours. Prerequisite: course 226 or 227 recommended. A study of aspects of police power and behavior. In addition to constitutional problems such as arrest, search and seizure, line-ups and confession, attention will be given to police powers, including conduct of police, criminal justice, municipal codes, basic authorizing statutes, administrative practices, and informal controls. An additional unit of credit either by research or a seminar paper available to students with consent of instructor.) Limited enrollment.

274. Unfair Trade Practices (2) (II) Wyckoff Discussion—2 hours. A study of unfair competition and the protection of intellectual property. Among the topics consi- dered are consumer fraud, misleading and false advertising, disparagement, interference with business relations, the role of the Federal Trade Commission, trade secrets, patents, trademarks and copyrights.

275. The Correctional Process (2) (II) Discussion—2 hours. Field trips. Prerequisite: course 226 or 227. From pre-sentence report to discharge of ex-offenders. Major emphasis is not on prisoners' rights but rather it is on the lawyer's role in all sentencing alternatives. Guest speakers and field trips are planned. A seminar paper may be required in lieu of a final examination.

276. Juvenile Justice Process (2) (II) Feeley Discussion—2 hours. Field trips. Legal and philosophical bases of a separate juvenile justice process; police investigation, apprehension and diversion; probation intake and processing; juvenile court hearings; and sentences and their corrections. Major emphasis is on the emerging role of course at each phase of the process. Guest speakers and field trips. A seminar paper may be required in lieu of a final examination.

277. Corporate Finance (2) Discussion—2 hours. Prerequisite: courses 213, 214 or 215. Economic and legal problems arising in connection with financing decisions of public business corporations; in- cluding valuation of the enterprise and its securities, deter-
287. Individual Rights and Union Authority (2) I. Barstic Seminar—2 hours. Prerequisite: consent of instructor. A study of the role of law in promoting union democracy, including rights and remedies available to workers, both union and non-union, to resist these pressures as they arise. Also covered are the formal and informal procedures for resolving grievances and complaints of being wronged, together with an examination of the role of law and the lawyer in ending poverty. Its sustaining conditions, and effects.

289. Criminal Justice Administration Seminar (2) I. Feeney Seminar—2 hours. Prerequisites: course 261 recommended. Consideration of current reform efforts in criminal justice administration. Emphasis will be on the pre-trial process. Specific topics include pre-trial detention, criminal discovery, and the charging process.

291-293. Litigation Seminar (2-3) I. Wilkerson Laboratory—lecture-discussion—2 hours (flexible); variable meetings with instructor. Prerequisite: courses 219 and 263 (concurrence recommended). Student receives intensive participative exposure to litigation process. In 291A, following brief series of lectures, demonstrations and assigned readings, students will prepare and conduct oral arguments of forensic trials simulating the basic components of a trial (e.g., opening statements, direct and cross-examination of lay and expert witnesses; introduction of physical evidence, closing arguments). During this phase of the student is assigned to small (2-3) people law firm, and under general supervision of "senior partner," undertakes responsibility for preparing and conducting a substantial case through the complete litigation process from initial client interview to jury trial (usually mid-spring), including factual investigation, legal research, pleading, discovery, and law and motion practice. In connection with the Trial Practice II program, seminar students prepare simultaneous oral trial as trial advisors. Seminar students are selected to participate as prosecution and defense counsel in California Highway Patrol Academy mock trial (SU grading only, deferred pending completion of course).

292. Immigration Law and Procedure (2) Seminar—2 hours. The course will include consideration of the following: status of the U.S. as a nation of immigrants; fundamental rights of aliens; discrimination against aliens; enforcement and operation of the laws; entry into the United States; administrative appeals; denial of entry; deportation; the INS and the judicial review process; the state and local aspects of the law; and current developments in the law. (SU grading only, deferred pending completion of course.)

293. International Environmental Law (2) I. Angelo Seminar—2 hours. The seminar will examine the impact of international law on environmental problems. Topics will include the role of international organizations and environmental agreements in the formulation of national policies. The seminar will also cover the role of international law in the resolution of environmental disputes.

294. Public Law (2) I. Goodpastur Seminar—2 hours. A selective study of the processes, institutions, and practices which produce, maintain, and interpret written and unwritten rules and policies, whether in the public or private sector.
also be required to prepare a bi-weekly journal, noting, commenting upon, and reflecting upon their clinical experience. (SU grading only.)

460. Clinical Program in the Legislative Process (2-4) I, II, Parnas
Clinical Program. Prerequisite course 231 recommended. This program is designed to provide students with practical experience in the operation of the office of a legislator or the operation of a legislative committee for 7 to 14 hours per week. The major thrust of the program is to enable students to become familiar with the give and take realities of the process of making law as contrasted with their interpretation and enforcement. Journals and seminar attendance are required. (SU grading only.)

470. Clinical Program in the Administration of Criminal Justice (4-12) I, II, Parnas, II, Goodpaster
Clinical Program. Prerequisites: courses 219, 226, 227 and 263 recommended. This program affords students the opportunity to gain practical experience working full or part time in a Local Agency's Public Defender's office in one of several surrounding counties for a minimum of 13 hours per week. Students enrolled in the program engage in the full range of activities associated with their respective office with emphasis on observation and participation in judicially related activities, interviewing, counseling, negotiating, motion practice, and trials under state bar rules. Journals and seminar attendance are required. Limited enrollment; Fall registration limited to third-year students. (SU grading only.)

480. Legal Problems of the Prison Inmate (2-4) I, II, Smith
Clinical Program. Prerequisite: course 210 and 275 recommended. This program offers students the opportunity to assist prisoners of the California Medical Facility at Vacaville with their legal problems, including both civil and criminal matters. Students are engaged throughout the semester interviewing inmates, investigating and evaluating their cases for a minimum of 6 hours per week. Seminar sessions on prison and parole laws are scheduled throughout the semester. The seminars will also include development of the ability to: interview, counsel, and negotiate in legal matters and in the criminal justice system guided by instruction, discussion, and simulated session and individual counseling. Limited enrollment. (SU grading only.)

485. Street Law (2) I, II
Clinical and seminar. Teams of selected students will be assigned to teach a general law course to prisoners in the California Medical Facility at Vacaville, the Sacramento County Jail, and Yolo County Jail. There is a wide demand among prisoners for practical knowledge of the law. The seminar will be devoted to the development of the students' teaching, writing, oral advocacy and communication skills and to the exploration of the social and legal problems of inmates. (SU grading only.)

485. Instruction in Legal Writing and Oral Advocacy Skills (2-3) I, II, The Staff
Lectures, legal writing, oral advocacy, simulated discussion. Prerequisite: either course 235 plus one semester of 410 or 208A-208B. Each student will plan, present, and oversee a legal writing project for one section of the course. Approval of the Court Board required for enrollment. May be repeated once for credit. (SU grading only.)

Linguistics
(College of Letters and Science)
Lenora Timm, Ph.D., Program Director
Program Office, 912 Sprout Hall, 752-1219

Committee in Charge
Wilbur A. Benware, Ph.D. (German), Committee Chairman
Maria Manolou-Manea, Ph.D. (French and Italian)
Richard A. Ogle, Ph.D. (Linguistics)
Winter-Spring Quarters
Susan B. Shinbo, Ph.D. (Rhetoric)
Maximo Torreblanca, Ph.D. (Spanish)
Lenora Timm, Ph.D. (Linguistics)
Edward J. Tully, Jr. (Mathematics)

Faculty
Ronald A. Arbin, Ph.D., Associate Professor (Philosophy)
Jarvis R. Bastian, Ph.D., Associate Professor (Psychology)
Wilbur A. Benware, Ph.D., Associate Professor (German)
Kent Bimson, Ph.D., Visiting Lecturer (English)
Gary L. Cronkite, Ph.D., Professor (Rhetoric)
Liliana C. Ehrl, Ph.D., Associate Professor (Education)
Campbell Gallant III, Ph.D., Assistant Professor (Russian)
Wayne Hasl, Ph.D., Professor (Linguistics, English)
Daniel Lafferty, Ph.D., Associate Professor (Russian)
Maria Manolou-Manea, Ph.D., Professor (French and Italian)
Barbara J. Merino, Ph.D., Assistant Professor (Education)
Richard A. Ogle, Ph.D., Assistant Professor (Linguistics)
David L. Olmsted, Ph.D., Professor (Anthropology)
Winfried Schleifer, Ph.D., Associate Professor (English)
Gwendolyn Schwabe, M.A., Lecturer (English)
Janet Shibamoto, Ph.D., Assistant Professor (Anthropology)
Susan B. Shinbo, Ph.D., Assistant Professor (Rhetoric)
Lenora Timm, Ph.D., Associate Professor (Linguistics)
Maximo Torreblanca, Ph.D., Associate Professor (Spanish)
Carolyn F. Wall, Ph.D., Associate Professor (Anthropology)
Benjamin E. Wallack, Ph.D., Professor (Anthropology and Civilizations)

The Major Program
The discipline of linguistics encompasses a broad spectrum of knowledge about human language. Linguistics focuses on the description of contemporary languages and the study of language change through time. It also has important applications within many other disciplines such as anthropology, biology, communications, education, language teaching, literature, philosophy, psychology, and sociology.

The major is designed to familiarize students with the methods of linguistic analysis at gradually accelerated levels of methodological and theoretical complexity through a sequence of "core" courses. Elective courses allow the student to explore areas which overlap linguistics.

Linguistics
A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linguistics 1 or 135</td>
<td>4</td>
</tr>
<tr>
<td>Foreign language, 20 units of Greek or Latin; or 22 units of any other language; or 30 units of two different languages</td>
<td>20-30</td>
</tr>
</tbody>
</table>

Depth Subject Matter:

| Linguistics 109, 110, 119, 140 | 16 |
| Linguistics 111 or 112 | 4 |
| Linguistics 102 or 112 | 4 |
| Oriental Languages and Civilizations 100 or Anthropology 100 | 24 |

At least 12 upper division units from the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropology 119, 120, 140, 176</td>
<td>12</td>
</tr>
<tr>
<td>English 105A, 105B, French 159</td>
<td>16</td>
</tr>
<tr>
<td>Human Development 101</td>
<td>150</td>
</tr>
<tr>
<td>Italian 150</td>
<td>150</td>
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<tr>
<td>Linguistics 105, 106</td>
<td>150</td>
</tr>
<tr>
<td>Russian 160</td>
<td>120</td>
</tr>
<tr>
<td>Spanish 131, 132, 133</td>
<td>133</td>
</tr>
</tbody>
</table>

The student should note that a number of these courses have prerequisites. Since it is usually to select some emphasis within the Linguistics major (e.g., anthropology, a foreign language, etc.) such prerequisites should be completed as a matter of course.

Total Units for the Major: 64-74

Major Advisers: W.A. Benware, L. Timm, C.F. Wall

Minor Program Requirements:
The minor in Linguistics is designed to provide the student with a basic knowledge of linguistic analysis. It would be especially appropriate for students interested in any aspect of language use.

Linguistics
<table>
<thead>
<tr>
<th>Courses</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linguistics 1, 109, 119 or 139, 140</td>
<td>16</td>
</tr>
</tbody>
</table>

Additional units of upper division Linguistics courses, chosen in consultation with an adviser | 8 |

Minor Advisers. Same as Major advisers.

Graduate Study. The Linguistics Graduate Group offers study and research leading to the M.A. degree. Detailed information may be obtained from the Graduate Adviser or from the Chairperson of the Linguistics Group.


Courses in Linguistics

Lower Division Courses

1. Introduction to Linguistics (4) I, II, III, Ogle, Timm, Benware, Wallack
Lecture, 1 hour. Laboratory in the study of language, its nature, diversity, and structure.

2. Historical Linguistics (4) II, Benware
Lecture, 1 hour; discussion, 1 hour. Prerequisite: course 1 and 109. Description and methods of the historical study of language; sound change, morphological change, semantic change. Offered in odd-numbered years, alternating with course 202.

3. German Phonology-Morphology (4) III, Benware
Lecture, 1 hour; discussion, 1 hour. Prerequisite: German 4; course 1 recommended. Modern German phonetics and the structures of the phonological system. Elementary morphological analysis. Offered in odd-numbered years.

4. History of the German Language (4) III, Benware
Lecture, 1 hour; discussion, 1 hour. Prerequisite: course 1 and 109. Survey of the development of the German language and its description in historical perspective. Offered in even-numbered years. (Same course as German 106.)

5. Special Topics in English Language (4) I, Schleifer, Harkness
Seminar, 1 hour; special project. Prerequisite: one course from English 1, 2, 3, 4A, 4B. Investigates a variety of subjects in contemporary and historical English language. May be repeated for credit when a different topic is studied. (Same course as English 107.)

6. Phonetics (4) I, Wall
Lecture, 2 hours; discussion, 1 hour. Thorough grounding in articulatory phonetics with some attention to the fundamentals of acoustic phonetics. (Same course as Anthropology 109.)
110. Elementary Linguistic Analysis (4) II, Olmsted, Shibamone
Lecture—3 hours: discussion—1 hour. Prerequisite: course 109. An introduction to phonemic theory, morphophonemics, morphemics, and syntax. (Same course as Anthropology 110.)

111. Intermediate Linguistic Analysis (4) III, Olmsted
Lecture—3 hours: discussion—1 hour. Prerequisite: course 110. Introduction of course 110. More advanced work in phonemics, morphophonemics, morphemics, and syntax. (Same course as Anthropology 111.)

112. Comparative Linguistics (4) I, Olmsted
Lecture—3 hours: discussion—1 hour. Prerequisite: course 110. Linguistic history, historical linguistics, and reconstruction. (Same course as Anthropology 112.)

113. Language and Sex (4) III, Timm
Lecture—3 hours: discussion—1 hour. Prerequisite: course 112. Investigation of real and purative (stereotyped) sex-linked differences in language structure and usage, with a consideration of some social and psychological consequences of such differences. Focus is on English, but other languages are also discussed.

114. The Ethnography of Speaking (4) I, Timm, Wall
Lecture—3 hours: discussion—1 hour. Prerequisite: course 112. Theoretical and applied aspects of verbal behavior, participants, situations, and functions of communication. Special communities include the Cihano Chicanos in the Southwest. (Same course as Anthropology 114.)

115. Chincan Sociolinguistics (4) III, Timm
Lecture—3 hours. Prerequisite: course 112. Language and Spanish 3 or the equivalent. Study of the variables in the Chicanos in the Southwest. (Same course as Anthropology 114.)

120. Semantics (4) II, Gallay, Meana
Lecture—3 hours: discussion—1 hour. Prerequisite: course 112. Language and Spanish 3 or the equivalent. 

121. Perspectives on Linguistic Research (4) II, Timm
Lecture—3 hours: discussion—1 hour. Prerequisite: course 112. Language and Spanish 3 or the equivalent. The nature of linguistic research, the methods of linguistic research, and the role of linguists in society. (Same course as Anthropology 114.)

122. Romance Linguistics (4) I, Meana
Lecture—3 hours: discussion—1 hour. Prerequisite: course 112. Language and Spanish 3 or the equivalent. An introduction to Romance languages and their history. (Same course as Anthropology 114.)

123. Language Development (4) I, Wall
Lecture—3 hours: discussion—1 hour. Prerequisite: course 112. Language and Spanish 3 or the equivalent. Language acquisition, including the development of language in children and the development of language in adults. (Same course as Anthropology 114.)

130. Phonological Analysis (4) I, Birmson
Lecture—3 hours: discussion—1 hour. Prerequisite: course 109. Introduction to phonological theory. (Same course as Anthropology 115.)

140. Grammatical Analysis (4) I, Ogle
Lecture—3 hours: discussion—1 hour. Prerequisite: course 112. Structural analysis of natural languages. Emphasis will be on developing knowledge and data analysis, rather than on investigating formal issues of the theoretical framework to be employed.

146. The Indo-European Languages (4) I, Ogle
Lecture—3 hours: discussion—1 hour. Prerequisite: course 112. Introduction to the Indo-European language family and its major grammatical features. (Same course as Anthropology 115.)

150. Contrastive Analysis of Spanish and English (4) III, Tononblanc, Timm
Lecture—3 hours: discussion—1 hour. Prerequisite: course 112. Introduction to the contrastive analysis of Spanish and English. (Same course as Anthropology 115.)

155. Introduction to Generative Grammar (4) I, Ogle
Lecture—3 hours: discussion—1 hour. Prerequisite: course 112. Introduction to the theory of generative grammar, formalization, and syntax of generative grammar. Learning problems of both native English and Spanish speakers will be considered.

160. Stylistics (4) II, Harsh, Birmson Seminar—3 hours: term paper. Prerequisite: English 105A. Analysis of linguistic style in specific works selected from the corpus of literature in English. (Same course as 116.)

1977. Tutoring in Linguistics (1-4) I, II, III. The Staff (Chairperson in charge)
Prerequisite: one of the following courses: Linguistics 105A, 105B, 105C, or 105D. (Same course as Anthropology 114.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: senior standing in Linguistics. (Same course as Anthropology 114.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Timms in charge)
Prerequisite: senior standing in Linguistics. (Same course as Anthropology 114.)

Graduate Courses

200. Gothic Language (4) I, Benware
Seminar—3 hours. Knowledge of modern German not required. Phonology, grammar, and reading of Gothic texts. Special topics include the relationship of Gothic to Indo-European and its place in the Germanic languages. Offered in even-numbered years. (Same course as German 200.)

202. Principles of Historical Linguistics (4) I, Benware
Seminar—3 hours. Prerequisite: course 102 or 112. Advanced treatment of the theory and methods of historical linguistics. Offered in odd-numbered years.

205. History of the German Language (4) I, Benware Seminar—3 hours. The development of the German language with emphasis on the early periods, from Middle High German to Middle German. (Same course as German 205.)

215. Computational Linguistics (4) II, Timm Seminar—3 hours. The use of computers and other computational devices in linguistic analysis, mechanical translation, and lexiconology. (Same course as Anthropology 114.)

220. Romance Linguistics (4) I, Meana Seminar—3 hours. A comprehensive survey of Romance languages, including their history, structure, and usage. Offered in odd-numbered years.

230. Modern Linguistic Theory (4) II, Ogle Seminar—3 hours. Prerequisite: course 165 or 163. Study of recent developments in second languages and their usage. Offered in even-numbered years.

250-D. Topics in Linguistic Theory and Methods (4) I, I, III.
The Staff Seminar—3 hours: laboratory—3 hours. Prerequisite: English 105A or course 109. Introduction to teaching English as a foreign language. (Same course as Anthropology 114.)

Professional Course

300. The Teaching of English as a Foreign Language (4) I, Schwab
Lecture—3 hours: laboratory—3 hours. Prerequisite: English 105A. Study of the four major language areas of English and their teaching methods. Offered in odd-numbered years. (Same course as Anthropology 114.)

397. Literature in Translation

The following courses are open to students throughout the campus. The readings can be in English. Refer to department listing for the course description.

Classics

40. Homer and the Tradition of Ancient Epic
41. Greek Tragedy
42. Greek Comedy
43. Greek and Roman Novel
44. Greek and Roman Novel

Comparative Literature

1. The Short Story and Novella
2. Fairy Tales, Fables and Parables
3. Myths and Legends
4. Literature of the Supernatural
5. Utopias and their Transformations
6. World Literature
7. Dramatic Literature
8. The Spiritual Quest
9. Man and the Natural World
10. Comparative Literature
11. Women Writers
12. A-typical Drama
13. A-typical Comedy
14. A-typical Tragicomedy
15. A-typical Comedy
16. The Theory and Practice of Literary Translation
17. Biography and Autobiography
18. A-typical Drama
19. A-typical Comedy
20. A-typical Tragicomedy
21. A-typical Comedy
22. Comparative Study of Major Authors
23. Modern Literary Movements
24. Modern Literary Movements

Dramatic Art

20. Introduction to Dramatic Art
21. Theatre and Drama: Aeschylus to Machiavelli
22. Theatre and Drama: Shakespeare to Schiller
23. Theatre and Drama: Ibsen to Albee
24. Contemporary Experimental Theatre and Drama

English

170A. The Epic
171. English Bible as Literature

French

25. French Literature in Translation
26. Masterpieces of French Literature

German

29. Freshman Seminar
30. Survey of German Culture
31. Masterworks of German Literature
32. Masterworks of German Literature
33. Older German Literature
34. Studies in Major Writers from the Seventeenth to the Twentieth Century
35. Special Topics in German Literature
36. Goethe’s Faust
37. Hermann Hesse
38. German Literature since 1945
39. German Literature since 1945
40. Intellectual Backgrounds of German Literature
Mass Communication

(Chool of Letters and Science)

Program Office, 912 Sprout Hall (752-1219)

Committee in Charge
Harvey Himelfarb, M.A. (Art.), Committee Chairperson
Joan C. Carr, Ph.D. (English)
Everard d’Harmoncourt, Ph.D. (Dramatic Art)
Jay Mechling, Ph.D. (American Studies)
John R. Owens, Ph.D. (Political Science)
Ralph S. Pomeroy, Ph.D. (Rhetoric)
Howard J. Weiner, Ph.D. (Mathematics)

The Major Program
This major is designed to acquaint the student with the general processes, content, and effects of the mass media. The program is not designed to provide specialized technical training. Rather, it is intended to introduce the student to the study of the nature, values, and functions of mass communication in our society and to encourage the student to integrate theoretical concepts, research findings, and critical insights from both social science and humanistic disciplines into a basic understanding of mass media. The major prepares students for graduate study in mass communication or journalism, for advanced professional training, and for careers requiring a coherent understanding of mass communication. Possible careers include advertising, public relations, news, and management of media outlets.

Mass Communication

A.B. Major Requirements:

Preparatory Subject Matter
There are no lower division requirements for the major. Students should plan to take those courses needed to satisfy prerequisites for upper division requirements in the major program.

Depth Subject Matter
At least 36 upper division units, selected in consultation with a major adviser, to include four courses from one of the following major areas, four courses from the remaining areas. The major areas are as follows:

- Rhetoric
- Mass Communication

Eligibility for upper division courses requires a grade of B or better in the major.

Senior Project

Students must complete a senior project in consultation with a major adviser.

Total Units for the Major

43-45

Topics

- Communication Theory
- Social and Political Influences on the Mass Media
- Production of Media Content
- Analysis of the content and Effects of Mass Communication

Note: With approval from the Mass Communication Curriculum Committee, certain courses not listed above may be used to satisfy upper division area requirements.

Student’s Program
A prospective or declared major planning to major in Mass Communication should submit a proposal program of upper division courses, prepared in consultation with a major adviser, to the MCC Committee for approval no later than the first quarter of the junior year. Prospective Mass Communication majors transferring into the College as upper division students should consult with an adviser immediately upon arrival.

Senior Project
A project proposal requiring approval by the majority of the Mass Communication Curriculum Committee precedes the senior project. Once the proposal has been approved, the student enrolls in Mass Communication 191. A paper is required substantiating the relation of the project to mass communication and containing a report and critical analysis of the process by which the project was created. If the project itself is a paper, as is the case in a library research paper or a report of an experiment or survey, that paper should incorporate sections substantiating the relationship to mass communication and critically analyzing the research process. If the project is a creative activity producing some artifact, that artifact must be accompanied by a separate paper in order to fulfill this requirement.

The project must be original work conceived, designed, and executed in consultation with a faculty adviser for the specific purpose of meeting the senior project requirement. Since it becomes the legal property of the Regent of the University it should not have been produced for any other purpose or previously submitted to any other agency except as approved by the Curriculum Committee and it should be unembargoed as to copyright at the time of its submission. (At the request of the student it may, of course, be released for publication or other public use after its acceptance by the Committee.)

The project may entail research answering some question or supporting some thesis regarding mass communication content, policy, or effects. For example, it may consist of a report of library research, an experiment, a survey, or a content analysis, or it may consist of a critical analysis of some communication event, process, or campaign. It may involve some form of creative activity which culminates in some artifact such as a film, audio or video tape, slide show, script, graphic design, a coordinated and perhaps multi-media persuasive or informational campaign, or some journalistic production such as a portfolio of editorial, news reports, or critical columns.

The completed project will be submitted for final approval in the quarter preceding the one in which the student plans to graduate (except for September graduates, who must submit their projects in the preceding winter quarter). Final approval requires a favorable evaluation of the completed project by two members of the Curriculum Committee assigned to the project by the Chairperson. If the two assigned members fail to agree, the project will be reviewed and the final decision made by a quorum of the entire Committee.

Both the proposal and the project must be submitted to the Curriculum Committee through the Mass Communication Office in 912 Sprout Hall.

Further information is contained in a booklet entitled, "Rationale and Program for Mass Communication Senior Projects," available in the Mass Communication Office.

Major Advisers. Members of the Committee.

Courses in Mass Communication

Upper Division Courses

191. Senior Project (5-3) I, II, III. The Staff (Committee Chairperson in charge)
Prerequisite: Rhetoric 190 and prior approval of senior project prospectus; upper division standing and declared major in Mass Communication or consent of instructor.

Directed execution of research study or creative project previously approved by Mass Communication Curriculum Committee. Credit will be given only upon approval of Curriculum Committee of the completed project. Required for Mass Communication majors.

192. Internship in Mass Communication (3-5) I, II, III. The Staff (Committee Chairperson in charge)
Work-study experience—9-15 hours. Prerequisite: completion of a minimum of 84 units of upper division course work; research project completed under Mass Communication supervision. Satisfactory completion of written report of project and satisfactory recommendation from on-site supervisor. (P/NP grading only.)

196. Directed Group Study (1-9) I, II, III. The Staff (Committee Chairperson in charge)
Seminar—1-5 hours. Prerequisite: upper division standing and consent of instructor. Group study of a topic or set of phenomena relevant to mass communication under the direction of a faculty member in mass communication. (P/NP grading only.)
Mathematics

(All undergraduate study is open to B.S. and B.A. students.
UNITS
Preparatory Subject Matter Mathematics 11 (or high school equivalent)
Mathematics 21A, 21B, 21C, 22A, 22B, 22C
29
Depth Subject Matter Mathematics 101, 108A (should be taken before junior year)
5
Total Units for the Major Mathematics 60-62

B.S. Major Requirements:
Preparatory Subject Matter Mathematics 11 (or high school equivalent)
Mathematics 21A, 21B, 21C, 22A, 22B, 22C
29
Depth Subject Matter Mathematics 101, 108A (should be taken before junior year)
5
Total Units for the Major Mathematics 60-62

Recommended Language Preparation Bachelor of Science degree candidates are advised to take
French, German, or Russian.

Depth Subject Matter Requirements Certain mathematics oriented courses given by other
departments may be admissible in partial satisfaction of the above mentioned 36- or 45-unit
requirements with prior departmental approval. In general, 192, 197TC, 198, and
199 courses are not appropriate to be applied towards this requirement; any exceptions
must be approved by the Department's committee on program review.

Statement of Objectives. During the last quarter
of the sophomore year each prospective
mathematics major should, in consultation with an
adviser, prepare a statement of his or her
mathematical objectives and a proposed upper
division program consistent with those objectives. The
form to be used for this statement is available from
the Department, and must be submitted in time to
receive final approval prior to the last day of
instruction of the first quarter of the junior year. Pro-
spective mathematics majors transferring to the
University at the upper division level should consult
an adviser immediately upon arrival.

Major Advisers. H. L. Alder, G. D. Chakerian, G.
J. Kurowski, P. Linz, R. E. Plant, S. K. Stein.

Information for Undergraduates. Students
interested in the study of mathematics should obtain
the Undergraduate Brochure, which is available at
the Department Office. Assistance in planning
an undergraduate major program in mathematics
should be obtained from a major adviser. In ad-
dition, students seeking information pertaining to
the application of mathematics to the biological or
social sciences or computer science may contact
the appropriate special area adviser.

Prerequisite Credit. Credit will normally be
granted for a course if it is prerequisite to a course
already successfully completed. Exceptions can
only be made by the Department Chairperson.

Applied Mathematics. Recommended
career preparation: Most programs include Mathematics
19 or 23, 118A, 118B, 120, 121A, 121B, 128A,
128B, 128C, and 167. Applied mathematics has
many possible areas of specialization; see the spe-
cial subject matter advisers for emphasis in ap-
plied analysis, biological science, computer sci-
ence, social science and systems theory.

Computer Science. Recommended preparation for a
career or graduate study in Computer Science should
include: Mathematics 29, 124, 128A, 128B,
128C, 129A, 129B, 139A, and 167. Contact
P. Linz, special adviser for Computer Science, for
more information.

Minor Program Requirements:

The Major Program
Students majoring in mathematics may follow a
program leading to either the Bachelor of Arts or
the Bachelor of Science degree. The latter is espe-
cially recommended for students who intend to
pursue mathematics at the graduate level. Under
either degree program the student may prepare for
different careers by an appropriate choice of
elective courses.

Developing an ability to think and communicate in
mathematical terms is the basic objective of both
bachelor's degree programs. This ability requires
familiarity with the concepts and techniques of
various branches of mathematics and is necessary
for graduate study in mathematics as well as the
successful pursuit of mathematically oriented
careers. In particular, mathematics is an essential
tool for people working in the physical sciences,
and mathematics has been widely applied to
studies in the biological and social sciences as
well. Students with career-oriented programs in
applied mathematics should supplement their
mathematics education with courses in other de-
partments which provide background in their pro-
posed area of application.

The Major Program

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program leading to either the Bachelor of Arts or
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well. Students with career-oriented programs in
applied mathematics should supplement their
mathematics education with courses in other de-
partments which provide background in their pro-
posed area of application.

Mathematics

A.B. Major Requirements:
Preparatory Subject Matter Mathematics 11 (or high school equivalent)
0-2
Mathematics 21A, 21B, 21C, 22A, 22B, 22C
29
Depth Subject Matter Mathematics 101, 108A (should be taken before junior year)
5
Additional upper division units in
Mathematics 31
Total Units for the Major Mathematics 60-62

B.S. Major Requirements:
Preparatory Subject Matter Mathematics 11 (or high school equivalent)
0-2
Mathematics 21A, 21B, 21C, 22A, 22B, 22C
29
Depth Subject Matter Mathematics 101, 108A (should be taken before junior year)
5
Additional upper division units in
Mathematics 40
Total Units for the Major Mathematics 60-62

Recommended Language Preparation Bachelor of Science degree candidates are advised to take
French, German, or Russian.

Depth Subject Matter Requirements Certain mathematics oriented courses given by other
departments may be admissible in partial satisfaction of the above mentioned 36- or 45-unit
requirements with prior departmental approval. In general, 192, 197TC, 198, and
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must be approved by the Department's committee on program review.

Statement of Objectives. During the last quarter
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mathematics major should, in consultation with an
adviser, prepare a statement of his or her
mathematical objectives and a proposed upper
division program consistent with those objectives. The
form to be used for this statement is available from
the Department, and must be submitted in time to
receive final approval prior to the last day of
instruction of the first quarter of the junior year. Pro-
spective mathematics majors transferring to the
University at the upper division level should consult
an adviser immediately upon arrival.

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J. Kurowski, P. Linz, R. E. Plant, S. K. Stein.

Information for Undergraduates. Students
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the Department Office. Assistance in planning
an undergraduate major program in mathematics
should be obtained from a major adviser. In ad-
dition, students seeking information pertaining to
the application of mathematics to the biological or
social sciences or computer science may contact
the appropriate special area adviser.

Prerequisite Credit. Credit will normally be
granted for a course if it is prerequisite to a course
already successfully completed. Exceptions can
only be made by the Department Chairperson.

Applied Mathematics. Recommended
career preparation: Most programs include Mathematics
19 or 23, 118A, 118B, 120, 121A, 121B, 128A,
128B, 128C, and 167. Applied mathematics has
many possible areas of specialization; see the spe-
cial subject matter advisers for emphasis in ap-
plied analysis, biological science, computer sci-
ence, social science and systems theory.

Computer Science. Recommended preparation for a
career or graduate study in Computer Science should
include: Mathematics 29, 124, 128A, 128B,
128C, 129A, 129B, 139A, and 167. Contact
P. Linz, special adviser for Computer Science, for
more information.

Minor Program Requirements:

Mathematics
Upper division units in mathematics (exclusive of
Mathematics 101, 192, 197TC, 198, 199)
20
Three of these units should come from
either Mathematics 36 or 37.

Special Area Advisers. F. A. Howes, (Aplied
Analyze) (Plant Biological Science), P. Linz
(Computer Science), H. J. Weigner (Probability), K.
Kleth (Social Science, Minor Program), A. J. Kren-
er (Systems Theory).

Graduate Study in Pure Mathematics. Recom-
thended preparation: Mathematics 127A, 127B,
127C, and 151A, 151B, 151C. Students are free to
take additional courses reflecting their special
interests with the approval of their adviser.

Secondary Teaching in Mathematics. Recom-
thended preparation: Mathematics 108A, 139A,
139B, 141, and 167 are essential; a selection from
courses 19 (or 29), 39, 36, 112, 114, 115A, 128A is
highly recommended.

Teaching Credential Subject Representative. G.
T. Sailese. See page 105 for the Teacher Education Program.

Graduate Study. The Department offers pro-
grams of study and research leading to the M.A.,
M.A.T., and Ph.D. degrees in mathematics. De-
tailed information regarding graduate study may
be obtained by writing to the Graduate Adviser,
Department of Mathematics.

Graduate Advisers. D. W. Barnett, F. A. Howes,

Courses in Mathematics

Lower Division Courses

Mathematics

B. Elementary Algebra (no credit). I. The Staff
Lecture—3 hours. Basic concepts of algebra, including
polynomials, factoring, equations, graphs, and inequalities.
Offered only if sufficient number of students enroll. (P.N.P.
grading only) (There is a fee of $45.)

C. Trigonometry (no credit) I. II. The Staff
Lecture—3 hours. Basic concepts of algebra, designed to
prepare the student for college work in mathematics, such
as course 16A, or 21A. Functions, equations, graphs, loga-

rithms, and systems of equations. Offered only if sufficient
number of students enroll. (P.N.P. grading only) (There is a fee of $30.)

D. Intermediate Algebra (no credit) I. II. The Staff
Lecture—3 hours. Basic concepts of algebra, designed to
prepare the student for college work in mathematics, such
as course 16A, or 21A. Functions, equations, graphs, loga-

11. Analytic Geometry (2) (I, II, III. The Staff Lecture—3 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry. Analytic geometry in two dimensions.

15. Introduction to Metric Theory and Linear Programming (III) (II, I. The Staff Lecture—3 hours. Prerequisite: one year of high school algebra, plane geometry, plane trigonometry. Not open for credit to students who have received credit for course 22A. Not recommended for students who wish to major in the mathematical sciences.

28A. Analytic Geometry and Calculus (3) (II, II, III. The Staff Lecture—3 hours. Prerequisite: one year of high school algebra, plane geometry, plane trigonometry. Not open for credit to students who have received credit for course 22A. Not recommended for students who wish to major in the mathematical sciences.

28B. Analytic Geometry and Calculus (3) (II, II, III. The Staff Lecture—3 hours. Prerequisite: course 18A or 21A. Not open for credit to students who have received credit for course 21B. Continuation of course 18A.

28C. Analytic Geometry and Calculus (3) (II, II, III. The Staff Lecture—3 hours. Prerequisite: course 18B or 21B. Not open to students who have received credit for course 21C. Continuation of course 18B.

18. Basic Concepts of Computing (3) (II, I, II. The Staff Lecture—3 hours. Prerequisite: two years of high school algebra, geometry, and trigonometry. Introduction to principles of computing. Methods and algorithms for solving problems by computer. Also includes an introduction to data structures and algorithms for students in physical sciences and mathematics. Students having had course 29 or Engineering 5 may not receive credit for this course.

21A. Calculus (4) (I, II, I. The Staff Lecture—discussion—4 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry (if analytic geometry has not been completed, course 11 may be taken concurrently). Only two units of credit will be allowed to students who have credit for courses 11A, 11B, 11C. Prerequisites: continuity, limits, and derivatives. Differential and integral calculus. Functions, differentiation, and integration. Functions of one variable. Elements of multivariable calculus.

21AH. Honors Calculus (4) I. The Staff Lecture—4 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry (if analytic geometry has not been completed, course 11 may be taken concurrently). Only two units of credit will be allowed to students who have credit for courses 11A, 11B, 11C. Prerequisites: continuity, limits, and derivatives. Differential and integral calculus. Functions, differentiation, and integration. Functions of one variable. Elements of multivariable calculus.

21B. Calculus (4) (I, II, I. The Staff Lecture—discussion—4 hours. Prerequisite: course 21A or 21AH. Only two units of credit will be allowed to students who have received credit for course 11B. Continuation of course 21A. Prerequisites: continuity, limits, and derivatives. Differential and integral calculus. Functions, differentiation, and integration. Functions of one variable. Elements of multivariable calculus.

21B. Honors Calculus (4) II. The Staff Lecture—4 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry (if analytic geometry has not been completed, course 11 may be taken concurrently). Only two units of credit will be allowed to students who have received credit for course 11B. Continuation of course 21A. Prerequisites: continuity, limits, and derivatives. Differential and integral calculus. Functions, differentiation, and integration. Functions of one variable. Elements of multivariable calculus.

21C. Calculus (4) (I, II, I. The Staff Lecture—discussion—4 hours. Prerequisite: course 21B or 21BH. Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions, partial derivatives, total differentials. Applications to maximum and minimum problems in two and three variables. Definite integrals over plane and solid regions in various coordinate systems. Applications to physical systems.

21CH. Honors Calculus (4) III. The Staff Lecture—discussion—4 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry (if analytic geometry has not been completed, course 11 may be taken concurrently). Only two units of credit will be allowed to students who have received credit for course 11B. Continuation of course 21A. Prerequisites: continuity, limits, and derivatives. Differential and integral calculus. Functions, differentiation, and integration. Functions of one variable. Elements of multivariable calculus.

22A. Linear Algebra (3) (I, II, III. The Staff Lecture—3 hours. Prerequisite: nine units of college mathematics, linear or abstract transformations, determinants, complex numbers, quadratic forms. Courses 22A, 22B, 22C may be taken in any order. However, if enrolled in Physics 41C, 41E-1, and 41C-2C, courses should be taken in reverse order, 22C, 22, 22A, 22B.

22A. Honors Linear Algebra (3) III. The Staff Lecture—3 hours. Prerequisite: course 22B or consent of instructor. More intensive treatment of material covered in course 22A.

22B. Differential Equations (3) (I, II, III. The Staff Lecture—3 hours. Prerequisite: course 21C. Solutions of elementary differential equations.

22B. Honors Differential Equations (3) III. The Staff Lecture—3 hours. Prerequisite: course 21C or consent of instructor. More intensive treatment of material covered in course 22B.

22C. Vector Analysis (3) (I, II, III. The Staff Lecture—3 hours. Prerequisite: course 21C. Vector algebra, vector calculus. Scalar and vector fields, line and surface integrals, Green's theorem, Stokes' theorem, divergence theorem.

22CH. Honors Vector Analysis (3) III. The Staff Lecture—3 hours. Prerequisite: course 21C or consent of instructor. More intensive treatment of material covered in course 22C.

29. Introduction to Computer Science (3) (II, I. The Staff Lecture—2 hours: laboratory—2 hours. Prerequisite: course 21C. Introduction to properties of a digital computer. Implementation of mathematical algorithms on a computer. Students electing this course may not receive credit for Engineering 5 and only two units of credit will be allowed for students who have had course 21C.

38. Fundamentals of Mathematics (3) (II, III. The Staff Lecture—3 hours. Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics. Properties of the primes, the fundamental theorem of arithmetic, properties of the rationals and irrationals, binary and other number systems.

37. Topology in Geometry (3) III. The Staff Lecture—3 hours. Prerequisite: one year of high school geometry. Topics in Euclidean geometry selected from the theory of geometric transformations, the area and dissection of plane figures, conic sections, elements of foundations of geometry.

71A. Elementary Mathematics and its Instruction (4) (I. The Staff Lecture—2 hours: field work—6 hours. Introduction to the mathematics teaching course and methods of instruction in grades K-8. Emphasis requires concurrent placement as a teacher-aid. (Deferred grading only, removing completion of course 71A-71B sequence.)

71B. Elementary Mathematics and its Instruction (3) (II. The Staff Lecture—3 hours. Prerequisite: course 71A; Education 100 must be taken concurrently. Continuation of course 71A. (Deferred grading only, pending completion of course 71A-71B sequence.)

98. Directed Group Study (1.5-5) (I, II, III. The Staff (Chairperson in charge.) Prerequisite consent of instructor. (P/N grading only.)

Upper Division Courses

101. Survey of Contemporary Mathematics (2) (II. The Staff Lecture—3 hours. Prerequisite: one year of high school algebra. An introduction to modern mathematics, its methods and applications, including the relationship between pure and applied mathematics. (P/N grading only.)

106A. Introduction to Abstract Algebra and Analysis (5) III. The Staff Lecture—3 hours. Prerequisite: course 21C or consent of instructor. Fundamental concepts including cardinal numbers, order types, ordinal numbers. Offered in odd-numbered years.

127A-127B. Advanced Calculus (4-4-4) I-II-III. The Staff Lecture—3 hours. Extensive reading and problem solving. Prerequisites: courses 22A, 22B, 22C; course 106A (may be taken concurrently with consent of instructor). Real number system, continuity, differentiation and integration on the real line; vector calculus and functions of several variables; theory of convergence.

128A. Numerical Analysis (4) IV. The Staff Lecture—3 hours: discussion—1 hour. Prerequisite: course 29 or a knowledge of FORTRAN or ALGOL. Error analysis, approximation, interpolation, numerical differentiation and integration.

128B. Numerical Analysis in Solution of Equations (4) IV. The Staff Lecture—3 hours: discussion—1 hour. Prerequisites: courses 22A and 29 or knowledge of FORTRAN or ALGOL. Solution of nonlinear equations and systems. Minimization of functions of several variables. Simultaneous linear equations. Eigenvalue problems. Linear programming.


129A. Mathematical Aspects of Computer Systems (4) IV. The Staff Lecture—3 hours: discussion—1 hour. Prerequisites: courses 22B, 22A, and 128A. Linear algebra, eigenvalues, eigenvectors, inner products, orthogonal bases, matrix factorizations, optimization, complexity theory.

129B. Mathematical Aspects of Computer Programming (4) II. The Staff Lecture—3 hours: discussion—1 hour. Prerequisites: courses 22A, 22B, and 129A. Fundamentals of computer programming, data structures, efficiency, data structures graphs, trees, reliability of data structures to problem solving, analysis of algorithms.

129C. Automata Theory and Formal Languages (4) I. The Staff Lecture—3 hours: discussion—1 hour. Prerequisite: course 129B or consent of instructor. Automata theory, Turing machines, formal languages and grammars. Discussion of formal aspects of ALGOL. Parsing of grammars.
131. Methods of Mathematical Probability (4) I. The Staff Lecture—4 hours. Prerequisite: course 20A. Probability space, event, combinatorial: discrete, continuous distribu-
tions, random variables: joint, marginal conditional den-
sities, moments: sums and moments are incom-
parable: laws of large numbers; central limit law; proba-
bility models via conditioning; tables. Students who have had Statistics 19A may not receive credit for this course.


136. Development of Mathematical Ideas (3) II. Kleeth Lecture—3 hours. Prerequisite: course 21C. Topics and mathemations studied with an emphasis on the origin of modern mathematics. May be repeated for credit with con-
sent of instructor.

139A. Introduction to Algebra (3) I. The Staff Lecture—3 hours. Prerequisite: courses 22A and 108A or consent of instructor. Introduction to the theory and applications of groups, rings, and fields. Not open to students who have already earned credit in course 151A without consent of Department Chairperson.

139B. Introduction to Algebra (3) II. The Staff Lecture—3 hours. Prerequisite: course 199A. Continuation of course 139A.

140. Applications of Mathematics (3) III. The Staff Lecture—3 hours. Prerequisite: courses 22A and 22B. Applications of mathematics in physical, biological and social sciences. Formulation, analysis and interpretation of math-
ematical models.

141. Euclidean Geometry (3) III. I. The Staff Lecture—3 hours. Prerequisite: course 108A. An axiomatic and analytic examination of Euclidean geometry from an advanced point of view, in particular, a discussion of its relation to other geometries.

143. Biomathematics (3) III. II. Plant Lecture—3 hours. Prerequisite: course 16C or 21C. Appl-
lications of mathematics in biology and the life sciences. Compartamental analysis, enzyme kinetics, population models, blood flow and neural modeling.

147. Topology (3) III. I. The Staff Lecture—3 hours. Prerequisite: course 127C, and 151A or 139A-139B. Basic notions of point-set and combinatorial topology. Offered in even-numbered years.

151A-151B-151C. Algebra (4-4-4) I-II-III. The Staff Lecture—3 hours. Prerequisite: course 108A. Groups, rings, fields and linear transformations. Course emphasizes theory and its application to the study of finite groups. Offered in even-numbered years.


167. Linear Algebra and Applications (3) III. The Staff Lecture—3 hours. Prerequisite: one of courses 20A, 21B, or con-
sent of instructor. Introduction to linear algebra: linear equa-
tions, orthogonal projections, similarity transformations, quadratic forms, eigenvalues and eigenvectors, applications to physics, engineering, economics, biology and statistics.

168. Mathematical Programming and Game Theory (3) III. The Staff Lecture—3 hours. Prerequisite: one year of calculus, and either course 22A or 2A. Linear and nonlinear programming, dynamic programming and game theory. Offered in even-numbered years.

168A-168B. Functions of a Complex Variable (3-3) II-I. The Staff Lecture—3 hours. Prerequisite: course 22C. Complex num-
ber analysis: analyticity, functions, elementary func-
tions. Cauchy integral theorem: power series. Laurent series, residue theorem: conformal mapping, special top-
ics. Offered in odd-numbered years.

192. Internship in Applied Mathematics (1-3) I-II. III. The Staff (Chairperson in charge) Work-experience oriented research. Prerequisite: upper di-
vision standing; project approval by faculty sponsor prior to enroll-
ment. Supervised work-experience in applied mathematics. May be repeated for credit for a total of 10 units. (P/NP grading only.)

197C. Tutoring Mathematics in the Community (1-5) I-II. III. The Staff (Chairperson in charge) Seminar—1-2 hours, 0-2 lecture credits. Prerequisite: upper division standing and consent of instructor. Special projects in mathematical education which involve the de-
velopment of techniques for mathematics instruction and tutoring on an individual or small group basis. (P/NP grad-
ing only.)

198. Directed Group Study (1-5) I-II. III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I-II. III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

201A-201B-201C. Real Analysis (3-3-3) I-II-III. The Staff Lecture—3 hours. Prerequisite: course 127C. Point set topology; Lebesgue measure and integration on the real line; abstract spaces; general measure and integration.

202A-202B-202C. Functional Analysis (3-3-3) I-II-III. The Staff Lecture—3 hours. Prerequisite: courses 127C, 151C, 201C. Hilbert spaces, spectral theorem, Banach spaces, com-
mutative Banach algebras.

205A-205B-205C. Functions of a Complex Variable (3-3-3) I-II-III. The Staff Lecture—3 hours. Prerequisite: course 127C. Theory of analytic functions: Cauchy integral theorem, power series, analytic continuation, conformal mapping, special func-
tions. Offered in even-numbered years.

210A-210B-210C. Topics in Algebra, Analysis and Geometry (3-3-3) I-II-III. The Staff Lecture—3 hours. Prerequisite: bachelor’s degree in math-
ematics or consent of instructor. Topics in advanced alge-
bra, analysis and geometry selected from current curriculum at all levels. (Courses 210A, 210B, 210C series may be repeated for credit with prior consent of instructor.)

212A-212B. Stochastic Differential Equations and Applications (3-3-3) I-II. The Staff Lecture—3 hours. Prerequisite: graduate standing or con-
sent of instructor. Review of probability and simple stochas-
tic processes. Linear stochastic differential equations, methods for solution; Properties of diffusion-Markov processes, applications. Non-linear stochastic differential equa-
tions, Ito and Stochastic calculus, diffusion processes, numerical methods, boundary conditions. Asymptotic methods for the solution of stochastic differential equations, filtering applications, Offered in even-
numbered years.

215A-215B-215C. Topology (3-3-3) I-II-III. The Staff Lecture—3 hours. Prerequisite: graduate standing in math-
ematics or consent of instructor. Topics selected from topo-
sity and homotopy theory. Offered in even-
numbered years.

218A-218B. Partial Differential Equations (3-3-3) I-II. Benson Lecture—3 hours. Prerequisite: courses 22A, 127C. Topics from the theory of partial differential equations and integral equations. Offered in even-numbered years.

260. Special Problems (3-3-3) I-II-III. The Staff Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. The theory of groups, rings, and fields.

251A-251B. Theory of Groups (3-3-3) I-II. The Staff Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. Normal subgroups, cosets, Sylow subgroups, quotient groups, groups with oper-
ators, group extensions, group homomorphisms, and ordered groups. Offered in even-numbered years.

252. Linear Algebra (3) I. Stein Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. Vector spaces. Offered in even-numbered years.

253. Theory of Linear Spaces (3) III. Tanura Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. Elements of semi-
groups, quasigroups, and groupoids.

270A-270B. Modern Methods of Operations Research (3) I-
II. Mangel Lecture—3 hours. Prerequisite: graduate standing or con-
sent of instructor. Modelling, scaling, nondimensionaliza-
tion. Deterministic control theory, nonlinear deterministic differential equations, nonlinear filtering, nonlinear opti-
mization. Decision theory, information theory and applica-

290. Seminar (1-6) I-II. III. The Staff (Chairperson in charge) Advanced study in various fields of mathematics, including the following: algebraic theory of semigroups, control theory, mathematical logic and computability, ordin-
ary differential equations, partial differential equations, theory of distributions, and univalent functions. (SU grading only.)

298. Group Study (1-5) I-II. III. The Staff (Chairperson in charge) Offered in odd-numbered years.

299. Individual Study (1-12) I-II. III. The Staff (Chairperson in charge) (SU grading only.)
Medical Microbiology

See Medicine

**Medicine**

School of, this page; Medicine (Veterinary Medicine), see page 255

**Medicine**

(School of Medicine)

Hibbard E. Williams, M.D., Dean of the School
Errett M. Godin M.D., Executive Associate Dean
James J. Castles, M.D., Associate Dean
Guy Corkill, M.D., Associate Dean
Keith F. Kilian, Jr., Ph.D., Associate Dean
Don A. Rockwell, M.D., Acting Associate Dean
Thomas Winston, M.H.A., Associate Dean
Frederick W. Hanson, M.D., Assistant Dean
Gary L. Henderson, Ph.D., Assistant Dean
Charles C. Smith, M.D., Assistant Dean
Larry G. Stark, Ph.D., Acting Assistant Dean

Dean's Office, Medical Sciences IC (752-0331)

**Faculty**

Charles F. Abdiggaard, M.D., Professor
Peadiatrics
Stephen I. Abramowitz, Ph.D., Associate Professor in Residence (Psychiatry)
Harry G. Adams, M.D., Assistant Professor in Residence (Internal Medicine)
Raymond D. Adey, M.D., Assistant Professor in Pediatrics
Charles A. Ahlford, M.D., Assistant Professor in Pediatrics
Eva A. Amstel, M.D., Professor (Internal Medicine)
Ariya L. Anderson, M.H.S., Lecturer (Family Practice)
Neil C. Andrews, M.D., Professor (Postgraduate Medicine, Surgery)
Len Hughes Andrus, M.D., Professor (Family Practice)
Najam Awan, M.D., Assistant Professor in Residence (Internal Medicine)
Paul Bach-y-Plata, M.D., Professor in Residence (Physical Medicine and Rehabilitation)
Thomas Barica, M.D., Instructor in Residence (Radiology)
William Barron, M.D., Assistant Professor (Internal Medicine)
Alexander Barry, M.D., Professor Emeritus (Human Anatomy)
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James Barter, M.D., Professor (Psychiatry)
Randal C. Baselt, Ph.D., Associate Professor (Pathology)
Ronald J. Baskin, Ph.D., Professor (Physical Medicine and Rehabilitation)
Lawrence Bass, M.D., Lecturer (Dermatology)
John R. Battista, M.D., Assistant Professor (Psychiatry)
Herbert Bauer, M.D., M.P.H., Lecturer (Community Health)
Blaine L. Beamam, Ph.D., Associate Professor (Medical Microbiology)
Charles J. Beauchamp, M.D., Assistant Professor (Pediatrics)
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Leslie Bernstein, D.D.S., Professor (Otolaryngology)
Kazuko Bill, M.D., Assistant Professor in Residence (Radiology)
Kay H. Blacker, M.D., Professor (Psychiatry)
F. William Blaisdell, M.D., Professor (Radiology, Internal Medicine)
Hugo G. Bogren, M.D., Professor (Radiology, Internal Medicine)

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Edward C. Carlsen, Ph.D., Associate Professor (Human Anatomy)
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James J. Castles, Jr., M.D., Professor in Internal Medicine
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Robbet S. Chang, M.D., D.Sc., Professor (Medical Microbiology, Family Practice)
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Amirall Dajee, M.D., Assistant Professor in Residence (Surgery)
Christine V. Davidson, Ph.D., Assistant Professor in Residence (Psychiatry)

**NOTE:** For key to lecture symbols, see page 130
Malcolm R. MacKenzie, M.D., Professor (Internal Medicine)
Dean T. Macon, M.D., Professor (Internal Medicine, Human Physiology)
James W. Mathewson, M.D., Assistant Professor in Residence (Pediatrics)
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Worden Waring, Ph.D., Professor (Physical Medicine and Rehabilitation, Human Physiology)
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Phillip G. Weller, M.D., Adjunct Professor (Community Health)
Albert Weishebaurn, M.D., M.D., Assistant Professor in Residence (Radiology)
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Richard P. Wernberg, M.D., Associate Professor (Pediatrics)
Theodore C. West, Ph.D., Professor (Pharmacology)
Lynda L. White, M.H.S., Lecturer (Family Practice)
Barry W. Wilson, Ph.D., Professor (Physical Medicine and Rehabilitation)
Lowell D. Wilson, M.D., Ph.D., Professor (Internal Medicine, Biological Chemistry)
Wallace D. Winters, M.D., Ph.D., Professor (Internal Medicine, Pharmacology, Psychiatry)
Bruce M. Wolfe, M.D., Assistant Professor (Surgery)
Earl F. Wolman, Jr., M.D., Professor (Surgery)
Hin-Nang Wong, M.B.B.S., Assistant Professor in Residence (Surgery)
Louise M. Wong, M.D., Assistant Professor (Internal Medicine)

NOTE: For key to footnote symbols, see page 130
Admission Requirements and Professional Course Credits: Detailed information can be obtained from the School of Medicine. See also page 119.

Courses in the School of Medicine

Departmental Courses

New Grading Schedule (affecting new medical students only). Beginning with Fall Quarter 1979, medical students enrolling in the School of Medi- cine for the first time will be graded on the letter-grade basis. Continuing medical students will continue to receive the H/S/U mode of grading as indicated in courses listed following. For further details on the new grading system, contact the School of Medicine.

Anesthesiology

Professional Courses

420. Case Management Conference (1) I, II, III, IV. The Staff (Rosenblatt in charge) Discussion—1 hour. Prerequisite: interns and residents; advanced medical and veterinary students; consent of instructor. Discussion of basic science material related directly to anesthesiology, particularly in the areas of physiology and pharmacology. Significant reading assignments are given in advance and utilized by the instructor to encourage discussion. In selected instances, the topics are organized and presented by the students and residents.

460. Resident Seminar (1) I, II, III, IV. The Staff (Rosenblatt in charge) Lecture—1 hour. Prerequisite: degree in medicine or veterinary medicine or consent of instructor. A series of lectures covering a spectrum of anesthesia and related topics in depth, primarily clinically oriented but also including relevant research material. Presented by faculty, residents, and visiting professors. Pertinent reference lists are circulated in advance of seminars.

498. Anesthesiology Research (1-6) I, II, III, IV. The Staff (Elcock in charge) Laboratory—3.18 hours. Prerequisite: third- or fourth-year medical students or consent of instructor: open to graduate and veterinary medical students. Problems in clinical and/or laboratory research.

Behavioral Biology

Lower Division Courses

98. Directed Group Study (1-5) I, II, III, IV. The Staff (Chapman in charge) Discussion—1 hour. Prerequisite: consent of instructor. Extended evaluative and critical discussions of selected topics relating to the physiological and biochemical bases of behavior. Primary emphasis within any topic will be on the methodology, theory and concepts of current research. (P/NP grading only.)

99. Special Study for Undergraduates (1-6) I, II, III, IV. The Staff (Chapman in charge) Prerequisite: consent of instructor. Laboratory research on selected topics relating to the biological bases of behavior. Participation in ongoing research projects or planning, initiation and execution of individual research problem. (P/NP grading only.)

Upper Division Courses

188. Recent Developments in Behavioral Biology (2) I. Post- dora Lecture—1 hour; discussion—1 hour. Prerequisite consent of instructor. What is new and interesting at the leading edge of development of behavioral biology? Through presentations by invited speakers and the instructor, the course will answer this question in lectures, demonstrations, experimental workshops and discussions. A passing grade will be contingent upon submission of a written description of each student's significant learning experience in the course. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Chapman in charge) Prerequisite: consent of instructor. Extended evaluative and critical discussions of selected topics relating to the physiological and biochemical bases of behavior. Primary emphasis within any topic will be on the methodology, theory and concepts of current research. (P/NP grading only.)

199. Special Study or Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chapman in charge) Prerequisite: consent of instructor. Laboratory research on selected topics relating to biological bases of behavior. Participation in ongoing research projects or planning, initiation and execution of individual research problems. (P/NP grading only.)

Graduate Courses

200. Seminar (2) I, II, III, IV. The Staff (Chapman in charge) Seminar—2 hours. Prerequisite: consent of instructor: open to graduate students. Group discussion and critique of current topics of relevance to behavioral biology. (Same course as 490.)

206. Group Study (1-5) I, II, III, IV. The Staff (Chapman in charge) Discussion—1-5 hours. Prerequisite: consent of instructor: open to graduate students. Extended evaluative and critical discussions of selected topics relating to the physiological and biochemical bases of behavior. Primary emphasis within any topic will be on the methodology, theory and concepts of current research.

207. Research (1-12) I, II, III, IV. The Staff (Chapman in charge) Prerequisite: consent of instructor: open to graduate students. Laboratory research on selected topics relating to the physiological and biochemical bases of behavior. Participation in ongoing research projects or planning, initiation and execution of individual research problems. (P/NP grading only.)

Professional Courses


456. Three-Dimensional Structure of the Human Brain (3) I, II, III. Poldora Lecture-laboratory-discussion consisting of two to three 2- hour sessions—20 hours minimum (intensive, somewhat flexible early-quarter scheduling). Course goal is the student retaining a clear, vivid, three-dimensional mental image of the major anatomical structures of the human brain. Phases: slide-illustrated lecture emphasizing function; gross dissection; build clay model of brain; identify structures on slides. (SU grading only for graduate students.)

Biological Chemistry

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chapman in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

213. Principles of Comparative Biochemistry (3) I. Bennek, Feeney Lecture—3 hours. Prerequisite: Biochemistry 210C or consent of instructor. An advanced treatment of comparative biochemistry, including interspecies, taxonomic and evolutionary aspects of systems, and their structures and functions on a molecular basis, biochemical unity and diversity, protein structures and organized enzyme systems. Comparison of biochemical processes related to photobiology, metabolism, and excretion. Offered in odd-numbered years. (Same course as Biochemistry 213.)

214. Contemporary Medical Biochemistry (1) I. The Staff (Troy in charge) Lecture—1 hour. Prerequisite: course in biochemistry or the equivalent. Series of lectures on current topics of biochemistry related to medicine. Material covered stresses concepts derived from biochemistry research which have some potential clinical relevance, which are intended to be of interest to medical students, graduate students, postdoc- toral fellows and faculty. (SU grading only.) (Same course as 414.)

220. Molecular Biology Laboratory (4) I. Traut, Hershey. (Biochemistry) Lecture—1 hour; laboratory—9 hours. Prerequisite: medical and graduate students with consent of instructors. A variety of laboratory techniques will be used to repeat significant experiments in the formation of our present concept of information transfer from gene to protein. Preparation of a protein synthesizing system; analysis of enzymatic, nuclear acid and ribosomal components. (SU grading only for graduate students.)

222. Mechanisms of Translational Control (2) I. Hershey Lecture—1 hour; discussion—1 hour. Prerequisite: consent of instructor. Mechanisms of mechanisms of protein synthesis and translational controls. Examples from bacterial, mammalian and plant cells and their viruses. (SU grading only for graduate students.)


293. Current Topics in Biological Chemistry (1) I, II, III. The Staff (Walsh in charge) Lecture—1 hour. Prerequisite: course in biochemistry. Biochemical topics of current research interest will be dis- cussed. Students will participate in preparation of papers and/or reviews of laboratory work in progress. (Same course as 490.)

299. Current Topics in Protein Synthesis (1) I, II, III. The Staff, Traut, Hershey Discussion and seminar sessions. Prerequisite: consent of instructor. Review of current research in structure, function, regula- tion of bacterial and mammalian ribosomes and control of protein synthesis. (SU grading only for graduate students.) (Same course as 490.)

299. Group Study (1-5) I, II, III. The Staff (Walsh in charge) Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

Research (1-12) I, II, III. IV. The Staff (Walsh in charge) Prerequisite: consent of instructor. (SU grading only.)

Clinical Psychology

Graduate Courses

200. Theory of the Person-Adult (4) I. II. Abramowitz and sma Lecture—2 hours; seminar—2 hours. Prerequisite: gradu- ate status. In Clinical Psychology or consent of instructor. Major contemporary personality theories will be examined and compared. Emphasis will be placed on those theories which are most relevant to contemporary intervention tech- niques.

201. Observational Practicum (3) I, II, III, IV. The Staff, Mead (in charge) Discussion—2 hours; laboratory—2 hours. Prerequisite: graduate status in Clinical Psychology or consent of instruc- tor. Students rotate through three major field placements: a child family, an adult clinical, and a community setting. The purpose is to develop skills in observing human behavior. Didactic material and field experience.

202. Theories in Clinical Child Psychology (4) I. II. Steward Lecture—2 hours; seminar—2 hours. Major theories in clinical child psychology, as related to research and clinical findings in pediatrics, child psychiatry and child development.

204. Schizophrenia Psychopathology and Intervention (3) II, III, IV. The Staff (Mead in charge) Seminar—3 hours. Prerequisite: consent of instructor. Major theories on the etiology of schizophrenia and the chief methods of therapy.

205. Issues in Clinical Adult Psychology (3) I, II, III, IV. The Staff (Morrison in charge) Lecture—2 hours. Prerequisite: consent of instructor. De-
tailed examination of theoretical and research data on topics of importance to faculty members, such as psychological stress, aggression, suicide, and the etiology of schizophrenia.

209. Introduction to Community Psychology (4) [I, II, III, IV. The Staff] Lecture—1 hour. Prerequisite: consent of instructor. Seminar—3 hours. Prerequisite: consent of instructor. This seminar and discussion emphasis the interaction of systems, including the psychological, social, economic, and political aspects of health, illness, and disability. Seminar and discussion emphasis the interaction of systems, including the psychological, social, economic, and political aspects of health, illness, and disability. (SU grading only.)

210. Developmental Theory of Jean Piaget (4) [I, III, IV. Steward] Seminar—4 hours. Prerequisite: graduate and professional students. Consent of instructor. The seminar on the structured interactionist theory of Jean Piaget will include mastery of the theories and cognitive-developmental stage experience with the concepts of assessment and application of the core concepts to theoretical and clinical psychology in children and adolescents. (SU grading only.)

211. Design and Analysis in Clinical Research I (4) [I. The Staff] Lecture—4 hours. Prerequisite: graduate status in Clinical Psychology. Consent of instructor. Basic statistical procedures, experimental design and control, and methods of analysis in clinical research. Emphasis will be placed on those methods that provide the broadest application to contemporary clinical investigations.

212. The Psychology of Women (3) [II. Pepitone-Rockwell, Morin] Seminar—3 hours. Prerequisite: consent of instructor. Course will trace developmental path of women—from birth to death. Implications for psychotherapy and coping styles will be explored. (SU grading only.)

213. Theories of Psychotherapy (3) [II. Lyons] Discussion—3 hours. Prerequisite: graduate student in Clinical Psychology or consent of instructor. Major theories of psychotherapy will be examined and compared. Implications for therapeutic technique and personality change will be considered. (SU grading only.)

214. Psychotherapy Practicum (1-3) [I, III, IV. The Staff] Discussion—1 1/2 hours. Clinical field placement—6 hours. Prerequisite: graduate student in Psychology or consent of instructor. Placement of students in clinical settings within the framework of specific models of psychotherapy. May be repeated for credit. (SU grading only.)

215. Assessment Practicum (1-3) [II, III, IV. The Staff] Laboratory—2.5 hours. Prerequisite: graduate student in Clinical Psychology or consent of instructor. Students will select the specific tests they need training in and will get consent of the instructor offering supervision. Students will also write assessment reports including their interpretation of test results and have them discussed with supervisor. May be repeated for credit. (SU grading only.)

216. Psychological Assessment I (3) [II, III, IV. Bell and staff] Seminar—3 hours. Prerequisite: graduate student in Clinical Psychology or consent of instructor. To help the student acquire critical knowledge of the methods and problems of psychological assessment with emphasis upon the theory of administration and interpretation of tests of intellectual functioning and the "objective" personality measures. (SU grading only.)

217. Introduction to Projective Assessment (3) [II, III, IV. Bell and staff] Seminar—3 hours. Prerequisite: graduate student in Clinical Psychology or consent of instructor. To help the student acquire critical knowledge of the methods and problems of psychological assessment with emphasis upon the theory of administration and interpretation of the Rorschach and TAT for children and adults. (SU grading only.)

218. Clinical Behavior Therapy (3) [II, III, Hines] Discussion—2 hours. Prerequisite: graduate standing in Other: FORTRAN or ALGOL (preferred), upper division and graduate students only. To increase, through examples, projects and discussions, understanding of components of information systems, including hardware, software, economics, and people, and to prepare the student to apply this understanding in solution of specific problems in creation, design and implementation of information systems.

219. Biomedical Applications of Computers (2) [II. Waiters] Lecture—2 hours. Prerequisite: upper division standing and capability of undertaking independent project under instructor's supervision; experience in some aspect of bio-medicine: knowledge of biological and/or medical systems and computer knowledge recommended. To increase student's understanding of ways in which computers can be used to solve biomedical problems.

220. Seminar in Community Health Practice (3) [I, II, III, IV. The Staff] Seminar—1 hour. Prerequisite: upper division undergraduate standing in psychology or consent of instructor. This seminar will deal with the concepts and theory seen in didactic instruction in this field-oriented course. (SU grading only.)

221. Intuition and Research (3) [II] Lecture—3 hours. Prerequisite: graduate student in Clinical Psychology or consent of instructor. Introduces student to subjective influences in clinical research. Also considers "biased" research. (SU grading only.)

222. Professional Development and Ethics (4) [II. Rockwell, F. Pepitone-Rockwell] Seminar—1 1/2 hours. Prerequisite: graduate students with consent of instructor. Focuses on professional ethics and the role of professional psychologists in order to examine areas of professional ethics, the social system and its impact on the professional, and the professional psychologist's role in contemporary society. (SU grading only.)

223. Community Health Practice (1-2) [II, III, IV. The Staff] Seminar—Consent of instructor. Individual or group research on selected topics. (SU grading only.)

Community Health

Upper Division Courses

101. Perspectives in Community Health (3) [II. Borhani, Kraus] Lecture—2 hours. Discussion—1 hour. Prerequisite: lower division standing in psychology or consent of instructor. Focuses on the principles of community health, its relationship to the life cycle, and to orient the students with perspectives of medicine in society.

121. Introduction to Medical Ecology (3) [II. Kraus] Lecture—2 hours. Discussion—1 hour. Prerequisite: upper division and graduate students. Focuses on the medical sciences: human ecology, or related areas. Focus on principles of medical ecology as they relate to the study of the distribution and determinants of disease, or injury in human populations. The biological, physical and social environments are examined to show the causes, natural histories and ecological correlates of human illness.

126. Introduction to Environmental Health (4) [II. Kraus] Lecture—2 hours. Discussion—1 hour. Prerequisite: course 101 or introductory course in biological science. Problems in environmental health: assessment of individual and public health. Diseases associated with pollution of air, water, soil and food; zoonoses such as malaria, plague, rabies, and hazards of occupational and environmental exposures are considered. (Same course as Environmental Studies 126.)

127. Contemporary Problems in Environmental Health (4) [II. Kraus] Lecture—2 hours. Discussion—1 hour. Prerequisite: Community Health Environmental Studies 126 or consent of instructor. Contemporary environmental challenges in environmentally dependent aspects of health. Diseases and injuries from environmental carcinogens, pesticides, noise, radiation, lead, asbestos, and stress phenomena, and heavy metals are considered. (Same course as Environmental Studies 127.)

151. Information Systems (3) [II. Waiters] Lecture—2 hours, laboratory—1 hour. Prerequisite: knowledge of programming in at least one high-level language, FORTRAN or ALGOL (preferred), upper division and graduate students only. To increase, through examples, projects and discussions, understanding of components of information systems, including hardware, software, economics, and people, and to prepare the student to apply this understanding in solution of specific problems in creation, design and implementation of information systems.

155. Biomedical Applications of Computers (2) [II. Waiters] Lecture—2 hours. Prerequisite: upper division standing and capability of undertaking independent project under the instructor's supervision; experience in some aspect of biomedicine; knowledge of biological and/or medical systems and computer knowledge recommended. To increase student's understanding of ways in which computers can be used to solve biomedical problems.

190. Seminar in Community Health (1) [I, II, III, IV. The Staff] Seminar—1 hour. Prerequisite: upper division undergraduate standing and capability of undertaking independent project under the instructor's supervision; experience in some aspect of community health, gains knowledge of organization, administration, and problem solving capabilities of these health care facilities. (SU grading only.)

198. Directed Group Study (1-5) [II, III, IV. The Staff] (Borhani in charge) Lecture—2 hours. Discussion—1 hour. Prerequisite: consent of instructor. Directed group study on selected topics relating to community health. (P/NP grading only.)

216. Directed Group Study (1-5) [II, III, IV. The Staff] (Borhani in charge) Lecture—2 hours. Discussion—1 hour. Prerequisite: advanced undergraduate standing and consent of instructor. Directed group study on selected topics relating to community health. (P/NP grading only.)

Graduate Courses

201. Medical and Environmental Epidemiology (3) [II, III, IV. Borhani] Lecture—2 hours. Discussion—1 hour. Prerequisite: medical, graduate, or veterinary students, or consent of instructor. Lectures and discussions on basic principles of preventive medicine and observation of community health programs utilizing both specific community models of primary and secondary prevention dealing with specific environmental problems.

202. Medicine and the Environment (2) [II. Kraus, Borhani] Lecture—1 hour. Discussion—1 hour. Prerequisite: medical, graduate, or veterinary students or consent of instructor. Lectures and seminar type open discussions and directed readings led by resident and guest lecturers on issues of environmental health as they relate to changing patterns or accelerated onset of disease.

204. Medical and Health Care Delivery Patterns (3) [II, III, IV. Borhani, Leonard, Bauer] Lecture—2 hours. Discussion—1 hour. Prerequisite: medical, graduate, or veterinary students, or consent of instructor. Lectures and seminar type open discussions led by resident and guest lecturers on current problems and practice in medical health care practice. delivery organization and financing systems.

205. Issues in Community Health (2) [II. Borhani, Bauer, Kraus] Lecture—1 hour. Discussion—1 hour. Prerequisite: medical, graduate, or veterinary students, or consent of instructor. Seminar type discussions and lectures on selected topics and problems in community health including population control, drug abuse, malnutrition, abortion, suicide, and public health problems of certain population groups.

206. Nutrition and Health (2) [II. Kraus, Borhani] Lecture—1 hour. Discussion—1 hour. Prerequisite: medical, graduate, or veterinary students, or consent of instructor. Lectures and seminar type discussions and discussions on selected topics and problems in community health including population control, nutrition and health.

207. Political and Economic Determinants of Health Care (3) [II. Borhani] Lecture—2 1/2 hours. Discussion—1 1/2 hour. Group study to obtain an understanding of the political and economic determinants of health-care systems. Each session consists of guest lecturer and discussion. Students select and read required from a reading list. (Does not count for graduate students; P/NP grading for undergraduates.) (Same course as Family Practice 207.)

208. Psychiatric Implications of Legal Intervention (2) [II. Borhani, Schlesinger] Lecture—2 hours. Discussion—2 hours. Prerequisite: consent of instructor. The influence of laws on human behavior, and vice versa, will be explored. Particular emphasis on youth and juvenile court procedures. Most court demonstrations. (SU grading only.)

Somatic Questions
121A-121B. Introduction to Community Health for Family Nurse Practitioners (2-2 A-R). Chaykin, Merrick
Seminar—2 hours. Prerequisite: students in Family Nurse Practitioner Program. Discussion of principles of community health and the health care system.

121C-121D. Fundamental Issues for Family Nurse Practitioners (2-2 I-V). Judson, Dostal
Seminar—2 hours. Prerequisite: courses 121A-121B. Discussion of the sociocultural and psychological aspects of health and disease: methods and materials in patient education.

127. Health Sciences Practicum (5) I, II, III, IV. Andrus and staff
Lecture—1 hour: laboratory—12 hours. Prerequisite: consent of instructor. Introduction to the health professions and healthcare delivery system through lecture and experience in clinical settings, such as hospitals, clinics, and home care.

192A-192B. 192C-192D. 192E. Internship in Family Practice (2-2-2-2-2-2). I, II, III, IV, Goldsmith Clinics—three 8-hour sessions; clinic meeting/discussion—1 hour; directed group committee work—4 hours. Prerequisite: consent of instructor. Successful completion of the health professions and healthcare delivery system through the integration of theory and practice.

186. Directed Group Study (1-5) I, II, III, IV. The Staff (Burr in charge)
Prerequisite: consent of instructor. Directed group study for advanced undergraduates interested in health care delivery system. (PnP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Special study for advanced undergraduates interested in the health care delivery system. (PnP grading only.)

207. Political and Economic Determinants of Health Care (3) I. Goldsmith, Borhani
Lecture-discussion—3 hours. Group study to obtain an understanding of the political and economic determinants of health-care systems. Each session consists of guest lecturer and discussion. Students select and read references from a reading list. (SU grading only for graduate students. PnP grading only for undergraduates.) (Same course as Community Health 207.)

286. Law and Medicine (3) I. Schwarz and Staff
Lecture—3 hours. First-year medical and second-year law students with consent of instructor. Seminar approach emphasizing class format, legal issues, individual projects in medical education and practice, attorney-physician relations, development of human behavior, community health care and medical malpractice. (Same course as Law 286.)

271. Clinical Pharmacology (2-10) I, II, III, IV. Winters
Lecture—2 hours; ward rounds. Prerequisite: advanced standing or postdoctoral fellow. Principles of pharmacology will be related to the diagnosis and treatment of drug induced disease status as well as principles of therapy of common clinical diseases. (Same course as Pharmacology 271.)

286. Group Study (1-5) I, II, III, IV. Burr, O'Hara-Devereaux
Prerequisite: consent of instructor. Group study for graduate students to explain selected areas of primary care and the health care delivery system. (SU grading only for all other sections. PnP grading only.)

Professional Courses

Lecture—1 hour: laboratory—2 hours. Prerequisite: second-year medical students or consent of instructor; open to graduate students. First quarter will cover primary health care care in sports medicine—evaluation, treatment and rehabilitation. Second quarter will deal with the physical fitness programs in health and disease—health care maintenance and rehabilitation. Third quarter is for independent study in sports medicine.

101A. Analysis of Health Care Delivery Systems (3) I. Mitchell, Andrus
Lecture—4 hours. Prerequisite: student in the Family Nurse Practitioner Program. This course is designed to provide an understanding of the economics and organization of health care systems. Topics include health care financing, cost issues, quality of care, legislation and licensure, human resources and planning.

11A. Family Structure and Function for Family Nurse Practitioners (2) I, II.
Lecture—1 hour: discussion—1 hour. Prerequisite: student in Family Nurse Practitioner Program. Topics aimed at providing a theoretical understanding of the contemporary American family as a social unit; includes human development, family organization, roles and dynamics.

11B. Family Structure and Function for Family Nurse Practitioners (2) I, II.
Lecture—1 hour: discussion—1 hour. Prerequisite: student in Family Nurse Practitioner Program. Topics aimed at providing a theoretical understanding of the contemporary American family as a social unit; includes human development, family organization, roles and dynamics.

204A-204B. 204C. Advanced Clinical Medicine for Family Nurse Practitioners (6-5-5) III-I. Chaykin, Sullivan, Trolinger
Lecture—1 hour: seminar—2 hours: laboratory—6 hours. Synopsis of topics in family medicine selected by student and presented in seminar form with an annotated bibliography. An expert in each selected field will attend and critique.

21A. Graduate Seminar in Preventive Medicine for Family Nurse Practitioners (2) I, II, III. O'Hara-Devereaux
Lecture—2 hours; discussion—1 hour. Prerequisite: consent of instructor. Selected topics related to disease prevention and health maintenance. (SU grading only for graduate students.)

21B. Graduate Seminar in Psychosocial and Cultural Aspects of Disease for Family Nurse Practitioners (2) I, II, III. O'Hara-Devereaux
Lecture—1 hour: discussion—1 hour. Prerequisite: consent of instructor. Selected topics of cultural, ethnic and socio-economic parameters related to disease prevention patterns and therapeutics; family and marital counseling, psychosomatic illness; and human sexuality. (SU grading only for graduate students.)

21C. Graduate Seminar in Clinical Geriatrics (3) I. Scott, Sullivan
Lecture—2 hours; discussion—1 hour. Prerequisite: consent of instructor. Selected topics in geriatrics will cover clinical variations, new developments in management and the psycho-social issues involved in the care of elders.

21D. Graduate Seminar in Clinical Medicine for Family Nurse Practitioners (2) I, Merrill
Lecture—1 hour: discussion—1 hour. Prerequisite: consent of instructor. Review and study of current patterns of management of the common communicable diseases; application of fluid flow sheet monitoring, record audits and algorithms. (SU grading only.)

449. Research Methods for Practitioners (3) I, Mitchell, O'Hara-Devereaux
Lecture—3 hours. Prerequisite: student in the Master of Health Services Degree Program. Basic concepts of research design and method and literature and preparing research reports. (SU grading only.)

450A-450B. Primary Care Practicum for Family Nurse Practitioners (5-5) III, IV. IV. Andrus, Chaykin
Discussion—1 hour; laboratory—6 hours. Prerequisites: courses 410, 420A-420B-420C, and 449. Course 450A is a continuation of course 450A. Individual field study. Each student will analyze a health care setting: plan, implement, and evaluate changes designed to improve health care to patients and their families.

745. Fundamentals of Psychological Medicine (3) I, II, III, IV. McHale
Lecture—1½ hours; discussion—1½ hours. Prerequisite: Medical and Family Nurse Practitioner students only; consent of instructor. Course focuses on the patients' intra- and interpersonal patterns of response to interpersonal interactions. A model for reducing interpersonal stress is presented and participants are required to videotape one interview using this model. Role-playing is used extensively as well as the dynamics of interactions between group members. (SU grading only.)

Human Anatomy

Upper Division Courses

101. The Gross and Microscopic Structure of the Human Body (4) I. Hunter
Lecture—4 hours; laboratory—3 hours. Prerequisite: Bio-
Human Physiology

Upper Division Courses

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Rennikin charge)
To be arranged. Prerequisite: consent of instructor. Directed reading and laboratory experience on selected topics. (P(NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Rennikin charge)
Prerequisite: senior standing in biology, chemistry, physics, psychology, or engineering. (P(NP grading only.)

Graduate Courses

200D. Advanced General Physiology (3) III. The Staff (Rennikin charge)
Lecture—3 hours. Prerequisite: Biochemistry 1018, Chemistry 1108, Physiology 1008B. graduate standing and consent of instructor. Physiological basis of living systems with emphasis on mammalian microcirculation and cardiovascular systems. Offered in even-numbered years.

201. Cellular Physiology of Excitable Membranes (4) I. Sobolov
Lecture—2 hours; discussion—1 hour; 1 hour problem set. Prerequisite: elementary physics and calculus. Beginning with electrochemistry, this course introduces the basic elements of cellular and tissue electrophysiology. Offered in odd-numbered years.

211. Surgical Approaches to Physiology (2) I, II, III, IV. Green
Discussion—1 hour; laboratory—3 hours. Prerequisite: Medical Sciences 411A-411B or the equivalent and consent of instructor. An overview of surgical procedures and techniques used to obtain physiological information. (P(NP grading only.)

211L. Physiological Anatomy (3) I, II, III, IV. O’Rahilly
Discussion—4 hours; laboratory—2 hours. Prerequisite: consent of instructor and substantial background in biology, including basic anatomy. This course covers the study of the nervous system, including an overview of the brain and spinal cord. (SU grading only.)

212. Physiology of Mammalian Gametes and Fertilization (2) I. Meizel
Lecture—11/2 hours; discussion—1/2 hour. Prerequisite: lecture courses in physiology and cell biology (or histology), and chemistry (with some endocrinology). (SU grading only.)

213. History of Anatomy (4) I, II, III, IV. O’Rahilly
Discussion—4 hours. Prerequisite: consent of instructor. This course is designed to provide an overview of the development and function of function and behavior. (SU grading only.)

214. Seminar (1) I, II, III. The Staff
Seminar—one hour. Prerequisite: consent of instructor. (SU grading only.)

215. Advanced Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

216. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

Professional Course

Lecture—2 hours; laboratory—6 hours. Prerequisite: second- or third-year medical student, graduate student and consent of instructor. This course is designed to give students a comprehensive understanding of the gross structure of the adult human body. (Deferrals grading only, pending completion of course.)

NOTE: For key to footnote symbols, see page 120

Medical Physiology 110B; 111B, or the equivalent consent of instructor. Course will consist of a series of lectures and discussion sessions on the physiology of mammalian peripheral circulation including topics on anatomy, physiology, and pharmacology of the cardiovascular system. Additional topics include regional circuits, microcirculatory control mechanisms, and dynamics of capillary transport. Offered in even-numbered years.

288. Group Study (1-6) I, II, III, IV. The Staff (Rennikin charge)
Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be offered. (P(NP grading only.)

299. Research (1-12) I, II, III, IV. The Staff (Rennikin charge)
Prerequisite: consent of instructor. (SU grading only.)

Internal Medicine—Allergy

Graduate Course

281. Clinical Immunology and Immunopathology (4) III. Gershwin
Lecture—4 hours. Prerequisite: Medical Microbiology 207 or Veterinary Microbiology 106. Descriptive analysis of animal and human pathologic processes that interact with the immune system. Emphasis on infection, genetics, transplantation, allergy and autoimmunity. Offered every other year. (Same course as Rheumatology 281.)

Internal Medicine—Cardiology

Upper Division Courses

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Amsterdam in charge)
Prerequisite: consent of instructor. Directed reading, discussion and/or laboratory experience on selected topics. (P(NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Amsterdam in charge)
Prerequisite: consent of instructor; senior standing in biophysics, chemistry, physics, psychology or engineering. Undergraduate research project. (P(NP grading only.)

Graduate Courses

298. Group Study (1-5) I, II, III, IV. The Staff (Mason in charge)
Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be offered. (SU grading only.)

Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Thesis research. (SU grading only.)

Internal Medicine—Endocrinology

Graduate Course

299. Research (1-12) I, II, III, IV. The Staff (Kumagai in charge)
Prerequisite: consent of instructor. Endocrinology research. (SU grading only.)

Internal Medicine—General Medicine

Professional Course

499. General Medicine Research (1-12) II, III, IV. Flynn Discussion—3 hours; laboratory—40 hours. Prerequisite: consent of instructor. The student will be involved in a laboratory research project with the area, interest and expertise of members of the Section of General Internal Medicine. Alternatively, the research effort will be directed toward investigation of a clinical problem of general medical interest.

Internal Medicine—Hematology-Oncology

Upper Division Course

199. Research in Hematology—Oncology (1-5) I, II, III, IV. Mackenzie and sunk Laboratory—hours variable. Prerequisite: upper division standing and consent of instructor. Experience in laboratory research. (P(NP grading only.)

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Internal Medicine—Infectious Diseases

Upper Division Course

99. Directed Research in Immunology (1-5) I, II, III, IV. The Staff (Levins in charge)
Laboratory—1-5 hours. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P+N grading only)

Graduate Courses

281. Clinical Immunology and Immunopathology (4) I, II, III, IV. Gershwin

289. Research in Autoimmune Disease (1-12) I, II, III, IV. Gershwin

Graduate programs and results will be reviewed at intervals with the instructor and via seminar presentation. (P+N grading only)

Professional Course

490. Research Topics in Infectious Disease (2-12) I, II, III, IV. The Staff (Levi in charge)
Prerequisite: successful completion of the first year of study in School of Medicine, graduate students, and/or consent of instructor. Directed problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results will be reviewed at intervals with the instructor and via seminar presentation.

Internal Medicine—Nutrition

Graduate Course

210. Nutritional Aspects of Medical Practice (3) III. The Staff
Lecture—2 hours, discussion—1 hour. Prerequisite: medical and graduate students and/or consent of instructor. Lectures and reading assignments on clinical nutrition. Preselected topics will relate to disease processes, organ systems and patient care. (SU grading for graduate students)

Internal Medicine—Pulmonary Medicine

Upper Division Course

199. Research in Lung Pathophysiology (1-12) I, II, III, IV. The Staff (Sorin in charge)
Discussion—2 hours; laboratory—6 hours minimum. Directed research in problems of lung water balance, vascular permeability, acute lung injury. Techniques involve large animal surgery, use of radioscopes, physiologic monitoring, and biochemical analysis. (P+N grading only)

Graduate Course

299. Research in Lung Pathophysiology (1-12) I, II, III, IV. The Staff
Discussion—2 hours; laboratory—6 hours (minimum); paper to be prepared over term. Prerequisite: consent of instructor. Research in problems of chronic and acute lung injury, lung immunology. Techniques involve large animal surgery, radioscopes, tracer techniques, physiologic monitoring, biochemical and immunologic analysis. (SU grading only)

Professional Course

491. Research in Lung Pathophysiology (2-3) I, II, III, IV. The Staff
Discussion—2 hours; laboratory—3 hours maximum; term paper. Prerequisite: undergraduate course in biochemistry or physiology. Research in problems of lung water balance, vascular permeability, acute lung injury, lung immunology. Techniques involve large animal surgery, radioscopes, tracer techniques, physiologic monitoring, biochemical and immunologic analysis.

Medical Microbiology

Upper Division Courses

107. Chemical and Cellular Immunology (4) I, II. Benjamini, Sclabieski
Lecture—4 hours; laboratory experience provided to selected individual students. Prerequisite: Biochemistry 101A, 101B and 103B, 103C. The chemical and cellular basis of immunity; structure-function relationship of antigens, antibodies, and antigen-antibody interaction; cellular basis of immunity; immunohemochromatography. (SU grading only)

115. Ecological Parasitology (2) I. Thesis Lecture—2 hours. Course will be devoted to the study of mankind's influence on environmental factors that affect the development and spread of parasitic agents.

136. Medical Mycology (2) III. Pappagianis
Lectures—6 hours. Prerequisite: course in organic microbiology; consent of instructor. Various aspects of pathogenic fungi, particularly affecting humans will be discussed including epidemiology, pathogenesis and pathologist diagnosis and therapy. (Same course as course 430.)

199. Group Study in Medical Microbiology (1-5) I, II, III, IV. The Staff (Pappagianis in charge)
Hours to be arranged. Prerequisite: upper division standing and consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (P+N grading only)

199. Research in Medical Microbiology (1-5) I, II, III, IV. The Staff (Pappagianis in charge)
Hours to be arranged. Prerequisite: upper division standing and consent of instructor. Individual research. (P+N grading only)

Graduate Courses

209. Frontiers in Immunology (2) I, II, III. Benjamini, Sclabieski
Discussion—2 hours. Prerequisite: consent of instructor. Current developments in various aspects of immunology and their clinical implications. (SU grading only) (Same course as 406.)

215. Medical Parasitology (5) I, Thesis Lecture—3 hours; laboratory—6 hours. Prerequisite: graduate students with consent of instructor. Epidemiological and laboratory studies of protozoa, helminths and arthropods of medical importance.

220. Current Concepts in Bacterial Ultrastructure (2) III. Beamann
Lecture—1 hour; discussion—1 hour; combination formal lectures, class discussion and student presentation. Prerequisite: Bacteriology 105 or consent of instructor. A critical evaluation of the current literate diagnostic with all aspects of bacterial ultrastructure. These will be combined formal lectures, discussion of selected and assigned reading and formal student presentation of assigned topics. There will be a midterm and final examination.

229. Group Study in Medical Microbiology and Immunology (1-5) I, II, III, IV. The Staff (Pappagianis in charge)
Prerequisite: consent of instructor; open to graduate students. Directed reading and discussion and/or laboratory investigation on selected topics. (Sections 1, 2, 4, 5; SU grading only)

299. Research (1-12) I, II, III, IV. The Staff (Pappagianis in charge)
Prerequisite: consent of instructor; open to graduate students. Laboratory investigation contributing to the dissertation for a graduate degree. (SU grading only)

Professional Courses

401. Medical Virology (2) II. Chang
Lecture—3 hours; discussion—1 hour. Prerequisite: Medical Sciences 410 and consent of instructor; open to graduate students. Course deals with the clinical epidemiologic and experimental aspects of viral diseases of man.

405. Clinical Immunology (2) P. Pappagianis
Lecture—2 hours. Prerequisite: third-year medical student Matus and/or consent of instructor. The bases of immunologic pathologies and immunologic techniques, particularly those related to diseases of man.

407. Chemical and Cellular Immunology (4) II. Benjamini, Sclabieski
Lecture—4 hours; laboratory experience provided to selected individual students. The chemical and cellular basis of immunity: structure-function relationship of antigens, antibodies and antigen-antibody interaction; cellular basis of immunity; immunohemochromatography and cellular aspects of hypersensitivity and related immunological phenomena. (SU grading only) (Same course as course 107.)

Neurology

Graduate Course

293. Seminar in Selected Topics (1) I, II, III, IV. Scooby
Seminar—1 hour. Prerequisite: consent of instructor. Selected topics in Neuroscience will be offered. (SU grading only)

299. Group Study (1-5) I, II, III, IV. The Staff (Dreyfus in charge)
Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. (SU grading only)

299. Individual Special Study and Research (1-12) I, II, III, IV. Scooby
Laboratory—3-36 hours. Prerequisite: consent of instructor. Individual special study and research in Neurophysiology and Biomedical Engineering is offered at both Davis and Sacramento Medical Center. (SU grading only)

Professional Course

499. Research (1-12) I, II, III, IV. The Staff (Dreyfus in charge)
Laboratory—2-24 hours. Prerequisite: consent of instructor. Laboratory investigation on selected topics. (SU grading only for graduate students)

Neurosurgery

Graduate Course

296. Diseases of the Nervous System (3) I, II, III, IV. The Staff (Youmans in charge)
Lecture—1 hour; discussion—1 hour; seminar—1 hour. Prerequisite: general pathology or special training in physiology and neurological sciences; consent of instructor. Reflection of the nervous system to injury and infection; degenerative and vascular diseases of the nervous system: neoplasms in the nervous system. Given jointly with Departments of Neurology and Pathology.

252
Orthopaedic Surgery

Professional Course

401A. Sports Medicine: Medical Aspects of Sports Injuries (2). The Staff (Riggs in charge) Lecture—2 hours. Prerequisite: completion of Core A for medical students; upper division course in systemic physiology and anatomy for graduate students. Course introduces the student to pathophysiology of sports injuries; physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. (SU grading only for graduate students.) (Same course as Physical Medicine and Rehabilitation 2014, 401A, Physical Education 2014.)

401B. Sports Medicine: Physiological Basis of Exercise Testing and Exercise Training (3). II. The Staff (Bernauer, Physical Education in charge) Lecture—2 hours; two 4-Hour laboratory projects; discussion—four 2-Hour sessions. Prerequisite: completion of Core A for medical students; upper division course in systemic physiology and anatomy for graduate students. Course introduces the student to methods and assessment of exercise physiology and exercise testing. Principles of exercise training for normal individuals and patients with various diseases and weight reduction and control will be discussed. (SU grading only for graduate students.) (Same course as Physical Medicine and Rehabilitation 2014, 401B, Physical Education 2018.)

401C. Sports Medicine: Special Problems in Preparing and Appraising Exercise Programs (3). III. The Staff (Bernauer, Physical Education in charge) Lecture—2 hours; two 4-Hour laboratory projects; discussion—four 2-Hour sessions. Prerequisite: completion of Core A for medical students; upper division course in systemic physiology and anatomy. Review of special problems related to specific sports and recreational activities. Areas to be covered include SCUBA diving, backpacking, jogging and skiing as well as specific exercise programs for disabled and aged. (SU grading only for graduate students.) (Same course as Physical Medicine and Rehabilitation 2014C, 401C, Physical Education 201C.)

409. Orthopaedic Research (1-12) I, II, III, IV. The Staff (Age in charge) Prerequisite: medical students. consent of instructor. Laboratory or clinical investigation on selected topics.

Otorhinolaryngology

Professional Courses

500. Suture Techniques (1). I, II, III, IV. Bernstein Lecture—5 hours total—laboratory—10 hours total. Prerequisite: second- and fourth-year medical students with consent of instructor; open to graduate and veterinary medical students. Principles of management of lacerations and the various techniques of suturing a wound.

501. Clinical Examinations in Otorhinolaryngology (1). I, II, III, IV. Choate Lecture—1 hour. Laboratory—1 hour. Practica—1 hour total. Prerequisite: first-year medical students with consent of instructor; open to graduate students. Obtaining the history, applied anatomy of the region, and the art of the examination. Head minor required.

502. Otorhinolaryngology in Family Practice (1). I, II, III, IV. Donald Lecture—10 hours total. Prerequisite: fourth-year medical students and family practitioners with consent of instructor; open to graduate students. Planned as a refresher course for those with some exposure to the pediatric ear, nose, and throat patient.

506. Clinical Otorhinolaryngology Elective (3-18). I, II, III, IV. Clark Full-time clinical activity. Prerequisite: third- and fourth-year medical students with consent of instructor; open to graduate students. Total involvement in clinical activities of the department.

NOTE: For key to footnotes, see page 130.

406. Histopathologic Diagnosis (1). I, II, III. The Staff (Toreson in charge) Seminar—1 hour. Prerequisite: medical students or consent of instructor; open to graduate students. Intensive and detailed histopathologic diagnosis. Material covered varies from year to year.

407. Diseases of the Nervous System (1-4). I, II, III, IV. Ellis Lecture—1 hour; discussion—1 hour; seminar—1 hour. Prerequisite: medical students or special training in pathology or neurologic sciences; consent of instructor; open to medical students. Study of human nervous system reactions to illness including infection, neoplasia and maldevelopment; application of experimental models to human disease; and clinical correlations. Seminars emphasize microscopic findings in current cases; discussions include individualized experience in neuropathologic techniques. Given jointly with the Departments of Neurology and Neurosurgery.

408. Autopsy Case Studies (1-12). I, II, III, IV. The Staff (Rueben in charge) Discussion—1 hour; laboratory—2-4 hours. Prerequisite: medical and veterinary students with consent of instructor; open for credit to graduate students. Participation and performance under supervision of complete autopsies with differential studies of clinical material, gross, microscopic, and radiological findings.

409. Neuropharmacology (1). I, II, III, IV. Ellis Seminar—1 hour. Prerequisite: medical students or consent of instructor; open for credit to graduate students. Neuropharmacologic findings in current cases are correlated with clinical findings and compared with previously reported cases. Given jointly with Departments of Neurology and Neurosurgery.

410. Seminar in Pathology (2). I, II, III. Rueben Seminar—2 hours. Prerequisite: consent of instructor; open for credit to graduate students. Student participation in conferences in the Department of Pathology. Limited enrollment.

411. Surgical Pathology Seminar (1). I, II, III, IV. The Staff (Toreson in charge) Seminar—1 hour. Prerequisite: medical students or consent of instructor, open for credit to graduate students. Gross and microscopic pathology of current surgical specimens and study sets with clinicopathologic correlation. Limited enrollment.

412. Ultrastructural Seminar (1). I, II, III. Jensen Seminar—1 hour. Prerequisite: medical students or consent of instructor. Electron microscopy and morphology. Workshop participants are encouraged to present their own material and problems for discussion. Limited enrollment.

Pediatrics

Lower Division Course

99. Special Study for Undergraduates (1-5). I, II, III, IV. The Staff (Gold in charge) Individual library or laboratory research. Prerequisite: consent of instructor. Chemistry 141A or the equivalent (may be taken concurrently). Research in the broad area of physiological maturation. Primarily for lower division students. (PHF grading only.)

Upper Division Course

109. Special Study in Pediatric Research (1-5). I, II, III, IV. The Staff (Gold in charge) Laboratory—3-15 hours. Prerequisite: limited to undergraduates with consent of instructor. Based on appropriate preparation in chemistry and/or physiology. Problems related to growth and development including the functions of different organ systems. Also examine different laboratory techniques and use of different laboratory equipment. (PHF grading only.)

Graduate Course

299. Pediatric Research (1-12). I, II, III, IV. The Staff (Gold in charge) Prerequisite: graduate students who are candidates for a degree in some area of biology or behavioral sciences; consent of instructor. Research in some aspect of growth and development. (SU grading only.)

Pharmacology

Lower Division Course

99. Special Study for Undergraduates (1-3). I, II, III, IV. The Staff (Department Chairperson in charge) Laboratory—1-3 hours. Prerequisite: lower division stand...
Medicine

ing. Laboratory experience in pharmacology and related fields. (P.N.P. grading only.)

Upper Division Courses

100. Pharmacology for Educators (2) I, II. K. Kilian Lecture—2 hours. Prerequisite: consent of instructor. Survey of the sources underlying the action of drugs; consideration of the pharmacology of prescription and nonprescription drugs commonly used to treat medical conditions in children of school age; pharmacological aspects of drug therapy and its controlled toxicology.

101. Introduction to Pharmacology (2) II. Hollinger, Stark Lecture—2 hours. Prerequisite: some knowledge of basic physiology and biochemistry. Survey course dealing with vertebrate and pharmacological function. Course is specially oriented to the undergraduate.

196. Directed Group Study (1-5) I, II, III, IV. The Staff (K. Kilian in charge) Prerequisite: consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (P.N.P. grading only.)

198. Special Study for Advanced Undergraduates (1-5) I, II, III, IV, V. The Staff—Laboratory—3 to 5 hours. Prerequisite: consent of instructor. (P.N.P. grading only.)

Graduate Courses

200A-200B. Advanced General Pharmacology (3-3) I-II. The Staff (K. Kilian in charge) Lecture—3 hours. Prerequisite: upper division courses in biology (101A-101B) and mammalian physiology (110A-110B and 111A-111B) or the equivalent. May be taken as a laboratory course in human pharmacology and is designed for graduate and medical students. Principles in pharmacology, including pharmacokinetics and drug metabolism and the actions, uses and toxicity of the major classes of drugs.

200A-200BII. Advanced General Pharmacology (1-1) I-II. The Staff (K. Kilian in charge) Discussion—1 hour. Prerequisite: upper division courses in biology (101A-101B) and mammalian physiology (110A-110B and 111A-111B) or the equivalent. Laboratory procedures in advanced pharmacology. Emphasis and discussion designed to follow subject-matter sequence of upper-division course.

201. Pharmacology of the Nervous System I: Transmitter Substances (1-3) I. Lecture—1 hour. Discussion—1 hour. Prerequisite: courses 101, 102, and 103 or Medical Science 410, 411B and 413A-413B, or the equivalent. Pharmacology of substances affecting central transmission. Offered in odd-numbered years.

202. Pharmacology of the Nervous System II: Hypnotics, Sedatives and Anticonvulsants (1-3) I, II. K. Kilian Lecture—1 hour. Discussion—1 hour. Prerequisite: courses 101, 102, or Medical Science 410, 411B and 413A-413B, or the equivalent. Pharmacology of centrally acting, hypnotic and anticonvulst agents with emphasis on alterations in brain function. Offered in even-numbered years.

203. Pharmacology of the Nervous System III: Stimulants and Antidepressants (1-3) I, II. Lecture—1 hour. Discussion—1 hour. Prerequisite: courses 101, 102, and 103 or Medical Science 410 and 411B, or the equivalent. Pharmacology of stimulant and convulsant agents, anticonvulsive agents and their evaluation in animal models. Offered in even-numbered years.

204. Pharmacology of the Nervous System IV: Drug Alteration of Behavior (1-3) I, II. K. Kilian Lecture—1 hour. Discussion—1 hour. Prerequisite: courses 101, 102, or Medical Science 410, 411B and 413A-413B, or the equivalent. Activity of drugs altering mood and behavior; psychopharmacological agents, hallucinogens, antidepressants. Offered in odd-numbered years.

205. Advanced Pharmacology of Renal and Respiratory Systems (3 I, II. West Lecture—2 hours. Discussion—1 hour. Prerequisite: course 200A-200B for graduate students; Medical Science 411C and 423 for medical students. In-depth study of interaction between the kidney and respiratory systems with particular emphasis on pharmacologic intervention in homeostatic processes subserved by the kidney and the respiratory system.


207. Drug Alteration of Subcellular Function (1-3) I. Holinger Lecture—1 hour. Discussion—1 hour. Prerequisite: course 101I or Medical Science 410, or the equivalent. The action of drugs and subcellular components with special emphasis on mechanism of action. Offered in odd-numbered years.

208. Application of Pharmacology to Clinical Practice (I) I, Hance, K.F. Kilman, III. Lecture—1 hour. Prerequisite: consent of instructor. Preparation of the student for an understanding of the basic principles of pharmacology. Review of special problems related to the practice of medicine and the treatment of diseases. Areas to be covered include I. Clinical Drug Therapy, II. Clinical Pharmacology. Specific drugs will be used as clinical examples.

209. Advanced Pharmacology of Cardiovascular System (3) I, West Lecture—2 hours; discussion—1 hour. Prerequisite: course 200A-200B, or the necessary laboratory hours in Medical Science 411B and 413A for medical students. In-depth study of action and effects of drugs on electrical and mechanical properties of mammalian heart and on mammalian vasculature.

210. Statistical Approach to Pharmacological Research (2) III. Hance Lecture—2 hours. Prerequisite: course 200A or consent of instructor. Introduction to the application of statistics in pharmacological research and researching, basic concepts of distribution, measures of location, dispersion and correlation, significance, probability, uncertainty, design of experiments.

211. Clinical Pharmacology (3-10) I, II, III, IV, Winters, Ralph Lecture; round tables. Prerequisite: advanced graduate students in the sciences. Basic principles of pharmacology will be related to the diagnosis and treatment of drug induced disease states as well as principles of therapy of common clinical diseases. (Same course as Family Pract. 271.)

215. Tseufing in Pharmacology (1) I, II. The Staff (K. Kilian in charge) Discussion—1 hour. Laboratory—3 hours. Prerequisite: courses 200A-200B and 200A-200BII, with a grade of B or better and consent of instructor. Intensive review of pharmacology through leading through seminar sessions with a small group of students taking the sequence of 200A-200B and 200A-20BII.

226. Group Study (1-5) I, II, III, IV. "The Staff (K. Kilian in charge) Prerequisite: consent of instructor. Directed reading and discussion of topics in modern pharmacology.

226. Research (1-12) I, II, III, IV. The Staff (K. Kilian in charge) Prerequisite: consent of instructor. (S.U.G. grading only.)

242. Physical Medicine and Rehabilitation

Upper Division Courses

196. Directed Group Study (1-5) I, II, III, IV. The Staff—Clinical (in charge) Prerequisite: advanced standing and consent of instructor. Reading, conferences, laboratory and clinical exposure in special topics in general and child psychiatry and psychology. (P.N.P grading only.)

198. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff—Clinical (in charge) Hours to be arranged. Prerequisite: advanced standing and consent of Instructor. Supervised independent study project and research for upper division students. (P.N.P. grading only.)

Graduate Courses

226. Psychiatric Implications of Legal Intervention (2) I, II. Timp, Bauer, Schuffler Discussion—2 hours. Prerequisite: consent of instructor. The influence of laws on human behavior, and vice versa, will be explored. Particular emphasis on youth and juvenile court procedure. Many state specific similarities. (Same courses as Community Health 226.)

250. Existential-Humanistic Psychotherapy (2) I, II. Battista Seminar—discussion-practicum—24-hour evening session. Prerequisite: engaged in conducting outpatient psychotherapy (concurrently). An overview of existential-humanistic approach to psychotherapy based on an existential analysis of human condition. Role-playing of psychotherapy sessions will be used to complement reading and discussions. Emphasis will be placed on work of Jim Bugental. (S.U.G. grading only.)

250. Program Evaluation in Human Services (2) I, II. Edwards Seminar—2 hours. Prerequisite: graduate standing in medical or social sciences; introductory course in statistics or consent of instructor. Introduction to the techniques of the interactive time-sharing computer and the Statistical Package for the Social Sciences. (Students will develop basic mastery of the measurement and statistical analysis techniques.)

250. Interdisciplinary Research Seminar in Family Psychology (3) I, II, III, IV. Meadow Seminar—3 hours. Prerequisite: medical, law, or social sciences graduate student with consent of instructor. Participation in research project designed to study the relationship between family structures and communication processes in normal and abnormal behavior. Families will be selected from patient and normal" populations, ethnic groups, and a variety of socioeconomic classes.
242. Grand Rounds for Department of Psychiatry (1-12) I, II, III, IV. Tropic

Prerequisite: students or staff of the School of Medicine or other qualified mental health professionals with consent of instructor. One and one-half hour weekly conference at the Sacramento Medical Center of UCD for presentation of selected clinical cases, presentation of lecture and research reports.


To be arranged—variable time experience and clinical assignments and selected conferences. Prerequisite: medical or graduate students and consent of instructor. Primary focus will be work with juvenile and adult offenders in one of several settings: Sacramento County Jail, Juvenile Center for Sacramento County, or California Medical Facility. May be repeated for credit with consent of instructor.

Radiology—Diagnostic

Professional Courses


Lecture—1 hour; laboratory—1 hour. Prerequisite: one-year college physics course for non-engineering students (e.g. Physics 2A-2B, 3A-3B, or 3C-3D) or consent of instructor. Subjects discussed are from fields of basic radiologic physics, physics of diagnostic radiology, and physics of nuclear radiology. Offered at VA Hospital, Martinez. (PHN grading only for undergraduates, H-SU grading for graduate students.)

468. Group Study in Diagnostic Radiology (1-12) I, II, III, IV. The Staff

Prerequisite: consent of instructor.

469. Research in Diagnostic Radiology (1-12) I, II, III, IV. The Staff

Prerequisite: consent of instructor.

Radiology—Nuclear Medicine

Upper Division Courses

101. Biomedical Radiochemistry (3) II, III. J. S. DeNardo, Krohn

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Course is designed to combine basic nuclear physics, chemistry, and biology to the comprehensive and practical laboratory experience in applied radiochemistry, focusing on medical applications. (PHN grading only.)

186. Directed Group Study (1-5) I, II, III, IV. The Staff (J. S. DeNardo in charge)

Lecture—1 hour; reading—2 hours. Prerequisite: upper division standing and consent of instructor. Selected reading in nuclear medicine. (PHN grading only.)

189. Special Study for Advanced Undergraduate (1-5) I, II, III, IV. The Staff (G. L. DeNardo in charge)

Laboratory—3-15 hours. Prerequisite: upper division standing and consent of instructor. Students will learn the scientific approach and laboratory techniques pertaining to biophysical investigation in the Nuclear Medicine Laboratory. (PHN grading only.)

Graduate Course

299. Research: Special Study for Graduate Students (1-121) I, II, III, IV. The Staff

Prerequisite: graduate standing and consent of instructor. Supervised independent study and research for graduate students. (SU grading only.)

Professional Courses


Lecture—3 hours; laboratory—2 hours. Prerequisite: consent of instructor. Course is intended to cover in a comprehensive didactic and practical fashion those fundamental and clinical sciences which are the basis for the practice of nuclear medicine and nuclear medical technology.

400B. Fundamental Nuclear Medicine (4) II, III. J. S. DeNardo, Banman, Sadehn, G. L. DeNardo (in charge)

Lecture—3 hours; laboratory—2 hours. Prerequisite: consent of instructor. Course is intended to cover in a comprehensive didactic and practical fashion those fundamental and clinical sciences which are the basis for the practice of nuclear medicine and nuclear medical technology.

401. Biomedical Radiochemistry (3) II, III. J. S. DeNardo, Krohn, Chen

Lecture—2 hours; laboratory—3 hours. Prerequisite: open to graduate students; consent of instructor. Course is designed to combine basic nuclear physics, chemistry, and biology to the comprehensive and practical laboratory experience in applied radiochemistry, focusing on medical applications. Subjects include choice and purification of appropriate gamma and beta radioisotopes, compounding biological pharma/chemistry, and radiomunoassays. (Same course as 410.)

456. Group Study in Nuclear Medicine (1-1) II, III, IV. The Staff (Ravents in charge)

Prerequisite: consent of instructor.

459. Research in Nuclear Medicine (1-12) II, III, IV. The Staff (Ravents in charge)

Prerequisite: consent of instructor.

Radiology—Therapeutic

Graduate Course

259. Independent Study and Research (1-12) II, III, IV. The Staff (Ravents in charge)

Laboratory—3-12. Prerequisite: enrollment with Biophysics Group for Ph.D. candidacy, and consent of group adviser and sponsor. Research under supervision of a member of the department (sponsor). Work must be appropriate to fulfill the requirements for the Ph.D. degree. (SU grading only.)

Professional Courses

450. Medical Literacy (2) II. Ravents, Meyrose

Lecture—1 hour; seminar—1 hour. Prerequisite: consent of instructor. For medical students and hospital residents. Writing and interpreting papers; most examples from current medical literature.

458. Group Study in Therapeutic Radiology (1-12) II, III, IV. The Staff

Prerequisite: consent of instructor.

459. Research in Therapeutic Radiology (1-12) II, III, IV. The Staff

Prerequisite: consent of instructor.

Medicine

(School of Veterinary Medicine)

Murray E. Fowler, D.V.M., Chairperson of the Department

Department Office. 2106 Medical Science 1A (752-1363)

Faculty

Alexander A. Ardans, D.V.M., M.S., Associate Professor

Kurt Benirschke, M.D., Clinical Professor (San Diego Campus)

Dale E. Brooks, D.V.M., Ph.D., Lecturer

Gary P. Carlson, D.V.M., Ph.D., Associate Professor

Larry D. Cowgill, D.V.M., Ph.D., Assistant Professor

Laurence R. Enos, Ph.D., D.L., Assistant Professor

Murray E. Fowler, D.V.M., Professor

Roy V. Heinrickson, D.V.M., Lecturer

Charles A. Hierpe, D.V.M., Professor

Peter J. Irke, V.M.D., Assistant Professor

Humphrey D. Knight, D.V.M., Ph.D., Professor
Medieval Studies

Gerald V. Ling, D.V.M., Associate Professor
Donald G. Low, D.V.M., Ph.D., Professor
Baine McGowan, Jr., D.V.M., Professor
Niels C. Pedersen, D.V.M., Ph.D., Associate Professor
William R. Pitchard, D.V.M., Ph.D., J.D., Professor
Ling G. Raggi, D.V.M., Ph.D., Professor Emeritus
Sigmund T. Rich, D.V.M., Lecturer
Edward A. Rhode, D.V.M., Professor
Gary E. Rumbaugh, D.V.M., Assistant Professor
Charles J. Seidemann, D.V.M., Assistant Professor
Bradford P. Smith, D.V.M., Assistant Professor
Anthony A. Starnard, D.V.M., Ph.D. Associate Professor (Medicine, Pathology)
Donald R. Strombeck, D.V.M., Ph.D., Professor
William P. Thomas, D.V.M., Assistant Professor
James F. Wilson, D.V.M., J.D., Assistant Adjunct Professor

Part-Time Clinical Faculty
Paul S. Chaffee, D.V.M., Assistant Clinical Professor
Lanny H. Cornell, D.V.M., Assistant Clinical Professor
Stephen J. Ettinger, D.V.M., Associate Clinical Professor
Norman L. Gates, D.V.M., M.P.H., Assistant Clinical Professor
Gary R. Kuehn, D.V.M., Assistant Clinical Professor
Robert R. Pensinger, D.V.M., Associate Clinical Professor
Philip T. Robinson, D.V.M., Assistant Clinical Professor
James D. Russell, D.V.M., Assistant Clinical Professor

Courses in Medicine

Upper Division Course

190. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Fowler in charge) (P/W grade only.)

Graduate Courses

298. Seminar in Veterinary Medicine (1-5) I, II, III, The Staff (Fowler in charge)

299. Group Study (1-5) I, II, III. The Staff (Fowler in charge) Prerequisite: student must be a member of School of Veterinary Medicine. Consent of instructor. Group study in selected areas of the clinical sciences. (S/U grade only)

299R. Research (1-12) I, II, III. The Staff (Fowler in charge) (S/U grade only)

Professional Courses

401. Small Animal Clinic (1/2 per week) I, II, III. The Staff (Ling in charge)
Laboratory—50 hours total. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns responsible for diagnoses, medical and surgical treatment of animals in the wards and outpatient clinic, including laboratory, physical examinations, laboratory tests, special diagnostic and therapeutic procedures, and consultations, under the direction of the senior staff. May be repeated for credit. (S/U grade only)

402. Large Animal Medicine (1/2 per week) I, II, III. The Staff (Knecht in charge)
Laboratory—50 hours total. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents responsible for the medical care of patients in the VMTH and outpatient clinics under the direction of the senior staff of the hospital. May be repeated for credit. (S/U grade only)

403. Small Animal Medicine (1/2 per week) I, II, III. The Staff (Ling in charge)
Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for the medical care of animals in the wards and outpatient clinic involving physical examinations, history taking, laboratory tests, and consultations under the supervision of the senior staff. May be repeated for credit. (S/U grade only)

404. Herd Health Management (1/2 per week) I, II, III. Hjerpe and McGowan in charge
Laboratory—50 hours total. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns apply their knowledge of veterinary medicine, nutrition, genetics, husbandry, management, and economics on a herd basis toward the improvement of food animal production efficiency through improved feeding, health, and environmental management. (S/U grade only)

421. Veterinary Dermatology (1/2 per week) I, II, III. Stannard Laboratory—25 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents are responsible for the care of patients in the hospital and outpatient clinic including history taking, physical examinations, and diagnostic procedures under the direction of the staff dermatologist. (S/U grade only)

472. Pulmonary Diseases (1/2 per week) I, II, III. Glaespie Laboratory—25 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. New and advanced techniques for the detection and characterization of respiratory and cardiac diseases in animals demonstrated and discussed. Interns assist in assessment of respiratory dysfunction of patients and correlation of the dysfunction and clinical signs. (S/U grade only)

429. Zoo and Wildlife Medicine (1/2 per week) I, II, III. Fowler Laboratory—25 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents are responsible for the care of patients in the hospital and outpatient clinic including history taking, physical examinations, and diagnostic procedures under the direction of the staff veterinarian. (S/U grade only)

481. Small Animal Grand Rounds (1/2 per week) I, II, III. The Staff (Ling in charge)
Discussion—1 hour. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital or consent of instructor. Interns and residents take an active part in the presentation and discussion of selected cases from the small animal clinic. May be repeated for credit. (S/U grade only)

492. Large Animal Grand Rounds (1/2 per week) I, II, III. The Staff (Knecht in charge)
Discussion—1 hour. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital or consent of instructor. Interns and residents take an active part in the presentation and discussion of selected cases from the large animal and ambulatory clinics. May be repeated for credit. (S/U grade only)

493. Seminar in Veterinary Medicine (1/2 per week) I, II, III. The Staff (Ling in charge)
Seminar—2 hours. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital. Seminars given by the faculty of the School of Veterinary Medicine in topics relating directly to the practice of clinical medicine and surgery. Interns and residents will assist in the presentation of seminar material. May be repeated for credit. (S/U grade only)

Medieval Studies

College of Letters and Science
Program Office, 912 Sproul Hall (752-1219)

Committee in Charge
James J. Murphy, Ph.D. (Rhetoric), Committee Chairperson
William M. Bowery, Ph.D. (History)
Robert O. Crammey (History), Winter-Spring Quarters
Dennis J. Dutschke, Ph.D. (Italian)
Manfred P. 'Heilich, Ph.D. (History), Fall Quarter
Winder McConnell, Ph.D. (German)
Robert K. Sarlos, Ph.D. (Dramatic Art)
David A. Traill, Ph.D. (Classics)

The Major Program

The major in Medieval Studies is designed to introduce you to the main features of European civilization during the period from the fall of Rome to the beginnings of the Renaissance. Medieval studies are inherently interdisciplinary. The program involves studies in history, art, philosophy, literature, drama, music, national languages, religion, rhetoric, and political theory.

Medieval Studies

A.B. Major Requirements:

Preparatory Subject Matter
Recommended: Art 18, History 44A, Philosophy 105, Medieval Studies 20A.


Language proficiency is a necessity; courses in Latin and other European languages are strongly recommended, particularly for students planning to pursue graduate studies in the medieval field.

Depth Subject Matter

52

History, at least 12 units from History 102B, 121A, 121B, 121C, 2018

Literature at least 16 units, including two of the following:

- English 111, 112, 113, 150A, 150B, 150C
- French 115A, 115B
- German 120, 121, 122
- Russian 110, 112, 113
- Political Science 116, 116A, 116B
- Senior thesis, Medieval Studies 184

Credit for 12 units from the following:

- Philosophy and religion, at least 8 units from Philosophy 105, 132, 145, 146, 190
- Religious Studies 102, 110
- Arts and language, at least 8 units from Art 176A, 176B, 176C, 177A, 178A, 178B
- Dramatic Art 156, German 106, Music 114 (row prerequisite), 199, Rhetoric 110, 111
- Political Thought, at least one course from Political Science 116, 116B, 116A
- Senior thesis, Medieval Studies 184

Total Units for the Major

52

Major Advisers:

W. M. Bowery (History), D. J. Dutschke (Italian), J. J. Murphy (Rhetoric), D. A. Traill (Classics).

Courses in Medieval Studies

Lower Division Courses

20A. Early Medieval Culture (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Readings (in translation) in early medieval culture, such as the Codes of Justinian, the Confessions of St. Augustine, The Consolation of Philosophy by Boethius, Beowulf the Nibelungenlied, and the Song of Roland.

20B. The Culture of the High Middle Ages (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Readings (in translation) in the culture of the high Middle Ages, such as the Breviary of Thomas Aquinas, the Chronicles of Froissart, the Canterbury Tales of Chaucer, and the Divine Comedy of Dante.

20C. Medieval Transformations (4) III. The Staff
Lecture—2 hours; discussion—1 hour; paper or formal presentation. Course deals with the medieval transformations that took place before the Renaissances. Topics will be selected from various disciplines such as literature, philosophy, religion, history, art, music, political thought, rhetoric, and other pertinent fields.

190. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/W grade only)

98. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/W grade only)

Upper Division Courses

120A. The Medieval World (4) I, II, III. The Staff (Chairperson in charge)
Lecture—2 hours; discussion—1 hour; term paper. Course
Mexican-American (Chicano) Studies

A.B. Major Requirements:

Humanities Emphasis

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
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<tbody>
<tr>
<td>Spanish 1 or IATA, 2 or 2ATA, 3; (or equivalent)</td>
<td>8-40</td>
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<tr>
<td>Spanish 4 or 7A, 5 or 7B, 28 or 7C</td>
<td>0-10</td>
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<tr>
<td>Linguistics 1</td>
<td>4</td>
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<tr>
<td>Chicano Studies 10</td>
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Depth Subject Matter

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<tr>
<td>Spanish 124, 125, 129, 129, 130</td>
<td>30</td>
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<tr>
<td>One course from Spanish 131, 132, 133</td>
<td>3-4</td>
</tr>
<tr>
<td>One course from Linguistics 115, 150 or Education 151</td>
<td>3-4</td>
</tr>
<tr>
<td>History 169A, 169B, 169A or 169B</td>
<td>12</td>
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<tr>
<td>Political Science 168</td>
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Total Units for the Major 46-80

Recommended

<table>
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<tr>
<th>Subject</th>
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<tbody>
<tr>
<td>Linguistics 115 and 150 (above), American Studies 45; two courses from Spanish 8A, 8B, 9 (for non-native speakers of Spanish); English 2 (for native speakers of Spanish); two courses from American Studies 110, Sociology 124, 130, Anthropology 104, 105A, 130A, Spanish 169A, 132 and 133 (above)</td>
<td>300</td>
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Sociology Emphasis

Preparatory Subject Matter

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<tr>
<td>Chicano Studies 10</td>
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<tr>
<td>Spanish 4 or 7A, 5 or 7B, 28 or 7C</td>
<td>11-13</td>
</tr>
<tr>
<td>Sociology 1, 46A, 46B</td>
<td>13</td>
</tr>
<tr>
<td>Linguistics 1</td>
<td>4</td>
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</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sociology 130, 140, 165A, 169</td>
<td>16</td>
</tr>
<tr>
<td>Agricultural Economics 150</td>
<td>3</td>
</tr>
<tr>
<td>History 169B</td>
<td>3</td>
</tr>
<tr>
<td>Linguistics 115</td>
<td>3</td>
</tr>
<tr>
<td>Political Science 168</td>
<td>4</td>
</tr>
<tr>
<td>Electives, a maximum of 12 units chosen from any of the following courses with no more than 2 courses from any one group</td>
<td>12</td>
</tr>
<tr>
<td>Group 1: History 169A, 169B, or 169A</td>
<td>12</td>
</tr>
<tr>
<td>Group 2: Linguistics 150, Spanish 124, 126</td>
<td>12</td>
</tr>
<tr>
<td>Group 3: Anthropology 163, Sociology 118</td>
<td>12</td>
</tr>
<tr>
<td>Group 4: Applied Behavioral Sciences 172, 176</td>
<td>12</td>
</tr>
<tr>
<td>Political Science 176</td>
<td>12</td>
</tr>
</tbody>
</table>

Total Units for the Major 74-76

Further Study. If you are contemplating studies in a graduate or professional school you can, with the aid of an adviser, build a program around the discipline of your choice, i.e., Spanish or Spanish-American literature, history, or political science. If you are contemplating a career in bilingual education you should consult the Department of Education for information about the Teacher Credential Program (see also page 105).

Major Adviser. L. L. Arroyo (History), D. M. Ramirez (Sociology), A. S. Riddell (Chicano Studies), G. Rojas (Spanish).

Minor Program Requirements:

This interdisciplinary minor provides the student with a general view of the Chicano in terms of the history, culture, political involvement and role in the society of the Southwestern United States.

Courses in Chicano Studies

Lower Division Courses

10. Introduction to Chicano Studies (4) I, III. Riddell. Lecture—3 hours; discussion—1 hour. Analysis of the situation of the Chicano (Mexican-American) people, emphasizing their history, literature, political movements, education and related areas.

98. Directed Group Study (1-5) I, II, III. The Staff (Riddell in charge). (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Riddell in charge). (P/NP grading only.)

Upper Division Courses

102. Chicanas in Contemporary Society (4) I, III. Riddell. Lecture—3 hours; term paper. Prerequisites: course 10 or Spanish 124 or History 169B. Analysis of the role and status of Chicanas in contemporary American society. Special emphasis is on their historical role, the political, economic and social institutions which have affected their status, and their contributions to society and their community.

189. Directed Group Study (1-5) I, II, III. The Staff (Riddell in charge).

Microbiology

See Also Medical or Veterinary Microbiology

Microbiology (A Graduate Group)

David Pratt, Ph.D., Chairperson of the Group

Graduate Study. The Graduate Group in Microbiology offers study and research leading to the M.A. and Ph.D. degrees. For information on the graduate study and undergraduate preparation for the program contact the graduate adviser or the Chairperson of the Group. See also page 99.

Graduate Advisers. B. L. Beaman (Medical Microbiology); Y. C. Zea (Veterinary Microbiology); P. Baumann (Bacteriology); M. W. Miller (Food Science and Technology).

Course in Microbiology

Graduate Course

299. Research (1-12) I, II, III. The Staff. Laboratory—variable. Research under the guidance of dissertation committee. (EUI grading only.)

NOTE: For key to footnote symbols, see page 130
Military Science

(College of Letters and Science)

Philip J. Perles, Lieutenant Colonel, Chairperson of the Department
Department Office, 125 Hickey Gymnasium (752-0541)

Faculty
William L. Carville, Major, Assistant Professor
Mark J. Donald, Captain, Assistant Professor
Jay D. Johnson, Major, Associate Professor
Young C. Lim, Captain, Assistant Professor
George J. Mikosz, Captain, Assistant Professor
Paul Fayette, Major, Associate Professor
Philip J. Perles, Lieutenant Colonel, Professor
William Treece, Captain, Assistant Professor

Program of Study

The Military Science Department extends the educational opportunities and provides extracurricular activities which, when combined with a baccalaureate degree, qualify a student for a commission in the Army Reserve or Regular Army. The program assists qualified students in all academic fields to prepare for positions of leadership in military or civic careers. A continuing effort is made to assign graduates to military career fields aligned with their major field of study, individual capabilities and preferences. Active duty obligation for ROTC graduates is for three years for those who choose Active Duty or six months for those who choose Reserve Component Duty. A liberal scholarship program is available. The Army offers four-, three-, and two-year scholarships. The four-year is awarded to high school seniors who will be freshmen at U.C. Davis. The three-year and two-year are awarded to freshmen and sophomores who are already attending college. Application for the four-year scholarship is completed prior to December 15th of the senior year in high school. The three-year and two-year scholarship applications are made during March of the freshmen or sophomore year.

Department Programs

Students are enrolled in military science under one of two programs.

Four-Year Program

Students are enrolled in the basic course (lower division) for the first two years on a voluntary basis. There is no military obligation associated with attendance in lower division courses. Admission to the advanced course (upper division) is by application after second year lower division students who meet the academic, physical and military aptitude requirements. Qualified veterans can enter the advanced course immediately because of their military service experience.

Upper division students receive $100 subsistence per month after executing a contract agreeing to complete the course and accept a commission if offered. During the course all military science textbooks, uniforms and equipment are provided without cost. Students are given leadership development experience at summer camp between their third and fourth years of the course. Emphasis is placed on individual and group decision-making, leadership development and the capability to function effectively in positions of significant responsibility.

Two-Year Program

This program is designed for students who have not attended lower division Military Science classes. In lieu of lower division courses an applicant attends a six-week summer camp which is voluntary and carries no military obligation. Applicants are paid for camp attendance and transportation costs. Applications are accepted during winter term of the year preceding enrollment in the two-year program. All other provisions explained above for the upper division course apply to the two-year program. Other methods for entering the upper division program are available by arrangement with the department.

Scholarship Program

Four-year merit scholarships are awarded to high school seniors in nationwide competition. Of these, two-, and three-year scholarships are applied for through the Military Science Department after entering the University. Scholarship winners receive all tuition, fees, books, uniforms, and $100 subsistence allowance per month.

Scholarship students incur a four-year active duty military obligation.

For further details on these scholarships contact the department.

Leadership Laboratory

During the course of the school year seven Saturdays are allotted to practical exercises. These are voluntary for lower division students. Classes emphasize adventure activities including mountaineering techniques, orienteering, and rifle marksmanship. Upper division students are required to attend leadership laboratories for practical leadership experience and to prepare for attendance at ROTC Advanced Camp.

Air Force ROTC

The UC Davis campus does not offer Air Force ROTC; however, the Department of Aerospace Studies (AFROTC) on the UC Berkeley campus offers upperclassmen the opportunity to qualify for a commission in the Air Force through cross registration at Berkeley.

Students contemplating application for this two-year program must have two years of academic studies (undergraduate, graduate, or a combination) remaining with the University following the summer in which they intend to complete the AFROTC Field Training. Application should be made as early as possible in the academic year preceding the summer training.

Two-year scholarships are available to qualified students. Tuition, fees, book allowance, and a $100 monthly living allowance is paid all recipients.

Students qualified for, and clearance of flight training as an Air Force officer will be provided training without charge during their final year in the AFROTC program.

Selection for the two-year program is based upon aptitude and interest in becoming an Air Force officer, and potential for leadership and command. Placement is subject to the approval of the Department Chairperson. Those students accepted into the Professional Officer Course are provided with uniforms, texts and $100 per month.

For details on the program, contact the Department, 10 Callaghan Hall, University of California, Berkeley 94720, or telephone (415) 642-3572. For information on cross-enrollment procedures, contact the Admissions Office on this campus.

Academic Credit

College of Letters and Science. The Bachelor of Arts degree requires the completion of 180 units. Military Science courses are counted in the allowance for electives.

College of Agricultural and Environmental Sciences. The Bachelor of Science degree in agriculture requires the completion of 180 units. Military Science courses are counted in the unit allowance for electives.

College of Engineering. Military Science units are acceptable toward the Bachelor of Science degree in Engineering. Military Science courses are counted in the unit allowance for electives.

College of Veterinary Medicine. The number of Military Science units is acceptable toward the Bachelor of Science degree in Veterinary Medicine. Military Science courses are counted in the unit allowance for electives.

Courses in Military Science

Lower Division Courses

11. Introduction to Military Science (1) I. Mikosz Lecture—1 hour. A discussion of the military as an element of national security and international diplomacy. Course surveys the United States defense structure to include military treaties and organizations.

12. Introduction to Military Science II (1) I. Mikosz Lecture—1 hour. A discussion of the military in American society. Course focuses on current political attitudes within the military and discusses technological developments of modern military equipment.

13. Introduction to Military Science III (1) I. Mikosz Lecture—1 hour. A survey of the organization and structure of the United States Army. Course includes discussion of various branches of the Army, their roles in the overall organization, and the interface with one another.

21. Military History I (2) I. Lim Lecture—2 hours. An analysis of selected historical military campaigns and battles. Emphasis is on continuity of principles of warfare throughout the ages. Course covers period from Greco-Persian Wars to Age of Louis XIV.

22. Military History II (2) I. Lim Lecture—2 hours. Survey of selected campaigns and battles from American Revolution era to end of nineteenth century. Emphasis is on the foundation and development of modern American and European military organizations.

23. Military History III (2) I. Lim Lecture—2 hours. An analysis of modern military conflicts from World War I to present. Emphasis is on development of mechanized warfare and its impact on current world-wide military doctrine.

Upper Division Courses

131. Principles of Military Instruction (2) I. Treece Lecture—4 hours. Principles and practice in fundamentals applicable to military instruction to include planning, presentation and evaluation. Student presentations exemplify lecture material.

132. Theory of Leadership (2) I. Perles Lecture—2 hours. Principles and theory of leadership, individual and group problem solving in the support of leadership problems, and to include the impact on current world-wide military doctrine.

133. Advanced Military Operations (2) II. Payette Lecture—4 hours. Prerequisite: course 23 or consent of instructor. Advanced study of military operations, to include the analysis of the functions of primary and supporting branches and commands.

141. Principles of Military Administration (2) T. Johnson Lecture—4 hours. Discussion of the functions of military staff organizations to include the areas of administrative correspondence, procedures and the system of military justice.

142. Managerial Principles and Theories (3) T. Johnson Lecture—2 hours. Military administrative principles and personnel management theories, including the military occupational structure, and the administration of military justice.

143. Revolutionary Conflict (2) T. Johnson Lecture—4 hours. Analysis of revolutionary conflict to include an examination of the urgency and counterinsurgency movements in the world arena.
Music

(College of Letters and Science)

D. Kern Holoman, Ph.D., Chairperson of the Department
Department Office, 112 Music Building (752-0666)

Faculty

Lawrence E. Anderson, Ph.D., Lecturer
Robert S. Bloch, M.A., Associate Professor
Sydney R. Charles, Ph.D., Professor
Andrew D. Frank, M.A., Associate Professor
D. Kern Holoman, Ph.D., Associate Professor
Gilbert Kahlil, B.A., Visiting Professor
Albert J. McNeil, M.S., Professor
David L. Nutter, Ph.D., Assistant Professor
Jerome W. Rosen, M.A., Professor
Richard G. Swift, M.A., Professor
William E. Valente, M.A., Associate Professor

The Major Program

The Department of Music offers a unique program of study for a career in music as part of a broadly-based liberal arts education leading to the Bachelor of Arts degree.

The student engages in the study and performance of music of all styles and periods including those of the present. Options are provided for those students with special interests in composition, history, teaching and performance, and for those who plan to continue in graduate work in music. The Department of Music offers a Master of Arts degree with emphasis on composition or music history, and a Master of Arts in Teaching degree with emphasis on teaching music.

Music

A.B. Major Requirements:

<table>
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<th>Requirement/Subject Matter</th>
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<td>Preparatory Subject Matter</td>
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<tr>
<td>Music 4A, 4B, 4C, 5A, 5B, 5C, 21A, 21B</td>
<td>39</td>
</tr>
<tr>
<td>Music 30 (or equivalent as determined in consultation with major advisor)</td>
<td>1 year</td>
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Depth Subject Matter:

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<tr>
<td>Music 104A, 104B, 104C</td>
<td>12</td>
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<tr>
<td>Music 130 (or equivalent as determined in consultation with major advisor)</td>
<td>1 year</td>
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Performance:

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<td>At least 14 units from Music 41, 43, 44, 45, 46, 141, 143, 144, 145, 146</td>
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Pleno Skills:

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Total Units for the Major: 92-95

Beginning and transfer students must take an examination in piano playing. Sufficient pianistic ability to perform four-part choral and composition is assumed. Failure in this examination is an illustration of students with a deficiency in piano playing.

NOTE: For key to footnote symbols, see page 130

study of selected musical instruments, melodic and rhythmical styles and structures, and the social role of music in non-Western societies.


*Performance instruction.*—1 hour. Prerequisite: admission by audition only, ability to perform scales and short compositions from the standard repertoire. Required. Class instruction; arranged by section; in the appropriate orchestral instruments, or in voice. Required for music majors; recommended for those preparing for a teaching credential in music. May be repeated for credit.

41. University Symphony (2) I, II, III. Holoman Rehearsal—4 hours. Prerequisite: admission subject to audition before the first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal, and performance of music from the orchestral literature. May be repeated for credit. (P.N.P. grading only)

42. University Concert Band (2) I, II, III. Valente Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Rehearsal and performance of music for band may be repeated for credit. (P.N.P. grading only)

43. University Chorus (2) I, II, III. McNeil Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal, and performance of music of choral music. May be repeated for credit. (P.N.P. grading only)

44. Early Music Ensemble (2) I, II, III. Nutter Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of Medieval, Renaissance, and Baroque music for vocal ensemble and historical instruments. May be repeated for credit. (P.N.P. grading only)

45. Chamber Music Ensemble (2) I, II, III. Blanch in charge Rehearsal—3 hours; student practice—1 hour. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, voice, piano, harpsichord, and organ. May be repeated for credit. (P.N.P. grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Holoman in charge) (P.N.P. grading only)

Upper Division Courses

104A-104B-104C. Advanced Theory (4-4-4) I-III. Rosen Lecture—4 hours. Prerequisite: course 5C. Twentieth-century compositional procedures: analyses and projects in composition.

107A-107B-107C. Electronic Music (2-2-2) I-III. Rosen Laboratory—6 hours. Prerequisite: consent of instructor; limited enrollment with priority to music majors. Compositional and instrumental techniques for the creation of music using the Beethoven (Only 2 units count toward the music major).

108A-108B. Orchestration (2-2) II-III. Rosen Lecture—2 hours. Prerequisite: course 5C. Techniques of orchestration from the study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations.

110A. The Music of a Major Composer: Beethoven (4) II. Holoman Lecture—3 hours; listening section—1 hour. The work of Beethoven will be studied in the context of his time and his contemporaries. Lectures, listening sessions, and selected readings. For non-majors. Offered in odd-numbered years.

*110B. The Music of a Major Composer: Mahler (4) II. Frank Lecture—3 hours; listening section—1 hour. The work of Mahler will be studied in the context of his time and his contemporaries. Lectures, listening sessions, and selected readings. For non-majors. Offered in even-numbered years.

110C. The Music of a Major Composer: Bach (4) III. Swift Lecture—3 hours; listening—1 hour. Work of Bach will be studied in the context of his time and his contemporaries. Lectures, listening sessions, and selected readings. For non-majors.

110D. The Music of a Major Composer: Mozart (4) I, II. Frank Lecture—3 hours; listening—1 hour. Work of Mozart will be studied in the context of his time and his contemporaries. Lectures, listening sessions, and selected readings. For non-majors.

111. Choral Conducting (2) II. McNeil Lecture—2 hours. Prerequisite: course 5C. Study of the principles and techniques of conducting choral ensembles.
Graduate Courses

200A-200B. Music Research (4-4) III. Charles Semester—3 hours. Survey of basic materials for music research. Selected projects.

200C. Notation (6) III. Charles Semester—3 hours. Study of selected notation practices.


240A-240B-240C. Techniques of Analysis (4-4-4) I, II, III Holomann in charge Semester—3 hours. Analysis and analytical techniques as applied to music of all historical style periods.

291A-291B-291C. Topics in Music History (4-4-4) I-III. Charles in charge Semester—3 hours. Studies in selected areas of music history and theory.

299. Individual Study (2-5) I, II, III The Staff (Holoman in charge) Special studies and projects in musical composition or music history (SU grading only.)

Teaching Methods Courses

Instrumental Methods. The courses in this series consider methods of teaching orchestra and band instruments, and include repertory and program planning for secondary schools.

300. The Teaching of Music (3) II. Anderson Lecture—3 hours. Prerequisite: course 1 or the equivalent. Methods of teaching music in grades K-6.

301. The Teaching of Music (3) I, McNeil Lecture—3 hours. Prerequisite: course 5C (or the equivalent). Methods of teaching music in grades 7-12.

371A-321B. Stringed Instruments (1-1-1) I-III Discussion—2 hours. Prerequisite: course 4C.

322. Brass Instruments (2) II. Anderson Discussion—2 hours. Prerequisite: course 4C.

323A-323B. Woodwind Instruments (1-1-1) I-III Anderson Discussion—2 hours. Prerequisite: course 4C.

Professional Course

404A-405B-405C. Elementary Piano (1-1-1) I-II-III. Laboratory—2 hours. Prerequisite: limited enrollment, with priority given to music majors. Designed for students requiring training to meet the minimal piano requirements for the major in music. (PRN grading only.)

Native American Studies

(College of Agricultural and Environmental Sciences)

Faculty

See under the Department of Applied Behavioral Sciences.

The Major Program

The Native American Studies major is designed to affect the lives of American Indian people as directly as possible. In order to accomplish this the major is designed to prepare you to: (1) work with Indian people as community service personnel, teachers, tribal administrators, etc.; (2) understand Indian values and problems; (3) develop data and creative products directly usable by Indian people or by schools and agencies serving Indian people; (4) apply results of past experiences or research to finding solutions to the many problems faced by Indian communities; (5) further creative development of Indian people through innovations within the context of Indian artistic and musical traditions; and (6) enter into graduate programs either in Native American Studies or in related fields. In consultation with the Native American Studies Major Review Committee, you will select the course sequence most appropriate for your educational goals. A minimum of 20 units shall be in a primary field of specialization.

Native American Studies

B.S. Major Requirements:

For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable.

Preparatory Subject Matter ............................................. 36

Introduction to native American studies (Native American Studies 1) .................................................. 4

Native American Studies 201 ............................................. 4

Native American art (Native American Studies 331) ............................................. 4

Inquiry courses which develop intellectual skills in: scientific methods, research methods, statistics, social science, and systems analysis .................................................. 4

Creative expression courses which explore and develop creative treatments in: art, music, design, etc. .................................................. 4

Personal and social behavior courses which build an understanding of the dynamics of human relationship from the individual to the international level (e.g., psychology, sociology, anthropology, literature, communication, etc.) .................................................. 8

Ecological and environmental studies courses which build an understanding of the dynamic interaction of man and man's environment (e.g., life science, earth science, environmental science, etc.) .................................................. 8

Depth Subject Matter .................................................. 69

Native American ethno-history (Native American Studies 130A-130B-130C) .................................................. 12

Native American community development (Native American Studies 161A) .................................................. 4

Field experience in native american studies (Native American Studies 198) .................................................. 12

Native American studies senior project (Native American Studies 196) .................................................. 5

Individualized program to be determined by the student and the Native American Studies Major Review Committee (a minimum of 20 units in any field of specialization) .................................................. 36

Breadth Subject Matter .................................................. 32

Additional inquiry courses .................................................. 8

Additional creative expression courses .................................................. 8

Additional personal and social behavior courses .................................................. 4

Additional ecological and environmental studies courses .................................................. 4

Additional units from the above four categories .................................................. 8

Unrestricted Electives .................................................. 43

Total Units for the Major .................................................. 180

Major Adviser: J. H. Adams

Related Undergraduate Major. Concentration in Native American Studies is also available through the Applied Behavior Sciences major.

American History and Institutions. This University requirement can be satisfied by any one of the following. Native American Studies courses: 20, 116, 130A, 130B, 130C, 155. (See also page 61.)

Courses in Native American Studies

Lower Division Courses

1. Introduction to Native American Studies (4) II, III, Risting Lecture—3 hours; discussion—1 hour. Introduction to U.S. Indian tribal-reservation culture; relationships of Native American Studies to other academic disciplines.

?Students may substitute other Native American Studies courses with the approval of the Native American Studies Major Review Committee.
20. The Native American Experience (4) Ill. Adams
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to American Indian historical and socio-cultural development with emphasis upon the U.S. area and upon those processes, such as relations with non-Indians which have contributed to the current condition of Indian people.

*2A. Native American Music and Dance (4) I. Rising
Lecture—1 hour; discussion—3 hours. Prerequisite: course 1 or consent of instructor. Introduction to the music and dance of the native peoples of the U.S. Students will study appropriate sacred songs and dances.

33B. Native American Music and Dance (4) I. Rising
Lecture—1 hour; discussion—3 hours. Prerequisite: course 1 or consent of instructor. Introduction to the music and dance of the native peoples of California and the west. Students will study appropriate sacred songs and dances.

33C. Native American Art in the U.S. (4) I. Longfish
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to the cultural-historical significance and practical application of Native American art in the U.S. area, with emphasis on the Southwest.

34A. Native American Art Workshop (4) I. Longfish
Lecture—1 hour; laboratory—6 hours; 3 hours to be arranged. Prerequisite: consent of instructor; course 33 recom men ded. Studio projects in Native American art.

34B. Native American Art Workshop (4) I. Longfish
Lecture—1 hour; laboratory—6 hours; 3 hours to be arranged. Prerequisite: consent of instructor; course 33 recom mend ed. Studio projects in Native American design in textiles, weaving, and weaving equipment.

34C. Native American Art Workshop (4) I. Longfish
Lecture—1 hour; laboratory—6 hours; 3 hours to be arranged. Prerequisite: consent of instructor; course 33 recom mend ed. Studio projects in Native American design in leather, beadwork, miscellaneous crafts.

96. Special Study for Undergraduates (1-5) I, II, Ill. The Staff
Rising in charge.

Prerequisite: consent of instructor. (P.N.P. grading only.)

Upper Division Courses

101. Contemporary Indian Art (4) I. Longfish
Lecture—3 hours; discussion—1 hour. Prerequisite: course 33 or consent of instructor. Contemporary Indian art and the influences that affect Native American artists today.

106. Native Cultures of the Northern Plains (4) I. Adams
Lecture—3 hours; discussion—1 hour. Prerequisite: course 20 or consent of instructor. Introduction to the cultures and history of the Indian Nations of the Northern Plains region with emphasis upon the area from Alberta to Colorado. Intercultural relations and white-Indian relations will both be considered.

110. Fundamentals of Native American Education (4) I. Adams
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110 or consent of instructor. The study and evaluation of existing Native American curricula and the design and preparation of new curricula and materials. Offered in even-numbered years.

112. History and Culture of the "Five Civilized Tribes" (4) I. Hutchison
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to the history and culture of the Native American people, found in southeastern part of the U.S. called the "Five Civilized Tribes."

113. Navajo History and Culture (4) I. Hutchison
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Overview of the history and culture of the Navajo (Navajo) people and their ties to the Navajos.

114. Contemporary Affairs of Native Americans in California (4) Ill. Rising
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Intensive survey of the contemporary problems, issues, and developments involving Native Americans in both urban and rural communities of California.

130A. Native American Ethno-Historical Development (4) I. Forbes
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Intensive survey of Native American Ethno-History in the United States, Canada, Greenland, and Northern Mexico in the years before 1770. Offered in even-numbered years.

130B. Native American Ethno-Historical Development (4) II. Forbes
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Intensive survey of Native American Ethno-History in the United States, Canada, Greenland, and Northern Mexico in the years 1770-1890. Offered in odd-numbered years.

130C. Native American Ethno-Historical Development (4) Ill. Forbes
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Intensive survey of Native American Ethno-History in the United States, Canada, Greenland, and Northern Mexico in the years 1770-1890. Offered in odd-numbered years.

155A. Americanism: Native American Contributions to World Civilization (4) II. Hutchison
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Analysis and study of Americanism: traits, inventions, and development of the Americas by Native peoples adopted by other peoples. Attention will be given to words in the world's languages, agriculture, medicine, clothing, the arts, theologies of society and government, and other pertinent areas. Offered in odd-numbered years.

155B. Native American Ethno and Value Systems (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Native American systems of values and how these values translate into actual behavior; attention to the problem of implementing traditional values in the twentieth century and the possible impact of Native values in modern societies. Offered in odd-numbered years.

157. Native American Religion and Philosophy (4) III. Forbes
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Native American religion and philosophy as a context for understanding Native American philosophy.

161A. Native American Community Development (4) I. Adams
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Native American community development and the development of Native American economic development in the reservation community, and communities under the control of one or more governing bodies.

161B. Native American Economic Development and Planning (4) I. Adams
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Native American community development and economic development of Native American reservations.

170. Native American Perception (4) I. Hutchison
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 20, 161A, Anthropology 109. Planning in economic development from the reservation standpoint, concentrating on Indian reservations.

171. Counseling the Native American (4) I. Hutchison
Lecture—2 hours; discussion—1 hour. Prerequisite: course 1 or 32 in 109. Indian communities, the role of the counselor, and the counselling process.

180. Native American Women (4) Ill. Hutchison
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. The social and economic roles of Native American women in the community.

NOTE: For key to footnote symbols, see page 130.

Nematology (College of Agricultural and Environmental Sciences)

David R. Vigliarico, Ph.D., Chairperson of the Division
Division Office, 488 Hutchison Hall (752-1403)

Faculty

Harry K. Kaya, Ph.D., Associate Professor
Benjamin F. Lownesbery, Ph.D., Professor
Armando R. Maggioni, Ph.D., Lecturer
Dewey J. Raskin, Ph.D., Professor
David R. Vigliarico, Ph.D., Lecturer

Related Major Program. See the major in Entomology (page 290).

Graduate Study. Graduate degrees specializing in Nematology are offered through the Department of Entomology or the Department of Plant Pathology.

Courses in Nematology

100. General Plant Nematology (4) I. Lownesbery
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1 or 10; lower division students with consent of instructor only. An introduction to the classification, morphology, biology, and control of the nematodes attacking plant crop species.

110. Introduction to Nematology (2) I. Maggioni
Lecture—2 hours. Prerequisite: Zoology 2 or the equivalent or consent of instructor. The relationship of nematodes to the...
Nutrition

111. Human Nutrition (4) I. Irlm.
Lecture—4 hours. Prerequisite: course 110. Nutrition of medical and clinical study of nutrient requirements at various phases of the life cycle.

111L. Nutrition Laboratory (1). III. Irlm.
Laboratory—3 hours. Prerequisite: course 110 or 111. Laboratory study of the chemical and physiological roles of nutrients in metabolism; use of experimental animals in determining the essentiality and function of nutrients.

122. Nutritional Considerations of Food Processing (3) III. Irlm.
Lecture—3 hours. Prerequisite: Biochemistry 101A-101B or understanding of the biochemical function of nutrients. The metabolism and availability of nutrients from foods. The effects of food processing and storage on the retention of nutrients in foods. Students having had course 102 or 110 may receive only 2 credits of for this course.

144. Nutrition and Development (4) II. Irlm.
Lecture—4 hours. Prerequisite: course 110 or 120. Role of nutritional factors in embryonic and postnatal development.

116A-116B. Diet Therapy (3-3-3) I, II. —, Clifford, Irlm.
Lecture—3 hours. Prerequisite: course 111 or 120; Physiology 110 (or the equivalent). Biochemical and physiological principles for therapeutic diets. Problems in planning diets for normal and pathologic conditions.

116AL. Practicum in Diet Therapy (2) I. Irlm.
Clinical—4 hours. Prerequisite: course 116B (may be taken concurrently). Planning and evaluation of therapeutic diets; procedures in patient education. Coordinated with course 116B. Continuation of course 116AL. (Deferred grading only; pending completion of 116AL-116BL sequence.)

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 110 or 122. Examination of nutrition problems in contemporary communities. Consideration of social, political, and economic forces in development and implementation of community nutrition programs. Principles and methods of nutrition education. Evaluation of community nutrition programs and resources.

Lecture—2 hours; six field work per week. Prerequisite: course 116 (may be taken concurrently) or consent of instructor. Introduction to field work in community nutrition: development of basic skills in assessing nutritional problems; application of basic skills to community nutrition programs serving selected subgroups; especially young children, adolescents, adults, the elderly, and minorities.

129. Food Habits and their Nutritional Implications (4) I, II. Irlm.
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division or graduate standing; upper division course in nutrition or Biochemistry 101B; course 20 recommended. Advanced themes in food habits and their nutritional implications: pica; toxicants naturally occurring in food; ethnic diet; food systems; dietary codes; overview and case histories.

121. Clinical Animal Nutrition (2) II. Irlm.
Lecture—2 hours. Prerequisite: course 110. The application of the principles of nutrition to the feeding of livestock. Evaluation of the nutritive and feeding value of feedstuffs and formulated rations. Feeding standards and nutrient requirements for physiological functions. Ration formulation; least cost rations.

122. Ruminant Nutrition and Digestive Physiology (3) III. Irlm.
Lecture—3 hours. Prerequisite: Physiology 110; Biochemistry 101A-101B or Physiological Sciences 103A-103B. Advanced treatment of ruminant nutrition and utilization as influenced by the unique aspects of digestion and fermentation in the rumen.

Neurology

See Medicine

Neurosurgery

See Medicine

Nutrition

(College of Agricultural and Environmental Sciences)

William C. Weir, Ph.D., Chairperson of the Department
Department Office, 129 Everson Hall (752-6650)

Louis E. Grivetti, Ph.D., Assistant Professor (Nutrition, Geography)

Frederick H. Hill, Ph.D., Professor
Lucille S. Hurley, Ph.D., Professor
Jess F. Kraus, Ph.D., Associate Professor (Nutrition, Medicine)

Jo Ann Proffitt, M.S., Lecturer
Robert B. Runkel, Ph.D., Professor
Barbara O. Schniee, Ph.D., Assistant Professor (Nutrition, Food Science and Technology)

Judith S. Stern, Ph.D., Associate Professor
Helene Swenerton, Ph.D., Lecturer
Alosa T. Tappel, Ph.D., Professor (Nutrition, Science and Technology)

William C. Weir, Ph.D., Professor
Frances J. Zeman, Ph.D., Professor

Related Major Program. See the major in Nutrition Science, page 263.

Graduate Study. Programs of study leading to the M.S. and Ph.D. degrees are available in Nutrition. For information on graduate study contact the graduate advisor.

Courses in Nutrition

Lower Division Courses

10. Discoveries and Concepts in Nutrition (3) I, II. Weir
Lecture—3 hours; discussion—1 hour. Prerequisite: An

20. Food and Culture: An Introduction to Culture, Diet, and Cultures (4) I. Irlm.
Lecture—3 hours; discussion—1 hour. Prerequisite: An

99. Individual Study for Undergraduates (1-5) I, II, III.
Lecture—1 hour. Faculty and invited guests will present topics in the area of nutrition and food science which are currently subjects of public debate. Intended as an introduction to Nutrition and Food Science for students new to the campus. (PAP grading only.) (Same course as Food Science and Technology 99.)

30. Public Issues in Nutrition and Food Science (1) I. Weir, Schwinger (Food Science and Technology)
Lecture—1 hour. Faculty and invited guests will present topics in the area of nutrition and food science which are currently subjects of public debate. Intended as an introduction to Nutrition and Food Science for students new to the campus. (PAP grading only.) (Same course as Food Science and Technology 99.)

Upper Division Courses

101. An Introduction to Nutrition and Metabolism (5) I.
Lecture—5 hours. Prerequisite: Chemistry 8B; Physiology 110 or 2. An introduction to the metabolism of protein, fat, and carbohydrate; the role of vitamins and minerals; food utilization. Not open for credit to students who have taken courses 110 or 111.

102. Nutrition in the Life Cycle (3) II.
Lecture—3 hours. Prerequisite: course 101 or a course in either biochemistry or physiological chemistry. A practical approach to the problems of meeting the nutritional needs of healthy people throughout the life cycle. Not open for credit to students who have taken courses 110 or 111.

103. Animal Nutrition and Feeding (4) I. Garrett (Animal Science)
Lecture—4 hours; discussion—1 hour. Prerequisite Chemistry 8B. The basic principles of animal nutrition as they are applied to livestock feeding: the composition and use of feeds and their relation to the feeding of farm animals and poultry: the balancing of rations.

110. Principles of Nutrition (5) I, II. Calvert (Animal Science)
Lecture—5 hours. Prerequisite: Biochemistry 101B; a course in physiology or zoology. Fundamental principles of the nutrition of man and other animals. The nutrients in relation to physiological processes of growth, maintenance and reproduction. Nutritional disorders.

1.2. Animal Nutrition (2) II. Heitman and Baeh (Animal Science)
Lecture—2 hours. Prerequisite: course 110. The application of the principles of nutrition to the feeding of livestock. Evaluation of the nutritive and feeding value of feedstuffs and formulated rations. Feeding standards and nutrient requirements for physiological functions. Ration formulation; least cost rations.

2.2. Ruminant Nutrition and Digestive Physiology (3) III. Mays (Animal Sciences)
Lecture—3 hours. Prerequisite: Physiology 110; Biochemistry 101A-101B or Physiological Sciences 103A-103B. Advanced treatment of ruminant nutrition and utilization as influenced by the unique aspects of digestion and fermentation in the rumen.
Nursing Science
(College of Agricultural and Environmental Sciences)

The Major Program

The Nursing Science major provides organized study in nutrition and relevant biological and physical sciences as preparation for (1) graduate study in nursing, including the nursing of species or groups, such as human, domestic animal, avian and wildlife; (2) professional study of medicine, veterinary medicine, public health, dietetics, and other health sciences; (3) technical work in nutrition in animal, food, and pharmaceutical industries; (4) technical writing; and (5) health education. You should consult with your adviser with respect to additional courses appropriate to your specific interest.

B.S. Major Requirements:

For convenience in planning, the weekly credit load is 3 hours. Courses shown without parentheses are required.

Graduation Core:

1. English (3-4 units)
2. Science (4 units)
3. Social Sciences (3 units)
4. Physical Education (2 units)
5. Foreign Language (3 units)
6. Electives (10 units)

Preparatory Subject Matter

Biochemistry (Biochemistry 101A, 101B or 102A, 102B)...

Biology with laboratory (Biological Sciences 1)...

Chemistry, general and organic (Chemistry 1A, 1B, 1C, 5, 8A, 8B)...

Microbiology with laboratory (Bacteriology 2)...

Statistics (Statistics 13 or Agricultural Science and Management 150)...

Written or oral expression (see College requirement)...

Depth Subject Matter

Select from Nutrition 110, 111L, 111L, 114, 116A, 116B, 117, 121, 122, 123, 139, 190, 190B, and 199...

Breadth Subject Matter

Courses in social sciences and humanities...

Restricted Electives

Biochemistry laboratory (Biochemistry 101L, 101L, 102L, 102L)...

Calculus of physics (excluding Physics 10)...

Forestry and food science...

Physiology with laboratory (Physiology 110L, 110L plus an additional physiology course)...

Additional nutrition or related biological and physical sciences...

Unrestricted Electives...

Total Units for the Major...

Major Adviser: W. C. Weir (Nutrition).

Graduate Study: The Department of Nutrition offers programs of study and research leading to the M.S. and Ph.D. degrees in nutrition. For information on graduate study contact the graduate adviser. See also page 99.

Graduate Adviser: See Class Schedule and Room Directory.

To fulfill the academic requirements for an internship in Dietetics, choose the courses from the categories in which they appear above: English 1, Psychology 1, Sociology or Anthropology 2, Economics 18, Food Science and Technology 102A, 102B, Nutrition 110, 111L, 111L, 116A, 116B. The following courses must be added: Agricultural Economics 112; Food Science and Technology 101A, 101B; Food Service Management 120, 120L, 121, 122, 123. Applied Behavioral Sciences 173 or Education 110. Students intending to apply for admission to a dietetic internship must complete Dietetics no later than the first quarter of the junior year for information on procedures.
Oriental Languages and Civilizations

(College of Letters and Science)
Department of Anthropology, 328 Young Hall (752-0745)

Faculty
Donald Gibe, Ph.D., Associate Professor
Key H. Kim, Ph.D., Associate Professor
Janet Shibamoto, Ph.D., Assistant Professor
Benjamin E. Wallacker, Ph.D., Professor
Yun-Chen Li, M.A., Lecturer

Related Courses. See East Asian Studies course listing.

Minor Program. Available through consultation with an undergraduate adviser in Oriental Languages and Civilizations.

Courses in Chinese
(See Asian American Studies for courses in Can tonese Language.)

Lower Division
1-2-3. Elementary Modern Chinese (6, 6-6) I, II, III. Li
Lecture—3 hours; recitation—3 hours. (Students who have successfully completed Chinese 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a PNP grading basis only. Although a passing grade will be charged to the student's PNP option, no petition is required. All other students will receive a letter grade unless a PNP petition is filed.)

4-5-6. Intermediate Modern Chinese (6-6-6) I, II, III. Gibe
Lecture—3 hours; recitation—3 hours. Prerequisite: course 3 or the equivalent.

Upper Division
Lecture—3 hours; term paper. Prerequisite: course 6. Readings in selected texts. May be repeated twice for credit.

111. Modern Chinese Literature: Reading and Discussion (4) I, II, III. Gibe
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or the equivalent. Short stories, newspaper articles, essays. May be repeated twice for credit.

Courses in Japanese

Lower Division
Lecture—3 hours; recitation—3 hours. (Students who have successfully completed Japanese 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a PNP grading basis only. Although a passing grade will be charged to the student's PNP option, no petition is required. All other students will receive a letter grade unless a PNP petition is filed.)

4-5-6. Intermediate Modern Japanese (6-6-6) I, II, III. Kim
Lecture—3 hours; recitation—3 hours. Prerequisite: course 3 or the equivalent.

Upper Division
111. Literary Japanese (3) I, II, III. Kim
Lecture—1 1/2 hours; term paper. Prerequisite: course 121.

121. Modern Japanese: Reading and Discussion (4) I, II, III. Kim, Shibamoto
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6. Short stories, newspaper articles, essays. May be repeated twice for credit.

Oriental Languages and Civilizations

Courses in Oriental Languages and Civilizations

Lower Division Courses
98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Permission for lower division students. (PnP grading only.)

98. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (PnP grading only.)

Upper Division Courses
100. Languages of Eastern Asia (4) I, II, III. Wallacker
Lecture—3 hours; oral reports. Prerequisite: Anthropology 110 (may be taken concurrently) or the equivalent. Survey of languages and language families of Eastern Asia, their nature and distributions.

177. Tutoring in Oriental Languages (1-5) I, II, III. The Staff (Wallacker in charge)
Tutor—1 hour. Prerequisite: consent of Department Chairperson. Leading a small voluntary discussion group affiliated with one of the department's regular classes. May be repeated for credit. (PnP grading only.)

189. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (PnP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(PnP grading only.)

Graduate Courses
201. Proseminar in Sinological Methods (4) I. Wallacker
Seminar—3 hours. Prerequisite: Knowledge of classical Chinese.

299. Research (1-12) I, II, III. The Staff
(SUP grading only.)

Orientation

(College of Agricultural and Environmental Sciences)

Course in Orientation
Questions pertaining to the following course should be directed to the instructor or to the Academic Advising Center, 122 Hoagland Hall.

Lower Division Course
1. Orientation (no credit) I, II, III. Crayton (Biochemistry and Biophysics)
Discussion. Exploration of the philosophy, purposes, significance, expectations and mechanisms of university education. (PnP grading only.)

Orthopaedic Surgery

See Medicine

Otorhinolaryngology

See Medicine

Pathology

Veterinary Medicine, this page; Medicine, see page 253

Pathology

(School of Veterinary Medicine)
Donald L. Dungworth, B.V.M., Ph.D., Chairperson of the Department
Department Office, 116c Haring Hall (752-1385)

Faculty
Donald R. Cordy, D.V.M., Ph.D., Professor
Donald L. Dungworth, B.V.M., Ph.D., Professor
David H. Gribble, D.V.M., Ph.D., Associate Professor
Thomas G. Kawakami, Ph.D., Associate Adjunct Professor
Peter C. Kennedy, D.V.M., Ph.D., Professor
Peter F. Moore, B.V.M., Ph.D., Assistant Professor
Jack E. Moulton, D.V.M., Ph.D., Professor
Benno I. Osburn, D.V.M., Ph.D., Professor
Roy R. Pool, Jr., D.V.M., Ph.D., Professor
Lester W. Schwartz, D.V.M., Ph.D., Associate Professor
Anthony A. Stannard, D.V.M., Ph.D., Associate Professor (Pathology, Medicine)
Eric B. Whedon, B.V.M., Ph.D., Assistant Professor

Courses in Pathology

Upper Division Course
199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(PnP grading only.)

Graduate Courses
282. Tumor Pathology (3) I. Moulton, Dungworth
Lecture—3 hours. Prerequisite: graduate standing or final year veterinary medical student; consent of instructor. The histogenesis, incidence, geographical distribution, etiology, transmission, immunity, host response, growth, and microscopic structure of neoplasms of domestic animals. Offered in even-numbered years.

286A. Selected Topics in Advanced Special Pathology (3) I. The Staff
Lecture—3 hours. Prerequisite: graduate standing or final year veterinary medical student; consent of instructor. Pathology of reaction to injury of selected organ systems and differentiating morphologic characteristics of their major disease entities. Emphasis will be on pathogenetic mechanisms and cellular/subcellular pathology involved in infarction, pulmonary disease, renal disease, and avian disease. Offered in even-numbered years.

286B. Selected Topics in Advanced Special Pathology (3) II. The Staff
Lecture—3 hours. Prerequisite: graduate standing or final year veterinary medical student; consent of instructor. Pathology of reaction to injury of selected organ systems and differentiating morphologic characteristics of their major disease entities. Emphasis will be on pathogenetic mechanisms and cellular/subcellular pathology involved in infarction, pulmonary disease, renal disease, and avian disease. Offered in even-numbered years.
Pharmacology and Toxicology (A Graduate Group)

Theodore C. West, Ph.D., Chairperson of the Group

Office, 4443 Medical Science 1A (Department of Pharmacology). (752-3200)

Faculty
Graduate group faculty members are based in the Departments of Environmental Toxicology, Pharmacology, Physiological Sciences and other related departments and laboratories in Medicine, Veterinary Medicine and Agricultural and Environmental Sciences.

Graduate Study. The Graduate Group in Pharmacology and Toxicology offers programs of study and research leading to the M.S. and Ph.D. degrees. For information on the program of study, contact the appropriate graduate adviser (below) or the group Chairperson. See also page 99.

Graduate Advisers. D.P.H., Hsieh (Environmental Toxicology), R.M. Joy (Physiological Sciences), T.C. West (Pharmacology).

Courses in Pharmacology and Toxicology

Graduate Courses

230. Advanced Topics in Pharmacology and Toxicology (1-3) I, II, III. The Staff
Lecture-discussion-seminar—1 hour each (course format can vary at option of instructor). Prerequisite: Pharmacology 200-202, Environmental Toxicology 200, or consent of instructor. In-depth coverage of selected topics for graduate students in Pharmacology-Toxicology and related disciplines. Topics determined by instructor in charge for each quarter.

260. Seminar (1) I, II, III. The Staff
Prerequisite: consent of instructor. Current topics in pharmacology and toxicology. (SU grading only.)

FREE CHOICE OPTIONS

Can we justify our claims to know anything? Are there objective criteria for distinguishing rational from irrational beliefs? Is there a God? Is morality merely a matter of each individual's feelings, or are there objective principles for deciding what's right or wrong? Thus, the problems studied are of interest to people, regardless of their field.

A second common reason is that being forced to think carefully and precisely about philosophical arguments concerning fundamental issues can be excellent training for the intellectual vigor of any academic subject. Students rightly look on course work in philosophy as helping in the development of intellectual discipline.

A third reason is that the sorts of issues philosophers raise have relevance for most fields. Virtually every university subject, from History to Computer Science, poses philosophical problems when fundamental concepts or methods are discussed. The study of philosophy therefore, has relevance through the range of University disciplines.

The Department of Philosophy offers courses in such areas as the theory of knowledge, metaphysics, logic, ethics, and aesthetics. In addition, upper division course work is given in the fields of philosophy of history, philosophy of science, political philosophy, philosophy of religion, and philosophy of the natural and social sciences.

Philosophy is also a subject in which the problems discussed recur, or have important roots in past discussion. The history of philosophy is thus important not only as part of the heritage of educated persons, but also because it is relevant to contemporary issues. The department therefore places great emphasis on the history of philosophy and provides courses in all the major figures and traditions of Western philosophy, as well as in the influential contemporary schools of the continental and analytic varieties.

Many students become sufficiently interested in major in philosophy, either with a plan to do graduate work and teach philosophy, or as background training for other professions. Philosophy majors have done extremely well in law schools and medical schools, for example. Also, many philosophy majors go on to advanced work in other academic areas in the humanities and social sciences; graduates have even been known to go into such fields as architecture and art history.

Philosophy

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>16</td>
</tr>
<tr>
<td>Philosophy</td>
<td>21, 22, 23</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>36</td>
</tr>
<tr>
<td>Upper division units in Philosophy selected with the approval of the departmental major adviser</td>
<td>36</td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>52</td>
</tr>
</tbody>
</table>


Minor Program Requirements:

In consultation with the minor adviser, students may plan a minor in Philosophy. Students may select a broad range of courses, or they may concentrate their work in a special field. Examples of specialized areas of study include philosophy and the sciences, philosophy and society, history of philosophy, and logic and language.

Minor Adviser. G.J. Matthey.
Courses for Non-Majors. The department offers a range of courses for non-majors. Students pursuing careers in agriculture and engineering might find Philosophy 5 and 10A-G especially useful, since these courses provide practice in concise and logical writing. Science and mathematics students may find these courses useful, as well as Philosophy 12, 21, 22, and 23. Pre-law students and students planning careers in medicine or the various health sciences may be interested in Philosophy 14 and 114A-114B. The offerings at the upper division level include courses of direct relevance to students in the biological and physical sciences, in psychology, history, art, sociology, anthropology, and political science.

Department Activities for Undergraduates. The Philosophy Department sponsors a series of well-known philosophers who present papers in their fields of expertise. The department also operates an on-going faculty and graduate student colloquia. Undergraduate students are welcome to attend and join these discussions. Information can be obtained in the department office.

Through a grant from University President David Saxton, the department sponsors an essay contest each year which is open to all undergraduates. The Saxton Prize in Philosophy consists of a monetary award to the student submitting the best essay on the subject set for the year. Information can be obtained in the department office.

Graduate Study. The Department of Philosophy offers programs of study leading to the M.A. and Ph.D. degrees. Graduate students who intend to work only for the M.A. degree are not admitted to the graduate program. Detailed information may be obtained by writing to the Graduate Advisor.

Graduate Adviser. M.V. Wedin.

Courses in Philosophy

Lower Division Courses

1. Introduction to Philosophy (4) I, II, III. The Staff (Chairperson in charge). Lecture—3 hours; discussion—1 hour. Problems of philosophy through major writings from various periods. Problems are drawn from political, religious, metaphysical, and sociological concerns of philosophy. 5
2. Critical Reasoning (4) II, III. Mathey. Lecture—discussion—3 hours; papers or written reports. Criteria of good reason in everyday life and in science. Basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation. Open to all majors. 30A-G. Theories of Philosophy (4) I, II, III. The Staff. Lecture—discussion—3 hours; papers or written reports. Introductory study of related problems in an area of philosopichal interest. Sections to be offered: (A) Knowledge and Existence; (B) God and Mind; (C) Philosophy and the Arts; (D) Morals and Politics; (E) Philosophy East and West; (F) Philosophy and Mythology; (G) Science and Human Nature. 12
3. Introduction to Logic (4) II, III. Friedman. Lecture—3 hours; discussion—1 hour. Basic concepts and techniques of deductive logic with emphasis on propositional logic. Development of first-system of propositional logic. Translation of English into symbolic formulas.
4. Ethical and Social Problems in Contemporary Society (4) I, II. Galan. Lecture—3 hours; discussion—1 hour. Philosophical issues and problems involved in contemporary moral and social problems, including possible topics are: civil disobedience and revolution, racial and sex discrimination, environment and population control, genetic engineering, technology and human values, sexual morality, freedom in society.
5. Ancient (Ancient Greek) (4) I, II. Malcom. Lecture—3 hours; discussion—1 hour. A survey of Greek philosophy with special attention to the pre-Socratics, Plato, and Aristotle.

Upper Division Courses

100. Founders of Modern Thought (4) I, II. Gilber. Lecture—discussion—3 hours; term paper. Prerequisite: open to philosophy majors or students who have received credit for course 22 or 23. A survey of modern philosophy, from Descartes to Kant. Major emphasis upon problems still current today.
110. Metaphysics (4) II, III. Malcom. Lecture—discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Theories of being. Such topics as reality, substance, universals, space, time, causality, becoming, body, experience, persons, freedom, and determinism. Basic method of metaphysics. Antinomies and reductio-arguments.
120. Theory of Knowledge (4) II, III. Mathey. Lecture—discussion—3 hours; term paper. Prerequisite: one course in Philosophy recommended. Philosophical problems of perception and thought, memory and cognition, imagination, truth and error, belief and knowledge. Types of epistemology.
130. Philosophy of Mind (4) II, III. Wedin. Lecture—discussion—3 hours. The relation between mind and body, our knowledge of the mind, and the explanation of the mind. Discussion of such concepts as mind, consciousness, intention, intention, and causation. Offered in even-numbered years.
140. Philosophy of Language (4) II, III. Arbib. Lecture—discussion—3 hours; term paper. Prerequisite: one course in Philosophy recommended. Logical, metaphysical, epistemological and existential aspects of selected religious concepts.
150. Philosophy of the Physical Sciences (4) I, III. Friedman. Lecture—discussion—3 hours; term paper. Prerequisite: one philosophy course or a science background recommended. The nature of testability and confirmation of scientific hypotheses; the nature of scientific laws, theories, explanations, and models. Problems of causality, determinism, induction, and probability; the structure of scientific revolutions.
160. Philosophy of the Biological Sciences (4) II, III. Ayala. Lecture—discussion—3 hours; term paper. Prerequisite: one philosophy course or a science background recommended. Scientific method in biology; nature of biological theories, explanations, and models. Problems of evolution, natural selection, the adequacy of the explanations in the social sciences. Problems in the social sciences such as "interpretable understanding," role of prediction, behaviorism, determinism, role of value judgments and social rules.
170. Intermediate Logic (4) II, III. Friedman. Lecture—3 hours; discussion—1 hour. Prerequisite: course 130 or consent of instructor. Development of the full first-order logic, with identity and descriptions; decision procedures; advanced translation of English into the formal language; elementary theory of classes and relations; Russell's paradox.
180. Introduction to Ethics (4) I. Aron. Lecture—discussion—3 hours; term paper. Prerequisite: one course in Philosophy recommended. An introduction to major questions philosophers of contemporary problems of right conduct, principles of obligation, responsibility, justice, the meaning of the basic terms of ethical language. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill.
190. Problems of Ethical Theory and Practice (4) III. Berger. Lecture—discussion—3 hours; term paper. Prerequisite: one course in Philosophy recommended. Discussion of important problems of ethical theory with application to contemporary problems of personal freedom, deformity and the like, act and rule utilitarianism, concept of a right, justification of a punishment, the death penalty, morality of civil disobedience, abortion, war.
200. Political Philosophy (4) II, III. Berger. Lecture—discussion—3 hours; term paper. Prerequisite: one course in Philosophy recommended. In-depth examination of some central political questions such as state, sovereignty, rights, obligation, freedom, law, authority, and responsibility. Offered in even-numbered years.
210. Philosophy of History (4) III. Child. Lecture—discussion—3 hours, term paper. Survey of philosophical theories of history, including contemporary problems of historical explanation. Offered in even-numbered years.
220. Aesthetics (4) II, III. Gilber. Lecture—discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Nature of art, of artistic creation, of the work of art, and of esthetic experience, nature and validity of criticism; relations of art to environmental aesthetics. Selected topics from: logical and semantical paradoxes, foundations of mathematics; set theory, type theory, and intuitionism; the philosophy of art; philosophical implications of God's incompleteness results. Offered in even-numbered years.
230. History of Logic (4) II, III. Malcom. Lecture—discussion—3 hours; term paper. Prerequisite: one course in philosophy or logic recommended. Overview of the chief developments in the history of logic. Offered in even-numbered years.
240. Survey of Advanced Logic (4) II, III. Friedman. Lecture—discussion—3 hours; written reports. Prerequisite: course 112 or consent of Preceptor. Survey of topics in mathematical logic, such as lambda calculus (Russell and Frege); classes and relations; Russell's Paradox; type theory, set theory, models and interpretations; modal logic. Selection from: computability and recursion theory, many-valued logic, combinatorial logic, non-standard logics. Offered in even-numbered years.
250. Philosophy of Language (4) II, III. Arbib. Lecture—discussion—3 hours; term paper. Prerequisite: one course in Philosophy or linguistics. Discussion of problems arising from the consideration of the syntax and semantics of natural and formalized languages. Nature of linguistic rules and universals; theories of universal grammar; linguistic implications for theories of cognition.
270. Medieval Philosophy (4) II, III. Gilber. Lecture—discussion—3 hours; written reports. Prerequisite: course 21. Study of major philosophers in the medieval period.
290. Philosophy of the Nineteenth Century (4) I, II. Mathey. Lecture—discussion—3 hours; written reports. Prerequisite: courses 21, 22, or 23 recommended. The idealism of Hegel, his concepts of history and human development, the positivism of Comte and Mill, the irrationalism of Kierkegaard and Nietzsche. Offered in odd-numbered years.
300. American Philosophy (4) II, III. Mathey. Lecture—discussion—3 hours; term paper. Prerequisite: one course in Philosophy recommended. Study of such American thinkers as Peirce, James, Royce, Dewey, Santayana, Whithead, and C.I. Lewis. Offered in even-numbered years.
310. Contemporary British Philosophy (4) II. Wedin. Lecture—discussion—3 hours; term paper. Prerequisite: one course in Philosophy, specially course 23 recommended. Interpretation and analysis of the most influential works of Bertrand Russell, G.E. Moore, Wittgenstein, J.L. Austin, and G. Ryle. Offered in odd-numbered years.
320. Phenomenology (4) I, II. Bosart. Lecture—discussion—3 hours; term paper. Prerequisite: one course in Philosophy, course 23 especially recommended. Husserl, his predecessors and successors. Offered in even-numbered years.
330. Existentialism (4) III. Mathey. Lecture—discussion—3 hours; term paper. Prerequisite: one course in Philosophy, course 23 especially recommended. Existentialism, from Nietzsche to Sartre, Merleau-Ponty. Offered in even-numbered years.
350. Aristotle (4) II. Wedin. Lecture—discussion—3 hours; term paper. Prerequisite: course 21 or consent of instructor. Offered in odd-numbered years.
Physical Education

(College of Letters and Science)

William C. Adams, Ph.D., Chairperson of the Department
Herbert A. Schmalenberger, M.A., Vice-Chairperson of the Department

Department Office, 264 Hickey Gymnasium
(752-0511)

Faculty

William C. Adams, Ph.D., Professor
Richard L. Bethin, Ph.D., Professor (Chemical Engineering)
Edmund M. Bernauer, Ph.D., Professor
Robert R. Brook, M.A., Supervisor
Joseph E. Carlson, M.A., Supervisor
Stewart E. Cassell, M.S., Lecturer
Jere H. Curry, M.A., Supervisor
Kathleen M. DeYoung, B.A., Assistant Supervisor
Rudy H. Dressendorfer, Ph.D., Lecturer
Robert L. Foster, M.A., Supervisor
Pamela L. Gill, M.A., Associate Supervisor
Raymond S. Goebel, M.A., Associate Supervisor
Robert I. Hamilton, M.S., Supervisor
Jerry W. Hinsdale, A.B., Supervisor
Barbara A. John, M.S., Assistant Supervisor
Charles R. Kovacs, Ed.D., Professor
William R. Lotter, Ed.D., Professor
Paul M. Mole, Ph.D., Associate Professor
Donald G. Morris, B.S., Lecturer
John W. Papp, M.A., Supervisor
Melvin R. Rampe, Ph.D., Professor (Civil Engineering)

E. Dean Ryan, Ed.D., Professor
Herbert A. Schmalenberger, M.A., Supervisor
Allene E. Short, B.A., Associate Supervisor
Joe L. Singleton, M.A., Supervisor
James L. Sochor, Ed.D., Supervisor
H. Robert Supperko, M.D., Lecturer
Phillip S. Swinyard, M.A., Supervisor
Jon E. Voelzinger, M.S., Assistant Supervisor
Stephen A. Wallace, Ph.D., Assistant Professor
Maya Weich, Ed.D., Supervisor

The Major Program

The Physical Education major focuses on the biological and psychological aspects of physical activity. A student will elect to specialize in either of these two emphases. Courses are designed to develop and impart a scientific understanding of physical performance in man under a broad spectrum of developmental and stressor states. The major provides the basic education for students planning careers in the area of teacher education and related applied health and sport sciences which require integrative knowledge of human performance.

Physical Education

A.B. Major Requirements:

Preparatory Subject Matter ........................................ 24

Biology Sciences 1 ........................................ 5

UNITS

Total Units for the Major ........................................ 71

Recommended

Students interested in the physiological aspects of physical education are strongly urged to take Chemistry 6A, 6B.


Teaching Major. The teacher-training curriculum in physical education requires courses in addition to the departmental major requirements.

Teaching Credential Subject Representative: H. A. Schmalenberger. See page 102 for the Teacher Education Program.

Graduate Study. A program of study and research leading to the M.A. degree is available in physical education. For detailed information regarding graduate study, write to the Graduate Adviser, Department of Physical Education.

Graduate Adviser: S.A. Wallace.

Class and Recreational Use of Facilities. The incidental fee payable by all students at the time of registration, entitles students to the use of gymnasium, showers, towels, lockers, tennis courts, and the athletic fields. Certain equipment, games, and sports is available for exercise and recreation, either with or without instruction. Lockers will be turned in on the last day of class, before the final examination period.

Fines are imposed for each formal transaction necessitated by failure of the student to comply with the regulations of the department.

Courses in Physical Education

Lower Division Courses

1. Physical Education for Men and Women (39) I, II, III. The Staff (chaperone in charge). Laboratory—2 hours. Section in a: sports skills, rules and strategy; b: physical fitness and personal health; c: recreation: d: dance, e: intercollegiate athletics. May be repeated for a total of 6 units. (PINP grading only.)


Lecture—1 hour; laboratory—2 hours. A survey of the basic concepts, facts, and accepted approaches current in selected exercise training regimens, e.g., theory of aerobic function and capacity, exercise and diet in weight control, muscular strength development and maintenance, and limitations of environment, age and gender on fitness levels. (PINP grading only.)

3. Foundations of Emergency First Aid Services (2). I, II, III. The Staff (Papp in charge)

Lecture—1 hour; laboratory—1 hour. An introduction to the basic principles and practices that form the prerequisites for advanced study in First Aid and Emergency Medical Services. Upon successful completion of course the Standard Red Cross Certificate is awarded.
7. Professional Educational Activities: Men and Women (I), II, III. The Staff (Chairperson in charge)
   Lecture—1 hour; or laboratory—2 hours. Fundamental skills for classroom teaching and coaching, and classroom teaching and officiating. May be repeated for a total of six units.

15. Administration of Intramural Sports (2) II. Colberg Lecture—2 hours. Planning and administering intramural sports program. The high school and college levels.

25. Theory of Lifesaving and Water Safety (1) I, II, III. Jahn Lecture—1 hour; laboratory—2 hours. Prerequisite: sound physical condition, no physical handicap that would render student physically unable or unsafe to learn the required skills and ability to pass preliminary swimming test. Provides the student with the knowledge, organizational procedures, and skill development necessary for water safety and give or save his or her own life or the life of another in an aquatic emergency. (American Red Cross Lifesaving Certificate awarded upon successful completion of necessary requirements.)

27. Training Course for Water Safety Instructors (2) II, III. Hirsline Lecture—1 hour; laboratory—2 hours. Prerequisite: advanced swimming techniques, and Senior Life Saving Certificate. Theoretical knowledge and practical experience necessary for the organization and teaching of swimming, life saving, and water safety courses. (American Red Cross Water Safety Instructors Certificate awarded upon successful completion of necessary requirements.)

29. Basic Scuba (2) I, III. Morris Lecture—1 hour; laboratory—2 hours. Prerequisite: advanced swimming skills equivalent to course 25; 25 dives medical examination, and consent of instructor. Introduction of basic scuba equipment and techniques for SCUBA diving, function and maintenance of equipment, physics and physiology of diving, safety and first aid, currents and wave action, marine life and underwater communication. Pool and open water sessions available for certification (contact Department Office for details). (PFIN grading only.)

30. Synchronized Swimming Competition (2) I. Jahn Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1 (synchronized swimming) or consent of instructor. Principles of choreography for solo, duet, and team competition, including competition preparation. Understanding and appreciation of technical principles of water show production: basic tools and equipment, principles of set construction, costuming, styling, and sound equipment.

35A. Dance Composition (2) I, Short Lecture—5 hours. Prerequisite: course 1, modern jazz or ballet. Prerequisite: 1 (synchronized swimming) or consent of instructor. The elements of dance composition as it applies the use of lighting, sound, costume design, selection of music, and building of stage props.

35C. Dance Composition (2) II. Short Lecture—5 hours. Prerequisite: course 35A or consent of instructor. To learn the elements of dance production as it applies the use of lighting, costume design, selection of music, and building of stage props.

35E-36B. History of Dance (3-3-3) I-II. Curry Lecture—3 hours. Study of dance and its relation to culture from the primitive to the Renaissance periods. The development of dance as an art form from the Baroque period to the twentieth century.

44. Principles of Healthful Living (2) I, II, III. Lobet Lecture—2 hours. Application of scientific and empirical knowledge to personal, family, and community health problems. (PFIN grading only.)

44L. Principles of Teaching Healthful Living (1) I, III. Lobet Discussion—1 hour; 2½ hour evening sessions. Prerequisite: course 44 (concurrently). Course will supplement course 44 by specifically dealing with the principles of teaching healthful living; it may be taken in the lectures as an elective course. (California Health Education Framework. Required of all teaching credential students. (PFIN grading only.)

44M. Foundations of Physical Education (3) I. Adams Lecture—3 hours. An introduction to historical, bioclimatic, psychological, and sociological foundations of physical education.

97. Tutoring in Physical Education (1-1-1) I, II, III. The Staff (Chairperson in charge) Tutoring—1½ hours. Prerequisite: lower division standing and consent of Department Chairperson. Tutoring of students in lower division physical activity courses. Weekly meetings with instructor in charge of courses. Written reports on methods and materials required. May be repeated once for credit. (PFIN grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor and Department Chairperson. (PFIN grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PFIN grading only.)

Upper Division Courses

100. Field Experience in Teaching Physical Education (2) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PFIN grading only.)

101. Physical Educational Regulation During Exercise (4) I, Berdauer, Molé Lecture—3 hours; discussion—1 hour alternate weeks with laboratory 3 hours. Prerequisite: Biological Sciences 110. A study of muscle/neuromuscular, cardiovascular, bone and joint, endocrine, and respiratory regulations during acute bouts of exercise and work. Focus on physiological and environmental factors influencing exercise regulation. Role of physical activity in maintaining optimal regulatory functions.

102. Psychological Adaptations to Exercise (4) I, II. Bernauer, Adams Lecture—2 hours. Prerequisite: course 101. Study of the fundamental physiological responses to repeated environmental and exercise stressors. Processes of adaptation as evolved in endurance and strength training, nutrition, and aging process.

103. Analysis of Human Movement (4) I, II. Kovacic Lecture—3 hours; laboratory—3 hours. Prerequisite: Physical Education 1A; Human Anatomy 155 and consent of instructor. Anatomical and physiological concepts and physical laws as applied to human movement.

104. Introduction to Motor Control and Skill Acquisition (3) I, Wallace Lecture—3 hours. Prerequisite: Psychology 1, 15, or 16. Analysis of variables affecting man's ability to produce, learn, and retain movement skills. Basic neuropsychological and behavioral accounts of motor control processes are examined. Theories of movement retention and motor learning are covered.

105. Psychosocial Factors in Motor Performance (3) I, Ryan Lecture—3 hours. Prerequisite: Psychology 1, 15, or 16. Survey of theories and experimental findings from social psychology that influence the acquisition and retention of motor performance, including sex differences, success and failure, expectations, anxiety, competition, and aggression.

110. Exercise Metabolism (3) I, II. Molé Lecture—3 hours; laboratory—2 hours lecture. Prerequisite: course 101. Theory of human metabolism and fuels used during different modes of exercise. Also, exercise-induced adaptations which affect metabolism and performance will be discussed. Experiments in laboratory will utilize a variety of techniques to characterize the metabolic responses to exercise.

111. Environmental Effects on Physical Performance (3) I, III. Adams, Bernauer Lecture—2 hours; discussion—1 hour laboratory—1½ hours. Prerequisite: courses 101 and 102, or consent of instructor. The effects of meteorological and geographical conditions on physiological function and physical performance of humans. Acute and chronic effects, emphasizing physiological limitations and adaptations, will be studied.

112. Clinical Exercise Testing (3) I, III. Dreesendorfer Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 101, 102; Exercise Science 191. An apparently healthy individual or patient with heart or lung disease: physiological rationale, clinical indications, and practical application. Use of tests to qualify training programs, or developing and maintaining physical fitness in adults.


120. Sports in American Society (4) III. Gill Lecture—4 hours. Historical development of sport; the phenomenon of play, games and non-structured sport. The national and international rules and interrelationship of American sports, its socio-cultural aspect, current trends, problems and issues.

121. Sports Psychology (4) II. Ryan Lecture—3 hours; discussion—1 hour. Prerequisite: course 105 and Psychology 145. Consideration of major theories research findings and methods of data collection in sport psychology through a critical examination of relevant experimental, clinical, and sport settings.

123. Human Performance and Motor Learning (3) III. Wallace Lecture—2 hours; laboratory—2 hours. Prerequisite: course 104 and Psychology 130. Emphasis on information processing. Open- and closed-loop theory, attention, feedback and other current issues are critically examined.

128A. Research Diving: 65 Feet (3) I, II. Bell Lecture—1 hour; laboratory—½ hour. Prerequisite: basic SCUBA Certification from approved agency (course 25 or the equivalent). 10 logged open water dives since certification, and consent of instructor. Lectures in diver rescue, and resuscitation, navigation, search and light salvage, night diving, research methods, work performance under water, cold water diving, blue-water diving, introduction to deep diving. Pool and open water sessions available for certification (contact Department Office for details). (PFIN grading only.)

128B. Research Diving: 65 Feet (2) II, III. Bell Lecture—1 hour; laboratory—2 hours. Prerequisite: course 128A; consent of Instructor. Lectures in dive rescue and resuscitation, navigation, search and light salvage, night diving, research methods, work performance under water, cold water diving, blue-water diving, introduction to deep diving. Pool and open water sessions available for certification (contact Department Office for details). (PFIN grading only.)

129. Research Diving: 100 Feet (2) I, II. Bell Lecture—3 hours (first five sessions); laboratory—3 hours (final three sessions). A study and practice of decompression diving or American Red Cross Advanced First Aid Card. Administration, organization and supervision of safety and first aid programs in schools and communities. Major types and all types of group activities. The study and practice of first aid leadership skills. The American Red Cross First Aid Instructor Card will be awarded upon successful completion of the course.

133. Conditioning of Athletes: The Prevention and Care of Sports Injuries (2) I, II. Peppa Lecture—1 hour; laboratory—2½ hours. Prerequisite: course 5 or the equivalent. An understanding of the use of various types of exercises prior to competition; understanding the common injury areas of participants in all activities and how to handle them.

140. Principles and Theory of Physical Education (4) II, III. Loiter Lecture—4 hours. Prerequisite: course 45 or consent of instructor. Critical analysis of the assumptions underlying the physical education program.

141. Design and Program Evaluation in Physical Education (4) III, IV. Loiter Lecture—3 hours; laboratory—3 hours. Prerequisite: basic statistics course; consent of instructor. Topics include data reduction and analysis: questionnaires; construction and administration; grading; and teacher evaluation.

142. Physical Education in the Public Schools (3) I, II. Schmalenberger Lecture—3 hours. Prerequisite: course 140 and senior standing or consent of instructor. Analysis and study of the principles and methods basic to teaching physical education at the elementary and secondary levels.
150. Recreation in the Community (3) III, Lahn Lecture—2 hours; discussion—1 hour. Two Saturday field trips—8 hours. The nature and scope of community recreation programs in California emphasizing low income, highly populated areas and poor rural communities.

1977. Tutoring in Physical Education (1-5) I, II, III. The Staff (Chairperson in charge) Tutorial—1-5 hours; prerequisite: consent of instructor. Tutoring of students in lower division physical activity courses. Weekly meetings with instructors in charge of courses. Written report of material covered, and materials required. May be repeated once for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

1989. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of Department Chairperson. (P/NP grading only.)

Graduate Courses

200. Proseminar in Physical Education (3) Adams, Ryan Seminar—3 hours. Prerequisite: course 141. The meaning, methods, and techniques of research procedure as applied to physical education, a critical review of selected books, literature, practices, and procedures used in the field; application to a particular problem in the field.

201A. Sports Medicine: Medical Aspects of Sports Injuries (3) I. Adams, Ryan (Orthopedic Surgery, in charge) Lecture—2 hours, discussion—1½ hour. Prerequisite: graduate students with upper division course in applied physiology or anatomy. A multidisciplinary course introducing the student to: pathophysiology of sports injuries, physical examination of the injured athlete, and critical aspects of emergency care and rehabilitation. (S/U grading only.) (Same course as Orthopaedic Surgery 40T, Physical Medicine and Rehabilitation 201A, 401A.)

201B. Sports Medicine: Physiological Basis of Exercise Testing and Exercise Training (3) II. The Staff (Bennear in charge) Lecture—2 hours; two 4-hour laboratory projects; discussion—four 2-hour sessions. Prerequisite: graduate students with upper division course in applied physiology and anatomy. Course introduces the student to methods and assessment of exercise physiology and exercise testing. Principles of exercise training for normal individuals and patients with various diseases and weight reduction and control will be discussed. (S/U grading only.) (Same course as Orthopaedic Surgery 40T, Physical Medicine and Rehabilitation 201B, 401B.)

201C. Sports Medicine: Special Problems in Preparing and Appraising Exercise Programs (3) III. The Staff (Bennear in charge) Lecture—2 hours; two 4-hour laboratory projects; discussion—four 2-hour sessions. Prerequisite: graduate students with upper division course in applied physiology and anatomy. Review of special problems related to specific sports and recreational activities. Areas to be covered include SCUBA diving, backpacking, jogging and skiing as well as specific exercise programs for disabled and aged. (S/U grading only.) (Same course as Orthopaedic Surgery 40T, Physical Medicine and Rehabilitation 201C, 401C.)

215. Growth and Development in Human Performance (4) I. Seminar—4 hours. Prerequisite: course 113. Graduate lecture-seminar investigating the interrelationships between growth and development, and physical activity. Alternates in body composition, motor performance and physiological function in man, and the special problem areas of sex, ethnic and racial differences, aging, athletics, and alteration of normal growth patterns.

220. Kinesiology (4) III, Kovan Lecture—3 hours; discussion—1 hour. Prerequisite: course 103 and consent of instructor. Critical review of current literature and research in kinesiology; neurophysiological concepts and principles; legal issues.

221. Anthropometry in Physical Activity (3) I. Adams Lecture—2 hours; laboratory—five 3-hour sessions to alternate weekly with five 1-hour discussion sessions. Prerequisites: courses 101 and 102. Consideration of physical constitution, body proportions, and body composition in man as they affect physical performance, and of body structure and composition changes accompanying prolonged, systematic physical conditioning. Offered in even-numbered years.

NOTE: For key to footnote symbols: see page 130.

"222. Metabolic Functions in Exercise (4) III, Motl Lecture—2 hours; discussion—1 hour. Laboratory—3 hours. Prerequisite: course 102. Physiology 114 Review of the current research literature on the metabolic responses to exercise in man: a laboratory survey of respiratory response, metabolic and water balances, blood gas adjustments and acid-base balance with particular reference to the effect of environmental conditions.

230. Motor Performance: Psychological Aspects (4) II. Lecture—2 hours; discussion—2 hours. Prerequisite: course 110. Critical review of current literature on motor learning, coordination, kinesthesia, and reaction time; consideration of sensory-motor perception, motivation, and personality factors in relation to physical activities.

231. Seminar in Motor Control of Voluntary Movements (3) III. Waceke Seminar—3 hours. Prerequisites: Physiology 112, 214, or the equivalent. Physiology 106 or consent of instructor. A neurophysiological and behavioral examination of motor control in the human and higher phylogenetic animal.

250. Physiological Basis of Physical Fitness (2) II. Bernauer Seminar—2 hours. Prerequisite: graduate standing. Review and critical discussion of current research topics concerned with the physiological aspects of physical fitness. Offered in odd-numbered years.

255. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing; consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing; consent of instructor and Department Chairperson. (S/U grading only.)

Professional Course

380. Methods of Teaching Physical Education (3) III. Schumenbarger Lecture—1 hour laboratory—6 hours. Prerequisite: course 142 and six units of course 10; or consent of instructor. The methods of teaching group and individual activities for grades K-12; program planning, management, organization, and evaluation. (P/NP grading only.)

\section{Physical Medicine and Rehabilitation}

\subsection{See Medicine, School of Physics (College of Letters and Science)}

William J. Knox, Ph.D., Chairperson of the Department

Merrill H. Potter, Ph.D., Vice Chairperson of the Department

Department Office, 225 Physics-Geology Building (752-1500)

\subsection{Faculty}

Franklin P. Brady, Ph.D., Professor

Thomas A. Cahill, Ph.D., Professor

Albert C. Cheung, Ph.D., Associate Professor

Lawrence B. Coleman, Ph.D., Assistant Professor

Linton R. Corruccini, Ph.D., Associate Professor

James E. Draper, Ph.D., Professor

Glen W. Erickson, Ph.D., Professor

\textit{Invoking a solid foundation in physics...}

Milton E. Gardiner, Ph.D., Professor Emeritus

Claude Garrod, Ph.D., Professor

Kenneth R. Greider, Ph.D., Professor

John F. Gunion, Ph.D., Professor

James P. Hurley, Ph.D., Associate Professor

John A. Jungman, Ph.D., Professor

William J. Knox, Ph.D., Professor

Winston 1. Ko, Ph.D., Associate Professor

Richard L. Landes, Ph.D., Professor

Douglas W. McColm, Ph.D., Associate Professor

Charles G. Patern, Ph.D., Professor Emeritus

Neal Peek, Ph.D., Lecturer

David E. Pellet, Ph.D., Associate Professor

Wendell H. Potter, Ph.D., Professor

Roderick V. Reid, Jr., Ph.D., Associate professor

William T. True, Ph.D., Professor

Philip M. Yager, Ph.D., Associate Professor

\subsection{The Program of Study}

While many people think of Physics as levers and pulleys or space shots and atomic reactors, there is much more to the realm of physics. From the smallest subatomic particles to atoms, molecules, stars, and galaxies, the study of Physics is the study of what makes the universe tick. For example, the working of the airplane, the paint sprayer, the Pitcher's curve ball are all understood in terms of the same physical law. Information learned from high-energy particle accelerators and nuclear reactors teaches us not only how the universe and the atom together but also why stars shine and how radiation therapy fights cancer.

As the world becomes more and more complex, the sciences appear to become more difficult to understand. Yet appearances are deceiving, and many of the most complex phenomena and devices are easily understood and used by those with a good understanding of the basic principles of physics. A major in Physics or in Applied Physics at UC Davis provides a student with this basic knowledge, plus experience in using that knowledge, to get the most out of today's technological world.

Careers in Physics and Applied Physics: The science of Physics involves the observation of natural phenomena and events. From these observations comes the mathematical formulation of general principles which may be tested further or applied to specific problems. Because physics is so basic to other sciences, its study provides a background with broad flexibility for later activities.

Careers in physics and applied physics include research and development, either in universities, government laboratories, or industry; teaching in high schools, junior colleges, and universities; management and administration in industrial laboratories and in government agencies, and in product research and sales in industry.

A major in Physics or in Applied Physics also provides a strong base for graduate-level work in such interdisciplinary areas as chemical physics, biophysics and medical physics, geophysics and environmental physics, astrophysics and astrometry, and computer science, materials science and energy.

\subsection{The Major Programs}

The Department of Physics offers three degree programs: The Bachelor of Arts in Physics, and the Bachelor of Science in Physics. The B.A. degree provides a broad coverage of classical and modern physics while permitting a broader liberal arts education than is possible with the other two programs. The B.A. program is preferred for a student seeking a secondary teaching credential. Either the B.S. in Physics or the B.S. in Applied Physics provides the student with a solid introduction to a particular applied physics specialty. For the student who plans to enter the job market on completing a B.S. degree, the applied physics orientation would be an asset. Either B.S. program provides a solid foundation in physics for the student interested in graduate work in either pure or applied physics.
Both programs are developed in a highly sequential manner, i.e., Physics 8A-B-8C-8D and Mathematics 21A-21B-21C and 22A-22B-22C are required for more upper division courses and must be taken in the freshman and sophomore years. Some prerequisites may be waived with consent of the instructor.

In the freshman year, Astronomy 2 and Physics 7 are recommended for the student who wishes to take some classes in this department prior to enrolling in Physics 8 in the Spring Quarter. These courses are introductory to the department and are not preparatory to Physics 8. Honors mathematics is highly recommended for both the freshman and sophomore years.

In the junior year the student normally studies mathematical methods, analytical mechanics, electricity and magnetism, and begins quantum mechanics. In the senior year the study of quantum mechanics is continued and courses in the principal modern fields of physics are selected. Laboratory courses may be taken both years.

Physics

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 8A, 8B, 8C, 8D</td>
<td>16</td>
</tr>
<tr>
<td>Mathematics 21A, 21B, 21C, 22A, 22B, 22C</td>
<td>21</td>
</tr>
</tbody>
</table>

Depth Subject Matter

| At least 5 additional upper division units in physics or astronomy. (No more than 4 units in courses numbered 194, 195, 197, 198, and 199 may be applied in satisfaction of this requirement.) | 5 |

Total Units for the Major: 75

Recommended

Chemistry 1A-1B-1C or 4A-4B-4C. See also recommended elective courses following the B.S. program.

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 8A, 8B, 8C, 8D</td>
<td>16</td>
</tr>
<tr>
<td>Mathematics 21A, 21B, 21C, 22A, 22B, 22C</td>
<td>21</td>
</tr>
</tbody>
</table>

Depth Subject Matter

| At least 11 units from Physics 105C, 112B, 129A, 129B, 129C, 140A, 140B | 11 |
| At least 10 additional upper division units from physics or astronomy. (No more than 6 units in courses numbered 194, 195, 197, 198, and 199 may be applied in satisfaction of this requirement.) | 10 |

Total Units for the Major: 106
105A. Analytical Mechanics (3) (I, Ko) Lecture—3 hours. Prerequisite: course 8A; Mathematics 22A, 22B, 22C. Principles and applications of Newtonian mechanics.

105B. Analytical Mechanics (3) (II, Ko) Lecture—3 hours. Prerequisite: courses 8C and 105A. Continuation of course 105A, introduction to Lagrange's and Hamilton's equations.


108. Optics (3) (II, Cahi) Lecture—3 hours. Prerequisite: course 8 or 2 sequence and Mathematics 21 sequence or consent of instructor. The phenomena described include reflection, refraction, diffraction, interference, and polarization of light, with applications to current problems in astrophysics, material science, and atmospheric science. Study of modern optical instruments and applications.

108L. Optical Laboratory (1) (II, Cahi) Laboratory—3 hours. Prerequisite: current enrollment in 108. The laboratory will consist of one major project pursued throughout the quarter, based on modern applications of optical techniques.

110A-110E. Electricity and Magnetism (3-3-3) II-II-III. Jungerman Lecture—3 hours; Prerequisite: course 8C; Mathematics 22C. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves.

112A-112B. Thermodynamics and Statistical Physics (3-4) III-III-III. Hotter Lecture—3 hours (112A); lecture—3 hours plus 9 hours outside work (112B). Prerequisite: course 8; Mathematics 22C. Thermodynamics, kinetic theory, and introduction to statistical mechanics.

115A-115B. Introduction to Quantum Mechanics (3-4) III-III-III. Draper Lecture—3 hours (115A); lecture—3 hours plus problem sets (115B). Prerequisite: courses 8D, 104B, 105B. The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.

116A. Electronic Instrumentation (4) (II, Ko) Lecture—3 hours; laboratory—3 hours. Prerequisite: course 8C; Mathematics 22B. An experimental and theoretical study of important electronic circuits commonly used in physics.

116B. Electronic Instrumentation (4) (III, Pelet) Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 8C, 116A. Continuation of course 116A. Introduction to the use of digital electronics and microcomputers in experimental physics.

121. Foundations of Atomic and Molecular Physics (4) (III, McCarr Lecture—3 hours; outside work—9 hours. Prerequisite: course 8C; Mathematics 21C. The phenomena of atomic physics; introduction to quantum phenomena and quantum mechanics; interactions of atoms and molecules, atoms, nuclei, and the solid state.

122. Advanced Physics Laboratory (2) (II, I) The Staff Discussion—1 hour; laboratory—3 hours. Prerequisite: consent of instructor. Laboratory techniques and measurements in atomic, nuclear, and solid-state physics. May be repeated once for credit.

123. Applications of Nuclear Physics (3) (II, Jungerman Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Applications to environmental, medical, and energy source problems. Course emphasis is not limited to experimental programs underway at Crocker Nuclear Laboratory. Student participation in one such experimental program is the required lab work.

127. Introduction to Astrophysics (3) (III, Cheung Lecture—3 hours. Prerequisite: course 8B and Mathematics 21C and knowledge of astronomy or consent of instructor. Celestial mechanics, radiative, astrophysical measurements, electromagnetic processes, the sun, binary and variable stars, stellar structure and evolution, galaxies, cosmology. (Same as Astronomy 27.)

128A. Introduction to Nuclear and Particle Physics (4) (I, Gailer Lecture—3 hours; term paper. Prerequisite: course 8D; Mathematics 22C. Survey of basic nuclear properties and concepts requiring only rudimentary knowledge of quantum mechanics.

128B. Nuclear Physics (4) (II, Draper Lecture—3 hours; outside work—9 hours. Prerequisite: courses 115B, 128A. Continuation of course 128A.

128C. Elementary Particle Physics (4) (III, Ko Lecture—3 hours; term paper. Prerequisite: courses 115A and 128A or consent of instructor. Properties and classification of elementary particles. Strong, electromagnetic, and weak interactions; conservation laws and QP violation; Gell-Mann.

140A. Introduction to Solid-State Physics (4) (II, Coleman Lecture—3 hours; outside work—9 hours. Prerequisite: course 115A. A survey of basic concepts and classification of solid-state phenomena in solids. Introduction to band theory.

140B. Introduction to Solid-State Physics (4) (II, Coleman Lecture—3 hours; outside work—9 hours. Prerequisite: course 140A. A thorough treatment of one or more of the following: energy bands and fermi surfaces, transport phenomena, cooperative phenomena, magnetic resonance.

150. Topics in Current Research (2) (I, II, III. The Staff Discussion—1 hour; outside work—5 hours. Prerequisite: consent of instructor. Discussion of topics of current interest in physics. May be taken for credit not more than four times.

163. Introduction to Heat Transfer (2) (McCorm Lecture—1 hour; outside readings and extensive problem sets. Prerequisite: courses 104A-104B, 105A-105B, 115A; 112A (may be taken concurrently). Fundamentals of conductive convective and radiative heat transfer— an emphasis on the solution of practical problems involving the combined modes of conduction and convection. Viscous fluid dynamics pertinent to convective heat transfer.

184. Special Study for Honors Students (4) (I, II, III. The Staff (Chairperson in charge) Prerequisite: open only to seniors who qualify for the honors program. Independent research and/or reading on selected topics.

195. Senior Thesis (5) (I, II, III. The Staff (Chairperson in charge) Prerequisite: physics major or senior standing. Preparation of a senior thesis on a topic selected by the student with approval of the department. May be repeated for a total of 15 units and for no more than 5 units in any one quarter without Departmental approval.

197T. Tutoring in Physics and Astronomy (1-5) I-I-I. The Staff (Chairperson in charge) Prerequisite: consent of instructor and department chairperson. Tutoring of students in lower division course. Weekly meetings with instructor. (PnP grading only.)

198. Directed Group Study (1-5) I-I-I. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PnP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I-I-I. The Staff (Chairperson in charge) (PnP grading only.)

Graduate Courses

200A. Theory of Mechanics and Electromagnetism (3) (I, Garrod Lecture—3 hours. Prerequisite: courses 105C and 110C or the equivalent; Mathematics 220A (concurrently). Special Relativity; stress-strain relation, craftman formulation of mechanics and electromagnetic theory. Lagrange's equations, variational principles for discrete and continuous mechanical and electromagnetic systems. Courses 200A, 200B, 200C, 200D, an integrated sequence will emphasize physical content as they are coordinated with Mathematics 220A, 220B, 220C.

206B. Theory of Mechanics and Electromagnetism (3) (II, Garrod Lecture—3 hours. Prerequisite: course 200A. Mathematics 220B (concurrently). Hamilton's equations. Hamilton- Jacobi theory and contact transformations. action-angle variables and perturbation theory, selected topics in mechanics of continuous media; incompressible and compressible flow, gravity waves and shock theory.

200C. Theory of Mechanics and Electromagnetism (3) (III, True Lecture—3 hours. Prerequisite: course 200C. 200D. Diffraction theory. Radiating systems and electron theory.

215A. Quantum Mechanics (3) (I, True Lecture—3 hours. Prerequisite: course 215A. Conservation of nonrelativistic quantum mechanics. Formal development and interpretation of quantum mechanics, including the Schrodinger wave equation, matrix mechanics, and use of state vectors in describing a dynamical system.

215B. Quantum Mechanics (3) (II, True Lecture—3 hours. Prerequisite: course 215A. Wave packet, Wentzlist-Kramers-Brillouin perturbation methods applied to atomic, nuclear, molecular, and solid-state problems.

NOTE: For key to footnote symbols, see page 130.
Physiological Sciences

252. Techniques of Experimental Physics (3) III. Potter Lecture—3 hours. Introduction to techniques and methods of designing and performing experiments. Problems and examples will be drawn from various fields of current experimental research—low-temperature solid-state and high-energy scattering experiments.

259. Seminar in Nuclear Physics (1-3) I, II, III. Staff (Chairperson in charge) Seminar—3 hours. (SU grading only.)

260. Seminar in Solid-State Physics (1-3) I, II, III. Fong, Potter Seminar—3 hours. (SU grading only.)

262. Seminar in Theoretical Physics (1-3) I, II, III. Staff (Chairperson in charge) Seminar—3 hours. (SU grading only.)

263. Seminar in Applied Physics (1-3) I, II, III. Staff (Chairperson in charge) Seminar—12 hours. Presentation and discussion of current topics in applied physics by visiting lecturers, staff and students. (SU grading only.)

279. Techniques of Teaching Physics (3) III. Greider Prerequisite: consent of instructor and Department Chairperson. Study of devices and methods used to teach physics at the college level. Participation in presenting lectures and demonstrating experiments. Preparation of new material for lectures and laboratories. (SU grading only.)

289. Group Study (1-3) I, II, III. Staff (Chairperson in charge) Seminar—2 hours. Consent of instructor.

299. Research (1-2) I, II, III. Staff (Chairperson in charge) Seminar—2 hours. Consent of instructor.

Courses in Physiological Sciences

Upper Division Courses

210A-101B. Physiological Chemistry (4-3) I-II. Black Lecture—4 hours. Prerequisite: organic chemistry. Recommended: a course in physiology may be taken concurrently and quantitatively analysis. Chemical and physical properties of substances composing the animal body, with major emphasis on the changes during metabolism and factors influencing these reactions. Biochemistry of the active glands and other specialized tissues and body fluids; chemistry of nutrition, energy metabolism and nutrition.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

200. Cell Physiological Biophysical Aspects (2) III. Burns Lecture—2 hours. Prerequisite: consent of instructor. Recommended: Physiology 100B or Bacteriology 130B; Biochemistry and Chemistry 707B or 110B. Discussion of modern approaches to understanding the cell as an organized system. Topics include analysis of regulation and function in the cell, energetic aspects and statistical relations in the cell; test kinetica applied to cells; fluorescence of cells and cell structure. Offered in even-numbered years.

205A. Intermediary Metabolism of Animals (3) II, III. Black Lecture—3 hours. Prerequisite: biochemistry and physiology of cell or consent of instructor. General consideration of use of biochemical data as related to metabolism of intact animals. Pathways and control of biosynthesis and degradation of carbohydrates and lipids, including hormonal, nutritional, and genetic effects. Dynamics of animal metabolism including pools and turnover rates.

205B. Intermediary Metabolism of Animals (3) III. Hansen, Rogers Lecture—3 hours. Prerequisite: course 205A or consent of instructor. Pathways and control of biosynthesis and degradation of amino acids, proteins, nucleotides and pyrimidines; hormonal and nutritional, and genetic effects.

222. Comparative Pharmacology (3) III. Gir, Conzelman, Joy Lecture—4 hours; laboratory—3 hours. Prerequisite: biochemistry and physiological chemistry, elementary physics and calculus or consent of instructor. Discussion of the properties of the endocrine system and their use as tracers in biological systems.

243A-243B. Use of Isotopes as Tracers in Biological Research (2-3) I, II. Burns Lecture—2 hours. Prerequisite: biochemistry or physiological chemistry, elementary physics and calculus or consent of instructor. Discussion of the properties of isotopes and their use as tracers in biological systems.

243A. Laboratory in Use of Isotopes as Tracers in Biological Research (2) II. Burns Laboratory—6 hours. Prerequisite: course 243A (concurrent study of radioisotope properties, techniques and measurement methods relevant to the biological sciences.

253. Drug Metabolism (2) II. Gir Lecture—2 hours. Prerequisite: courses 101A-101B or Physiology 116A-116B; consent of instructor. General pathways of drug metabolism, and factors influencing the drug metabolism. Emphasis will be laid upon the species, age, and genetic differences affecting the biological disposition of the drugs. Offered in even-numbered years.

255. Pharmacogenetics (3) II. Peoples, Gir Lecture—1 hour. Laboratory—3 hours. Prerequisite: consent of instructor. The genetic basis of interspecies and intraspecies differences in animals to the action of drugs. The laboratory exercises are designed to illustrate these differences and their biological basis.

257. Pharmacology Literature (1) I, Conzelman Discussion—1 hour. Critique of selected papers in pharmacology with the objective of discerning those general principles, techniques, and procedural facts that have led to success and the limitations, if any, in this field of research. Offered in even-numbered years.

258. Drug Receptors (2) II. Jay Lecture—2 hours. Prerequisite: Pharmacology 200A-200B or the equivalent. Theories of drug-receptor interactions and their application to known receptor systems are studied. Present concepts of agonists, antagonists, and other receptor are considered in conjunction with their functional importance.

259. Use of Antibiotic Drugs in the Management of Infectious Diseases of Small Animals (3) III. Conzelman, Kohn, Ling, Ling

Physiological Sciences

(School of Veterinary Medicine)

Richard A. Friedland, Chairperson of the Department

Department Office, 2163 Haring Hall (752-1373)

Faculty

Richard L. Bell, Ph.D., Professor (Chemical Engineering)

Arthur L. Black, Ph.D., Professor

Victor W. Burns, Ph.D., Professor

Gaylord M. Conzelman, Jr., Ph.D., Associate Professor

Donald L. Curry, Ph.D., Associate Professor "Richard A. Friedland, Ph.D., Professor

Jerry R. Gillespie, D.V.M., Ph.D., Professor

Shir N. Giri, D.V.Sc., A.H., Ph.D., Associate Professor

Marvin Goldman, Ph.D., Professor (Radiological Sciences)

Robert J. Hansen, Ph.D., Associate Professor

Benjamin L. Hart, D.V.M., Ph.D., Professor

Alfred A. Heusner, Doctor of Science, Professor

Robert M. Joy, Ph.D., Associate Professor

James G. Morris, Ph.D., Professor (Animal Sciences)

Stuart A. Peoples, M.D., Professor Emeritus

Quinton R. Rogers, Ph.D., Professor

Henry J. Segal, Ph.D., Assistant Professor
Physiology

See below; and also Human Physiology (Medicine), Plant Physiology, and Zoology

Physiology (College of Agricultural and Environmental Sciences)

Faculty

See under Departments of Animal Physiology, Animal Science, and Avian Sciences.

The Major Program

The Physiology major is designed to provide an understanding of the vital functions of living organisms and includes a systematic study of the functional properties of tissues and organs and comparison of processes among different kinds of animals. It will provide the foundations for a challenging career in physiology and also serve as a basis for further training in schools of human and veterinary medicine, medical technology, pharmacy, dentistry, optometry, and other health sciences. Students interested in research and advanced teaching may use the program as preparation for continued study leading to advanced degrees.

Choice of College. The Bachelor of Science degree is offered in both the College of Agricultural and Environmental Sciences and College of Letters and Science.

Students majoring in Physiology in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis.

Daveis and those that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

Physiology

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter

Units

Chemistry (Chemistry 1A-1B-1C, 5, 4A-4B-4C) 25
Mathematics (Mathematics 16A-16B, 16C) 13
Statistics 13

Physics (Physics 2A-2B-2C) 9

Depth Subject Matter

Units

Physiology, including Physiology 100A-100B, 100L, 110, 110L, 111A-111B 33

Breadth Subject Matter

College of Agricultural and Environmental Sciences students 16
Social sciences and humanities (see College requirement) 16
Additional requirements as described on page 70.

College of Letters and Science students:

Refer to page 93 for a description of requirements to be completed in addition to the major.

Restricted Electives

Upper division units, chosen with the adviser's approval, constituting a sequence in biochemistry, morphology, and selected biological science courses or mathematics, chemistry, physics, and/or engineering. No course 192 or more than 5 units of course 199 will be accepted as restricted electives.

Unrestricted Electives

Total Units for the Major 180


Graduate Study. The Physiology Department offers programs of study and research leading to the M.S. and Ph.D. degrees. Information on graduate study can be obtained from the graduate adviser or the Announcement of the Graduate Division.

Graduate Advisers, A-F: W. Adams (Physical Education); G-K: B-A. Horowitz (Animal/Physiology); L-P: J.W. Evans (Animal Science); Q-Z: R. Carlsson (Human Physiology).

Related Course. Human Physiology 200D (Medicine, School of).

Courses in Physiology

Lower Division Courses

See also Physiology 2, 2L, and 10 listed under the Department of Zoology course listing (page 310).

Upper Division Courses

100A. General Physiology (3) I, Horowitz

Lecture—3 hours. Prerequisite: Biological Sciences 1 and Chemistry 8B. Physics 2C recommended. Examination of the interaction of various intracellular compartments in the functioning of the animal cell. Emphasis is placed on metabolic bases and regulation of cellular function. Cell and tissue structure are discussed in relation to physiological mechanisms.

100B. General Physiology (3) II, Horowitz

Lecture—3 hours. Prerequisite: course 100A. Continuation of course 100A with particular emphasis on transport phenomena, cell recognition and communication, and properties of excitable cells.

100L. General Physiology Laboratory (2) I, Horowitz, Horowitz

Discussion—five 2-hour sessions (alternate weeks); laboratory—five 6-hour sessions (to alternate with discussion). Prerequisite: courses 100A, 100B (concurrently), Biological Sciences 1, or consent of instructor. Laboratory in the physical and chemical processes of cells and tissues.

102. Physiology of Growth (3) I, A. Smith

Lecture—3 hours. Prerequisite: course 100B. The nature of the growth of cells, organs, organisms, and population, and their regulatory processes. Emphasis is placed on the quantitative evaluation of growth.

103. Physiology of Animal Cells (4) I, B. Wilson

Lecture—4 hours. Prerequisites: course 100B or Zoology 121B. Organization of metazoon systems at the cellular level. Life cycles of cells; regulation and development of specialized cell functions.

106A. Experiments in Physiology: Design and Execution (3) III. The Staff (Horowitz, Horowiz in charge)

Discussion—total of 6 hours; laboratory—7-9 hours. Prerequisite: course 100B. Consent of instructor. Allows students to experimentally examine current physiological problems. Following group discussions on approaches to designing experiments, groups of 2-3 students will choose a project and design an experimental protocol that they will then carry out and report upon. (P/NP grading only.)

106B. Experiments in Physiology: Design and Execution (3) III. The Staff (Horowitz, Horowiz in charge)

Discussion—two 2-hour meetings during quarter. Laboratory—9 hours. Prerequisite: course 100B and consent of instructor. Continuation of course 106A. (P/NP grading only.)

108. Biodynamics (3) I, Horowitz

Lecture—3 hours. Prerequisite: course 100A or 110. Mathematics 16A, 16B. Application of mathematics to physiological processes.


Lecture—5 hours. Prerequisite: Biological Sciences 4. Physiology of organ systems including concepts of integrative and homeostatic mechanisms.

115. Systemic Physiology Laboratory (2) I, III. Barney, Goldberg, Silman

Discussion—1 hour, laboratory—3 hours. Prerequisite: course 110. Prior to taking 110L, recommended. Course may be taken concurrently. Selected experiments to illustrate functional characteristics of organ systems discussed in course 110.

111A-111B. Advanced Systemic Physiology Laboratory (3-3) II-III; Burger

Lecture—1 hour, discussion—five 2-hour sessions (to alternate with laboratory); laboratory—five 6-hour sessions. Prerequisite: course 110; courses 112, 113, 114 recommended. Selected experiments in depth on the neural, cardiovascular, respiratory, and renal systems. Emphasis on modern conceptual and methodological approaches using several species in demonstrating the physiology of organ systems.


Lecture—4 hours. Prerequisite: course 110. The nature, functional significance, and integration of neuronal and endocrine control of physiological processes. Emphasis will be placed on neuronociruine, neural sensory, and motor systems, higher neural integration, and control of metabolic and reproductive status.

113. Cardiovascular, Respiratory, and Renal Physiology (4) I, Goldberg, Weidner

Lecture—4 hours. Prerequisite: course 110. Chemistry 68B, Physics 2A, 2B, 2C recommended. An intense and advanced introduction of concepts of cardiovascular, respiratory, and renal physiology including discussion of acid-base balance. Recommended for Physiology students, graduate students, and others in allied sciences.

114. Gastrointestinal Physiology (4) III. Mendel

Lecture—2 hours. Prerequisite: course 110. Biochemistry 101 or Biological Chemistry 101 recommended. Advanced gastrointestinal physiology covering absorption, secretion, excretion, and motility. Also includes physiology of herbivorous digestive tracts. The emphasis will be on physiology of the gastrointestinal tract; however, the interaction between the tract and metabolic events will be briefly covered.

This course is in a group from which one or more may be chosen; however, to be considered as having had full exposure to advanced systemic physiology a student must take courses 112, 113, 114, 120A, 121, 121L, and 130. A student with special interests in comparative physiology may wish to select courses from the 120 series.

NOTE: For key to footnote symbols, see page 130.
adequate preparation in physiology, behavioral science, computer science, and some generalization of consent of instructor. Individual or team projects in voluntary control of physiological processes, emphasizing application of microcomputer-assisted biofeedback techniques. May be repeated for credit. (P/NP grading only; deferred grading can be in effect.)

1977. Tutoring in Physiology (2), (3), (I, II, III). The Staff (Woolley in charge). Discussion—1 hour; tutor—1 hour. Prerequisite: course 110 or 110L. Biochemistry 101B; Genetics 100B. Basic phenomena of sex. Equipment and reproductive capacities in laboratory processes in a wide variety of animals; gamete formation, structure, and metabolism; fertilization; neuroendocrine mechanisms; maturation and reproductive cycles; behavioral aspects.

217. The Ruminant Stomach (3). (II). Colvin Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110L. Biochemistry 101B or Biochemistry 101B; consent of instructor. Ruminant stomach anatomy, histology, and physiology. Original literature will be emphasized. (Offered: Fall.)

255. Physiology of Lactation (4). (II) Baldow Lecture—3 hours; discussion—1 hour. Prerequisite: course 110L. Biochemistry or Physiological Sciences 101B. Consideration of the biochemical, genetic, physiological, nutritional, and structural factors determining of mammalian gland development, lactogenesis and milk yields and composition; animal physiological adaptations to lactation; mammalian cancer research; and research perspectives in mammalian research.

231. Neuroendocrinology (4). (II) Wooley, Moberg Lecture—3 hours; discussion—1 hour. Prerequisite: course 130. Neural-endocrine interactions; neural regulation of endocrine systems; hormonal modifications of neural development and activity.

234. Neurophysiological Basis of Neurotoxicology (2). (I) Wooley Lecture—1 hour; discussion—1 hour. Prerequisite: course 110 or the equivalent. Mechanisms of action of a number of different neurotoxins, including marine toxins, insecticides and heavy metals. Experimental pathways may act on the nervous system and techniques for study of neurotoxicology. Offered in odd-numbered years. (Same course as Environmental Toxicology 234.)

242. Physiological Rhythms (1). (I) Winget Lecture—1 hour. General aspects and basic mechanisms of biological rhythms; the importance of rhythm desynchronizing areas of the brain (pontine tegmentum, thalamus and hypothalamus); mathematical methods: chronometry, tidal, lunar, and annual periods; periodic desynchronization. Offered in odd-numbered years.

256. Development of Physiological Concepts: Selected Topics (3). (I) The Staff (Woolley in charge). Lecture—2 hours; discussion—1 hour. Historical development of physiology. Selected topics from ancient to modern times. Course may be repeated for credit when different a topic is studied. (S/U grading only.)

275. Neurohumoral Regulatory Mechanisms of Thermoregulation (3). (I) Wooley Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A (or the equivalent). Biochemistry/Physiological Chemistry 101B (or the equivalent) and consent of the instructor. Designed for graduate and advanced undergraduate students in this course, we will examine nervous systems in human (primarily autonomic nervous system) regulation (hormonal and central nervous control) and effecter mechanisms (basis of heat generation at the sweat cells).

260. Seminar (1) (I) (II). The Staff (Woolley in charge). Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (S/U grading only.)

1977. Tutoring in Physiology (3), (II), (III). The Staff (Woolley in charge). Discussion—1 hour; tutor—2 hours. Prerequisite: course 110 or the equivalent. Biochemistry 101B; consent of instructor. Advanced laboratory techniques; study of specialized topics in upper division courses (students are required to attend lectures in the course which they are tutoring). May be repeated for credit by tutoring in different courses or in the continuation of a course (e.g., courses 112, 113, 114). (S/U grading only.)

256. Group Study (2) (I), (II). The Staff (Woolley in charge). Group study—2 hours. (S/U grading only.)

256. Research (1-12) (I), (II). The Staff (Woolley in charge). (S/U grading only.)

Professional Course

300A-300B. Preadjunctive Pedagogical Aspects of Physiology in Higher Education (3-5), (II). The Staff (Mendel in charge). Lecture—discussion, for 3 hours, or 3-5 hours. Prerequisite: a Ph.D. candidate and certification as T.A. in physiology. Participation as T.A. for one quarter in designated teaching sequence is a prerequisite for discussion group membership. Discussion group members are required to attend the discussions of the T.A. Professional course is designed to acquaint students with the procedures and techniques utilized in the different discussion groups. All students are required to attend the discussion groups, and in addition to their discussion group membership, student laboratory help is prepared by laboratory exercises in-
Plant Pathology; Plant Physiology; Plant Protection and Pest Management

Plants Faculty

Faculty
Edward E. Butler, Ph.D., Professor
Robert N. Campbell, Ph.D., Professor
James E. DeWay, Ph.D., Professor
John M. Durniway, Ph.D., Associate Professor
W. Harley English, Ph.D., Professor Emeritus
David G. Gilchrist, Ph.D., Assistant Professor
Austin C. Govean, Ph.D., Lecturer
Raymond G. Grogan, Ph.D., Professor
Dennis H. Hall, Ph.D., Lecturer
William B. Hewett, Ph.D., Professor Emeritus
Clarence I. Kado, Ph.D., Professor
John M. Klisiewicz, Ph.D., Lecturer
Susan B. Lee, Ph.D., Professor
Lyle E. Leach, Ph.D., Professor Emeritus
Bert L. Litt, Ph.D., Professor
James D. MacDonald, Ph.D., Assistant Professor
(Plant Pathology, Environmental Horticulture)
S. Brook Miersch, Ph.D., Lecturer
William J. Moeller, Ph.D., Lecturer
George Nyland, Ph.D., Professor
Joseph W. Ogawa, Ph.D., Professor
Mary Ann Sall, Ph.D., Assistant Professor
William J. Schnathorst, Ph.D., Lecturer
Thomas A. Shalla, Ph.D., Professor
Robert J. Shephard, Ph.D., Professor
Robert K. Webster, Ph.D., Professor
Edward W. Wilson, Ph.D., Professor Emeritus

Related Major Program See the major in Plant Science (page 276).

Graduate Study The Department of Plant Pathology offers programs of study and research leading to the M.S. and Ph.D. degrees. Information can be obtained from the graduate adviser. See also page 291.


Courses in Plant Pathology

Upper Division Courses

120. Introduction to Plant Pathology (4) I, Glichrist; III, Campbell. Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 2 or Bacteriology 2 recommended. The Nature, Cause, and Control of Plant Diseases.

125. Diagnosis and Control of Plant Diseases (4) III, MacDonald. Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 120. Clinical plant pathology with emphasis on diagnosis, epidemiology, and control of diseases of economic plants. Students may specialize in diseases of fruits, vegetables, field crops, or ornamentals in the laboratory exercises.

130. Physiology of Fungi (3) I, DeWay. Lecture—3 hours. Prerequisite: Botany 2; Biochemistry 101A and Botany 119 recommended. Discussion of the nature and interactions of fungal cell structure, growth, spore germination, nutrition, and metabolism with emphasis on response of fungi to environmental changes. Selective examples of beneficial and destructive roles of fungi will also be considered.

192. Internship (1-12) I, II, III, Staff. (Chairperson in charge) Laboratory—36 hours. Prerequisite: course 120 and consent of instructor. Work-related experience off and on campus, supervised by a member of the faculty. (FIP grading only.)

196. Directed Group Study (1-5) I, II, III. Staff. (Chairperson in charge) (FIP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. Staff. (Chairperson in charge) (FIP grading only.)

Graduate Courses

205. Diseases of Vegetable and Field Crops (4) I—III. Lecture—2 hours; laboratory—6 hours (alternate weeks through first summer session). Prerequisite: course 120. Botany 119. Study of soil conditions and field crops diseases with emphasis on recognition, diagnosis, and control, and alternatives in crop production. Course 206 may be taken concurrently.

206. Diseases of Fruit, Nut, and Vine Crops (4) I—III. Lecture—2 hours; laboratory—6 hours. Prerequisite: course 120 and the equivalent of Botany 119. Clinical study of fruit, nut, and vine crops diseases with emphasis on recognition, diagnosis, and control. Course 205 may be taken concurrently. (FIP grading only.)

207. Ecology of Pathogens and Epidemiology of Plant Disease (5) I. Lecture—2 hours; laboratory—6 hours. Prerequisite: course 120 or the equivalent of Botany 119. Study of the nature and distribution of plant pathogens in the environment, and plant disease resistance. (FIP grading only.)

210. Physiology and Biochemistry of Host-Pathogen Interaction (4) I. Lecture—4 hours; discussion—1 hour. Prerequisite: course 130 or the equivalent of Biochemistry 101B. Discussion of the nature of host-pathogen interactions, metabolic alterations in pathogen metabolism, and the genetic basis of plant disease resistance. (FIP grading only.)

211. Genetics of Plant Pathogens (4) II. Lecture—3 hours; laboratory—4 hours. Prerequisite: course 120. Genetics 100B, Botany 119. Study of the ecological and nutritional interactions of host-pathogen interactions.

221. Pathogenic Fungi (5) III. Lecture—3 hours; laboratory—6 hours. Prerequisite: course 120. Botany 119. Morphology and taxonomy of plant pathogenic fungi.

225. Plant Virology (5) I. Lecture—2 hours; laboratory—6 hours. Prerequisite: course 120. Virology 201A, 201B. Study of plant virology and the epidemiology of diseases caused by viral pathogens.

226. Plant Bacteriology (5) I. Lecture—2 hours; laboratory—6 hours. Prerequisite: course 120, Bacteriology 2 or the equivalent. Biochemistry 101A, 101B. Study of the biology of bacteria associated with plants, including pathogenic bacteria.

255. Special Topics in Animal Pathology (4) I. Lecture—2 hours; discussion—2 hours. Prerequisite: course 120. Insect pathology and the biology of pathogens and parasites of insects and other arthropods.

270. Seminar (1-5) I, II, III. Staff. (Chairperson in charge) (SU grading only.)

271. Seminar in Host-Parasite Physiology (1) I, II, III. Lecture—2 hours. Prerequisite: course 120. (SU grading only.)

Seminar in Plant Virology (1-5) I, II, III. Lecture—2 hours. Prerequisite: course 225. Review and evaluation of current literature in virology. (SU grading only.)

Seminar in Mycology (1) I. Lecture—2 hours. Prerequisite: course 205. Review and evaluation of current literature in mycology. (SU grading only.)

Special Group Study (1-5) I, II, III. Staff. (Chairperson in charge) (SU grading only.)

Research (1-12) I, II, III. Staff. (Chairperson in charge) (SU grading only.)

Plant Physiology

See Botany for undergraduate majors, and below for graduate study.

Plant Physiology (A Graduate Group)

Barbara D. Webster, Ph.D., Chairperson of the Group

Graduate Study The Graduate Group in Plant Physiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Detailed information can be obtained from the Group Chairperson and the Announcement of the Graduate Division.

Graduate Advisers B. D. Webster (Agronomy and Range Science).

Courses in Plant Physiology

Graduate Courses

286. Seminar Study (1-5) I, II, III. The Staff (Webster in charge) Prerequisite: graduate standing. (SU grading only.)

288. Group Study (1-3) I, II, III. The Staff (Webster in charge). Prerequisite: graduate standing. (SU grading only.)

Plant Protection and Pest Management (A Graduate Group)

Steven R. Radosevich, Ph.D., Chairperson of the Group

Graduate Study The Graduate Group in Plant Protection and Pest Management offers programs of study and research leading to the M.S. degree. Detailed information can be obtained from the Group Chairperson and the Announcement of the Graduate Division.
Plant Science

Graduate Adviser. O. G. Bacon (Entomology).

Courses in Plant Protection and Pest Management

Graduate Courses

201. Concepts and Systems of Plant Protection and Pest Management (3). Prerequisite: Plant Pathology 102. Lecture—2 hours; discussion—1 hour. Prerequisite: Entomology 110 or 112. Plant Pathology 120, Botany 120 (may be taken concurrently), Nematology 100. Botany 117 or Zoology 125 recommended. Ecological perspective of agricultural systems, the role of pests in these systems, plant protection and pest management methods as modifers of the systems and their components.

202A-202B-202C. Diagnosis of Plant Pest Problems and the Control of Causal Agents (3-3-3). Norris (Botany). Niland (Entomology). Large (Entomology). Fieldwork—9 hours. Prerequisite: Entomology 110 or 112. Plant Pathology 120, Botany 120, Nematology 100 (Botany or Nematology may be taken concurrently). Diagnosis of problems and assessment of losses caused by insects, pathogens, weeds, nematodes, and other pests, methods of determining infestation levels and establishing economic thresholds, and control of these pests with emphasis on integration of available management practices into programs.

290. Seminar (1-2). II, III. The Staff. (Chairperson in charge) (GU grading only.)

298. Group Study (1-5). I, II, III. The Staff. (Chairperson in charge)

299. Research (1-12). I, II, III, IV. The Staff. (Chairperson in charge) (GU grading only.)

Plant Science

(College of Agricultural and Environmental Sciences)

Faculty

For faculty in departments offering areas of specialization (Depth Subject Matter) in Plant Science, see under Departments of Agronomy and Range Science, Botany, Environmental Horticulture, Plant Pathology, Pomology, Vegetable Crops, and Viticulture and Enology.

The Major Program

The objective of the Plant Science major is to train students in the biological and natural sciences as applied to the technology required for the production, protection, and maintenance of crop plants. The Plant Science student may choose to specialize in one of the seven departmentally associated options or may choose general education by electing the general Plant Science option. The Master Adviser serves as adviser for all students who opt for the Plant Science major. Following commitment to one option, the student is assigned to an adviser associated with the department offering expertise in that area. The general option which includes two or more areas of specialization is administered by the Master Adviser.

Upon graduation, students may qualify for a career in their area of specialization or for advanced study leading to the M.S. or Ph.D. degrees. Each of the (UCD) Departments of Agronomy, Plant Pathology, and Vegetable Crops offers an M.S. degree in their respective fields, while the M.S. degree in Horticulture is available through the Departments of Environmental Horticulture, Pomology, and Viticulture and Enology. Occupational opportunities exist in nursery and green house management, farming, technical and sales positions in agricultural business and associated enterprises, such as banking and equipment and supply companies, as well as in private, state and federal service in consulting and research.

Plants Science

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses may be taken with your adviser's approval. Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>Common Core Courses</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>English (English 1, 2, 20 or 103)</td>
<td>4</td>
</tr>
<tr>
<td>Rhetoric (Rhetoric 1, 2, Philosophy 5)</td>
<td>4</td>
</tr>
<tr>
<td>Economics (Economics 1A or 1B)</td>
<td>5</td>
</tr>
<tr>
<td>Physics (Physics 1A, 1B)</td>
<td>6</td>
</tr>
<tr>
<td>Statistics (Agricultural Science and Management 150)</td>
<td>4</td>
</tr>
<tr>
<td>General chemistry (Chemistry 1A, 1B)</td>
<td>10</td>
</tr>
<tr>
<td>Organic chemistry (Chemistry 8A, 8B)</td>
<td>6</td>
</tr>
<tr>
<td>Biochemistry (Biological Sciences 1)</td>
<td>5</td>
</tr>
<tr>
<td>Botany (Botany 2)</td>
<td>5</td>
</tr>
<tr>
<td>Plant science (Plant Science 116)</td>
<td>4</td>
</tr>
<tr>
<td>Soil science (Soil Science 2, 2L)</td>
<td>4</td>
</tr>
<tr>
<td>Social sciences and humanities (two semester sequences or 6 units)</td>
<td>6</td>
</tr>
<tr>
<td>Weed science (Botany 120)</td>
<td>3</td>
</tr>
<tr>
<td>Entomology (Entomology 110 or 112)</td>
<td>4</td>
</tr>
<tr>
<td>Plant pathology (Plant Pathology 112)</td>
<td>4</td>
</tr>
<tr>
<td>Plant physiology (Botany 111A, 111B)</td>
<td>6</td>
</tr>
<tr>
<td>Genetics (Genetics 120 or 100-100B)</td>
<td>4-6</td>
</tr>
<tr>
<td>Plant nutrition (Plant Science 116)</td>
<td>4</td>
</tr>
<tr>
<td>Water science (Water: Science 104 or 110A)</td>
<td>3-4</td>
</tr>
</tbody>
</table>

Degree Subject Matter: 45

Agrology Option

Specific course requirements: 20-21

Agronomy 100, 100L

Agronomy 111, 112, 113 (any two courses)

Plant Science 101

Soil Science 109

Additional courses to be selected with consent of the adviser from the following: 23

Agricultural Economics 120, 140, 150; Agricultural Engineering Technology 102, 103, 104, 105; Agricultural Practices 48A, 48B; Animal Science 2; 111, 114, 116; Atmospheric Science 105; Nematology 100, 110; Plant Pathology 120; Plant Science 102, 103, 113; Soil Science 102, 120, 123, 125; Water Science 103, 1102, 1172. Courses offered in other production departments (e.g., Vegetable Crops, Pomology, Viticulture and Enology, etc.) or in Range Management may be selected in consultation with the adviser to satisfy specific individual goals. Natural sciences electives, not to exceed 8 units, may also be included (see page 70).

Floiriculture/Nursery Management Option

Specific course requirements: 27

Environmental Horticulture 6, 105, 120, 125, 126, 133, 102, 109

Additional courses to be selected with consent of the adviser from the following: 19

Agricultural Economics 18, 112, 113, 114; Agricultural Engineering Technology 114, Agronomy 100; Bacteriology 102, 111E; Economics 11A, 11B; Environmental Horticulture 107, 115, 130A, 130B, 155; Environmental Planning and Management 20, 154A; Geography 3; Plant Pathology 125; Plant Science 101, 112, 113, 115, 118; Psychology 144; Soil Science 109; Vegetable Crops 100; Viticulture and Enology 116A.

Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.

Courses offered in the natural sciences may be selected in consultation with adviser (see page 70) to satisfy specific individual goals.

Landscape Horticulture Option

Specific course requirements: 30

Environmental Horticulture 6, 105, 120, 130A, 130B, 133, 155

Environmental Planning and Management 20, 154A

Plant Science 102

Additional courses to be selected with consent of the adviser from the following: 15

Agricultural Economics 18, 112, 114; Agronomy 100; Botany 105; Economics 11A, 11B; Environmental Horticulture 107, 115, 125, 126; Environmental Planning and Management 22, 144; Geography 3; Plant Science 101, 109, 113; Pomology 101; Soil Science 109; Vegetable Crops 100; Wildlife and Fisheries 10, 110.

Courses offered in the natural sciences may be selected in consultation with adviser (see page 70).

Plan Pathology Option

Specific course requirements: 45

Botany 2, 3

Biochemistry 101A, 101B

Botany 105, 119

Chemistry 1C, 2

Mathematics 16A, 16B

Nematology 100, 110

Plant Pathology 125, 130

Plant Science 102, 109

Soil Science 109

Pomology Option

Specific course requirements: 53-54

Calculus (Mathematics 16A, 16B)

Plant science (Plant Science 101, 102, 109, 113, 120)

Agricultural economics (Agricultural Economics 18, 113, 120, 130, 140, 150)

Agronomy (Agronomy 100, 100L)

Environmental horticulture (Environmental Horticulture 6, 105, 125, 130A, 130B)

Pomology (Pomology 101, 102)

Vegetable crops (Vegetable Crops 100)

Viticulture (Viticulture 100)

Biochemistry (Biochemistry 101A, 101B)

Environmental toxicology (Environmental Toxicology 101)

Soils (Soil Science 109)

Additional courses to be selected with consent of the adviser from the following: 31

Agricultural Economics 18, 112, 113, 114; Agricultural Engineering Technology 101; Agronomy 100, 100L; Atmospheric Science 105; Entomology 119, 119L; International Agricultural Development 119; Nematology 100, 116; Plant Pathology 125, 130; Plant Science 101, 102, 112, 113L, 113; Pomology 3; Soil Science 102, 109, 121, 150; Vegetable Crops 100, 116; Viticulture and Enology 116A, 116B; Water Science 110B.

Natural sciences electives, not to exceed 8 units, may also be included (see page 70).

Vegetable Crops Option

Specific course requirements: 13

Vegetable Crops 100 and 101

Soil Science 109

Additional courses to be selected with consent of the adviser from the following: 32

Agricultural Economics 112, 114, 140; Agronomy 100, 111, 113; Biochemistry 101A, 101B, 101L; Geography 3; Nematology 110; Plant Science 102, 103, 109, 112, 113; Soil Science 102, 111, 150; Vegetable Crops 198, 199.

Natural sciences electives, not to exceed 8 units, may also be included (see page 70).
Courses in Plant Science

Questions pertaining to the following courses should be directed to the instructor or to the Academic Advising Center, 122 Hoagland Hall.

Lower Division Courses

1. Plants and Man (3) I, II, Howar’ (Vegetable Crops)
Lecture—3 hours. Plants as a basic resource for food, fiber, shelter, and recreation; their use and effect on man, past, present, and future.

2. Production of Cultivated Plants (4) I, II, Howar’ (Vegetable Crops), Lider (Viticulture)
Lecture—1 hour, discussion—1 hour, laboratory—3 hours. V.A.S.T.—2½ hours. Principles of plant production, improvement, propagation, harvesting, preserving, processing and marketing. Course will proceed by the Video-Audio-Do-Yourself-Tutorial method with students making use of the learning facilities at their own convenience.

3. Soil and Man (3) Lyons
Lecture—3 hours. Prerequisite: high school biology, chemistry and physics are essential. Plants as a basic resource for food, fiber, shelter, recreation and environmental enhancement. Emphasis is placed on food and fiber production and the many uses of plants by man.

4. Plant Science Internship (1-6) I, II, III, summer. The Staff (Department Chairperson in charge)
Laboratory experience off or on campus in all subject areas pertaining to plant science. Internships supervised by a member of the staff (fee charged only).

48. Directed Group Study (1-9) I, II, III. The Staff
Group study of selected topics. Restricted to lower division students. (P/NP grading only.)

Upper Division Courses

Lecture—3 hours; discussion—1 hour. Prerequisite course 2 or consent of instructor. Ecological processes governing the structure and behavior of managed ecosystems. Emphasis on competition, adaptation, photosynthetic productivity and relations to radiant energy, nutrition, water and temperature and their control in crop production.

102. Physiology of Cultivated Plants (4) III. Sachs (Environmental Horticulture, Rappaport (Vegetable Crops)
Lecture—1 hour, discussion—1 hour. Prerequisite: course 2 or consent of instructor. The plant as a dynamic unit; physiological processes in the vegetative growth, development, flowering and fruit production of cultivated plants.

103. Evolution of Crop Plants (3) I, Jain
Lecture—2 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Plant biology and human history. The evolution of plants of economic importance. The relationships of cultivated plants to wild species and the possible avenues for future development.

109. Principles of Plant Propagation (3) III. Hartmann and Kester (Pomology)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 2 or consent of instructor. The principles and practices of propagating commercial horticultural plants with emphasis upon physiological relationships.

110. Postharvest Physiology and Handling of Horticultural Commodities (3) I, Morris (Vegetable Crops), Nelson (Viticulture)
Lecture—2 hours. Prerequisite: Botany 111B or consent of instructor. Principles and techniques of handling and processing horticultural commodities. Problems of storage and marketing of horticultural commodities, physiology of postharvest physiology of storage and marketing of horticultural commodities.

112. Postharvest Physiology and Handling Laboratory (2) I, II, Morris (Vegetable Crops)
Discussion—1 hour, laboratory—3 hours. Prerequisite: course 112 (may be taken concurrently). Demonstrations and exercises involving the different aspects of the subject matter. Course 112, one or more field trips to observe commercial practices.

113. Plant Breeding (4) I. Oton
Lecture—3 hours; demonstration-discussion—2½ hours. Prerequisite: Botany 111A or the equivalent. Evolution and scope of plant breeding; nutrition; essential and other elements; mechanisms of absorption; translocation; mineral metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition.

115. Mineral Nutrition of Plants (4) I. Epstein (Botany, Toils and Plant Nutrition)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 111A or the equivalent. Discussion—1 hour. The effects of mineral nutrition on plants. At the close of the course the student should be able to: 1. Discuss the role of the various plant nutrients; 2. Understand various terms used in plant nutrition; 3. Recognize the symptoms of mineral deficiency or toxicity; 4. Understand the factors influencing mineral absorption and transport in plants; 5. Adapt to specific nutrient environments.

121A-121B-121C. Applied Crop Physiology (3-3-3) I-III. Agronomy and Vegetable Crops Staff
Lecture—1 hour; laboratory—6 hours. Prerequisite: basic knowledge of botany, chemistry, and horticulture and consent of instructor; elementary plant physiology advisable, and courses 101, 102 recommended (may be taken concurrently). Introduction to applied plant physiology with examples drawn primarily from agronomic and vegetable crops. Field and laboratory projects, data reduction, and preparation of suitable reports. Limited enrollment.

122. Physiological Genes and Crop Plants (3) I, J. Stevens
Lecture—3 hours. Prerequisite: Genetics 100A or 120; Botany 111A, 111B, or consent of instructor. Principles and recent advances in the physiological genetics of plants. Plant developmental processes related to yield will be considered at several levels; genetic control in biochemical regulation and the impact of the environment on development of plants.

130. Plant Growth Kinetics (4) III. Sik
Lecture—2 hours; discussion—1 hour. Prerequisite: Botany 2, Mathematics 16A, 16B; Botany 100 recommended. Topics include growth curves, developmental indices, growth of trees, leaves, stems, flowers, fruits, flowers, fruits, and their symptoms of mineral deficiency or toxicity; understanding the role of various plant nutrients; understanding of various terms used in plant nutrition; understanding of the factors influencing mineral absorption and transport in plants; adapting to specific nutrient environments.

196. Postharvest Technology of Horticultural Crops (3) III extra-session summer. Kandler in charge
Lecture-discussion-experimentation—5 days; field trips—2 days. An intensive study of current procedures for postharvest handling of fruits, nuts, vegetables, and ornamentals in California. (P/NP grading only.)

197. Tutoring in Plant Science (1-4) I, II, III. The Staff
Prerequisite: upper division standing; completion of course 102. May be repeated once for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

202. Advanced Physiology of Cultivated Plants (3) III. Sachs (Environmental Horticulture, Rappaport (Vegetable Crops)
Lecture—1 hour. Prerequisite: consent of instructor. (P/NP grading only.)
Political Science

preparation for subsequent careers as well as with a better understanding of politics in general and of the political systems in which they live. The major in Political Science aims to provide a broad understanding of political concepts and values, political institutions, political behavior and political processes. It offers excellent preparation and background for later careers in government, politics, law, journalism, business, urban planning, administration and teaching.

The Political Science—Public Service major is designed for students who have a specific interest in a career or other activities in or around government. This undergraduate program can also serve as preparation for enrollment in graduate and professional schools. The major combines regular coursework in political science and related fields with two quarters of public affairs internship for which academic credit is granted. It differs from the regular Political Science major in having the internship as a requirement and in emphasizing upper division coursework in functional and substantive policy areas of American Government. The functional areas of policy formulation, implementation, and interpretation and the substantive policy areas include urban, environmental, or others designed by the student and faculty counselors. The three units from other departments, for example, Economics, Environmental Studies, Environmental Planning and Management, may also be used to satisfy the major.

Political Science

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three courses from Political Science 1, 2 or 3, or 4 or 5, or 5 or 6</td>
<td>12</td>
</tr>
</tbody>
</table>

Depth Subject Matter

Select two courses in each of three fields, listed below. The fields must be chosen from those listed below.

Groups A, B, or C

- Group A
  - (1) American political science: Political Science 100-119
  - (2) American government: Political Science 120-129
  - (3) Parties and political behavior: Political Science 110-119
  - (4) Public law: Political Science 120-129
  - (5) Public administration: Political Science 120-129
  - (6) Comparative government: Political Science 130-139
  - (7) International relations: Political Science 130-139
  - Additional upper division units in political science to achieve a total of 12

  Only 5 units of Political Science 120-129 (Internship) may be counted towards the 3rd requirement, and Political Science 192A or 192B may not be counted toward a field requirement.

Total Units for the Major 56

Political Science—Public Service

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only one course from Political Science 1, 2 or 3</td>
<td>12</td>
</tr>
<tr>
<td>Or two courses from Political Science 2 or 4 or 5, or 4 or 5, or 4 or 5</td>
<td>8</td>
</tr>
<tr>
<td>Recommended: Economics 1A-1B</td>
<td></td>
</tr>
</tbody>
</table>
110. Contemporary Political Science (4) II. Downs Lecture-discussion—4 hours. Historical and methodological aspects of the discipline, the problems, schools of thought, and trends within the field at present. Offered in even-numbered years.

111. Systematic Political Science (4) II. Downs Lecture-discussion—4 hours. Philosophical basis of modern political science; major specific approaches; selected contemporary trends. Offered with official consent of political science department. Offered in odd-numbered years.

112. Contemporary Democratic Theory (4) II. Zetterbaum Lecture—3 hours; discussion—1 hour. The majorcontemporary approaches to traditional democratic theory; attempts to replace traditional theory by conceptual models derived from modern social science findings. Offered in odd-numbered years.

113. American Political Thought (4) II. Peterman Lecture—4 hours. Origins and nature of American political thought. The principles of American thought as they emerge from the American period to the present. Offered in odd-numbered years.

114. Quantitative Analysis of Political Data (4) II. Journal—3 hours. Texts. Logic and methods of analyzing quantitative political data. Topics include central tendency, probability, correlation, and non-parametric statistics. Particular emphasis will be placed on understanding and using the results of political science research. Offered in odd-numbered years.

115. Medieval Political Thought (4) II. Peterman Lecture—3 hours; discussion—1 hour. Prerequisite: course 110A. Offered in even-numbered years.

116. Foundational Ideas: A Study in Depth of a Major Political Philosopher (4) II. Peterman, Zetterbaum Lecture-discussion—3 hours; term paper. Intensive analysis and evaluation of the seminal works of a major political philosopher.

117. Marxian (4) III. The Staff Lecture—3 hours; discussion—1 hour. Examination of the political and social philosophy of Karl Marx, with reference to the evolution of Marxism in the nineteenth and twentieth centuries.

118. History of Political Theory (4) I. Peterman Lecture—3 hours; special assignments. Critical analyses of the works of major political philosophers. Modern political philosophy—Pato, Aristotle, Cicero, St. Thomas.

119. History of Political Theory (4) II. Peterman Lecture—3 hours; special assignments. Critical analyses of the works of major political philosophers. Modern political philosophy—Machiaveli, Hobbes, Locke, Rousseau, Burke.

120. History of Political Theory (4) III. Zetterbaum Lecture—3 hours; term paper. Critical analyses of the works of major political philosophers. Nineteenth and twentieth centuries: Hegel, Toqueville, Mill, Marx, Nietzsche, Sartre.

121. War (4) III. Silverman Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. An analysis of political processes involved in the initiation, conduct, and termination of modern international warfare.

122. International Law (4) III. Jacobs Lecture—4 hours. Selected topics in international law: territory, sovereign immunity, responsibility, the peaceful settlement or non-settlement of international disputes.

123. Theories of International Politics (4) II. Silverman Lecture—4 hours. Major contemporary approaches to the study of international politics, including balance of power, game theory, Marxism-Leninism, theories of systems, and decision-making analysis.

124. International Political Economy (4) II. Domke Lecture—3 hours; discussion—1 hour. Politics of international economic relations; international cooperation and competition; the relationship between international economic policies, interregional arrangements, and transnational flows of goods, services, and capital.

125. National Security Policy (4) I. The Staff Lecture—3 hours; research assignment. The development of American national security policy since 1945. An analysis of the policy of deterrence and the assumptions upon which it is based. Effects of nuclear weapons upon the conduct of war, alliances systems, and the international system. The prospects of security and stability through arms control.

126. Arms Control and Disarmament (4) II. Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. Examination of the proposals, problems, and achievements of various efforts to limit the magnitude, type, possession and use of major weapons systems in the period since World War II.

127. Recent American Foreign Policy (4) I. Domke Lecture—3 hours; discussion—1 hour. Development of American foreign policy in the twentieth century, with emphasis on the transformation of policy during and after World War II. Examination of the internal and international factors influencing policy adoption, retention, and change.

128. Conduct of American Foreign Policy (4) II. Domke Lecture—3 hours; discussion—1 hour. Examination of the role of individuals and organizations in the process of U.S. foreign policy formulation since World War II, relying extensively on case studies and memoirs to illuminate the nature of intergovernmental and public policy processes in international relations. May be repeated once for credit.

131. Soviet Foreign Policy (4) II. Zinner Lecture—3 hours; discussion—1 hour. The conduct of Soviet foreign relations in contemporary world affairs; ideology and power as mainsprings of policy; foreign policy as an instrument of revolution; the role of economic aid and nuclear armaments. Offered in odd-numbered years.

132. The American Role in East Asia (4) III. Kalilin Lecture—4 hours. Prerequisite: course 3 recommended. Survey of the role the United States has played in East Asia. The influence on Asian modernization of U.S. governmental East Asian foreign policy, missionaries, traders, and returning students.

133. International Relations: East Asia (4) III. Kalilin Lecture—4 hours. Prerequisite: course 3 recommended. An analysis of international relations in East Asia. Emphasis upon twentieth century problems with examples from China, Japan, Korea, and Southeast Asia.

134. International Relations in Africa (4) I. Rochkind Lecture—3 hours; discussion—1 hour. Inter-African state relations, pan-Africanism, regional integration, policies toward South Africa, and relations between African and major non-African powers.

135. Nationalism and Imperialism (4) I. Kalilin Lecture—4 hours. Prerequisite: course 3 recommended. The theory of nation building illustrated by Western and non-Western experience. Offered in even-numbered years.

136. Politics of Development in East Asia (4) III. Rochkind Lecture—4 hours. Prerequisite: course 3 recommended. An analysis of the developmental process in the region of East Asia. Emphasis will be placed on the impact, socio-economic environment, strategies of development, party systems, bureaucracy and military coups. Course is designed to be a cross-countries, cross-disciplinary sequence of courses on East Africa, including Anthropology 1396 and History 1159.

137. International Relations in West Europe (4) II. Lieber Lecture—4 hours. Analysis of European unity, problems of the Atlantic alliance, Atlantic political economy, East-West relations, Communist in Western Europe and the relationship between domestic politics and foreign policy.

138. Comparative Public Policy (4) II. Groth Lecture—3 hours; term paper. Ideological orientations, institutions, processes, and public policies of modern states. Emphasis on democratic, socialist, communist and fascist experience.

139. Communist Political Systems (4) III. Zinner Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 2D or consent of instructor. Systematic comparative analysis of the origin, structure and performance of communist political systems with emphasis on the Soviet Union and the states of Eastern Europe.

140. Revolution and Political Change (4) I. Groth Lecture—3 hours; term paper. Theoretical, historical, and comparative analysis of the causes and impact of political change through evolution and revolution in the twentieth century. Emphasis upon movements and systems representing of communism, fascism, and nationalism.

141. Latin American Politics (4) I. The Staff Lecture—4 hours. Survey of major issues in government and politics, with emphasis upon participation structure and decision-making processes. Four nations receive intensive study. Mexico, Cuba, Chile, and Brazil.

144. British Government and Politics (4) II. Lieber Lecture—3 hours; discussion—1 hour. The British political system, party and pressure groups politics, public policy, and the British Commonwealth. Offered in odd-numbered years.

145. Government and Politics in Emergent Nations (4) III. Zinner Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 2D. Conceptual study of problems of political organization in new states. Emphasis in the period since World War II. Offered in even-numbered years.

146. Comparative African Politics (4) II. Ritchie Lecture—4 hours. Analysis of the political systems, military coups, bureaucracy, regional integration, and disintegration, and economic development in Africa south of the Sahara.

147. Politics and Policy in Western Europe (4) III. The Staff Lecture—4 hours. The evolution, politics, and contemporary problems of selected political systems of Western Europe.
to majors in international relations, or consent of instructor. Analysis of research design and methodologies appropriate to field research in both political theory and policy, with an emphasis on elite interviewing and observation. Analysis of illustrative studies. Team participation in design, execution and analysis of a field research project.

207. Environment Public Policy (4) III. Wardenford-Smith Seminar—4 hours. Analysis of the interface between the world of academic reflection about ecological and environmental problems and the world of political action. Evaluation of alternative approaches to policy analysis and recommendation. Individual research, including field research, will parallel discussion with the literature.

208. Policy Analysis (4) III. Downey Seminar—4 hours. Social science techniques applied to public policy formulation and evaluation.

209. The American Political System (4) I. Wade Seminar—4 hours. Analysis of selected theoretical and empirical issues posed by contemporary research in American government and politics.

213. Problems of Classical and Medieval Political Thought (4) II. Peterson Seminar—3 hours. Prerequisite: consent of instructor. Concentrated study of the political thought of selected political thinkers of classical and medieval periods.

215. Basic Problems of Political Theory (4) I. Zetterbaum Lecture—3 hours. Prerequisite: 4 units of political theory or consent of instructor. An examination of the fundamental assumptions underlying various approaches to an understanding of politics, emphasizing the scientific or value-free school, the historical school, and the contributions of analytic philosophy. Offered in even-numbered years.

216. Political Theory (4) I. Zetterbaum Seminar—3 hours.

223. International Relations (4) II. Lieber Seminar—3 hours.

224. International Organization (4) I. Seminar—3 hours.

225. The International System (4) III. Simpson Seminar—3 hours. Analysis of the international system by means of theory formulation and integration; critique of research designs; use of various techniques of data generation and analysis.

230. American Foreign Policy (4) II. Seminar—3 hours.

240. Democracy and Dictatorship (4) III. Zinner Lecture—3 hours. Prerequisite: 7 units in comparative government, or consent of instructor. Analytical study of differences and similarities in the political processes under democratic and totalitarian government. Offered in odd-numbered years.

241A. Communist Political Systems (4) II. Zinner Seminar—3 hours. Prerequisite: course 141 or the equivalent and consent of instructor. Systematic analysis of selected topics dealing with the political thinking of Communist political systems.

241B. Communist Political Systems (4) II. Zinner Seminar—3 hours. Prerequisite: course 141 or the equivalent and consent of instructor. Systematic analysis of selected topics dealing with the political thinking of Communist political systems.

242. Seminar in Comparative Politics (4) I. Groth Seminar—3 hours. Prerequisite: graduate status or consent of instructor. Systematic study of theories and methods used in the study of Comparative Politics.

253. Latin American Politics (4) III. Seminar—3 hours. Prerequisite: consent of instructor. Intensive study of topic chosen by instructor each year. Normally students will focus on a specific country, although other possible foci include land reform and politics, the U.S. in Latin America, etc. Students conduct research projects related to their interests.

256. Selected Problems of Transitional Societies (4) III. Rothchild Seminar—3 hours.

257. Western European Government and Politics (4) II. Groth Seminar—3 hours. Evaluation, politics, and contemporary problems of selected political systems of Western Europe.

258. Politics of East Asia (4) III. Kaligren Seminar—3 hours. Selected contemporary problems of government and international relations in East Asia.

260. Political Parties (4) II. The Seminar—3 hours. Survey of selected topics in American and comparative parties.

261. Political Behavior (4) III. Owens Seminar—3 hours. Survey of selected topics in political behavior and public opinion.

270. National and Regional Integration (4) I. Rothchild Discussion—3 hours. Prerequisite: one upper division course in comparative government or international relations, or consent of instructor. Examination of the means and motives of regional integration as well as the problems involved in operation and maintaining federations. Classical federal experience and experiments in developing countries will be considered.

282. Concepts and Problems in Public Administration (4) I. Gable Discussion—3 hours. The nature of administrative processes in modern society; analysis of complex organizations; contemporary management practices and processes; and means of controlling bureaucracy. Offered in even-numbered years.

NOTE: For key to footnote symbols, see page 130
Hudson T. Hartmann, Ph.D., Professor Emeritus
Claron O. Hesse, Ph.D., Professor Emeritus
Adel A. Kader, Ph.D., Associate Professor
Dale E. Kester, Ph.D., Professor
Andrew H. Kuniyuki, Ph.D., Assistant Professor
John M. Labavitch, Ph.D., Lecturer
George C. Martin, Ph.D., Lecturer
Warren C. Mick, M.S., Lecturer
F. Gordon Mitchell, M.S., Lecturer
Vito S. Polito, Ph.D., Assistant Professor
E. Louis Probsting, Ph.D., Professor Emeritus
David E. Ramos, Ph.D., Lecturer
Ray J. Remo, Ph.D., Lecturer
Kay Ryugo, Ph.D., Professor
Noel F. Sommer, Ph.D., Lecturer
Kyoko Ucu, Ph.D., Lecturer
Steven A. Weinbaum, Ph.D., Lecturer

Related Major Program, See the major in Plant Science, page 276.

Related Courses, See Plant Science 109, 112, 112L.

Courses in Pomology

Lower Division Courses

3. Citrus and other Subtropical Fruits (3) II. Brinhurst
   Lecture—3 hours (including one 3-hour field trip to be arranged). The production of the subtropical fruits including avocados, dates, olives, and citrus with special emphasis on citrus. A study of the fundamental information relating to orchard management as applied to these fruits.

10. Fruit and Nut Crop Production and Utilization (3) I, Martin, Sommer
   Lecture—2 hours; discussion—1 hour; one all-day Saturday field trip in lieu of discussion last 5 weeks of quarter. Introduction to pomology including: climatic adaptation of deciduous fruits; orchard planning and management; tree nutrition and physiology; fruit development, maturation and harvesting; protecting from cold, quality, storage, trans-
   portation and marketing.

92. Internship in Pomology (1-12) II, III, The Staff (Chairperson in charge)
   Laboratory—3-12 hours. Prerequisite: consent of instructor. Work-learning experience on and/or off campus in the production and management of orchard crops or closely related enterprises. (P1PN grading only.)

Upper Division Courses

101. Tree Growth and Development (4) II, Crane, Ucu
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 2 or Plant Science 102 or consent of instructor. Physiology of fruit plant growth and maintenance; species adaptation; responses to environment and cultural modification (pruning, soil and water management, etc.)

102. Principles of Fruit Production (4) III, Ryugo
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 2 or Plant Science 102. The course covers principles underlying cultural practices associated with fruit and nut production, including morphology and physiology of the developing buds, fruits and flowers. The course emphasis is on commercially important temperate zone species.

170A-170B-170C. Applied Pomology (2) I, II, III, Keiser, Mitchell, Ramos, Ucu
   Lecture—2 hours bi-weekly; two full-day fieldtrips. An overview of production and handling of major pomologic crops including a clinical study of important cultural and harvesting problems, and progress associated with commercial fruit growing. (P1PN grading only.)

192. Internship in Pomology (1-12) II, III, The Staff (Chairperson in charge)
   Laboratory—3-12 hours. Prerequisite: consent of instructor. Work-learning experience on and/or off campus in the production and management of orchard crops or closely related enterprises. (P1PN grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Sommer in charge)
   Prerequisite: consent of instructor. (P1PN grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Sommer in charge)
   (P1PN grading only.)

Graduate Courses

201. Biochemistry and Physiology of Fruits (3) II, Roman
   Lecture—3 hours. Prerequisite: Biochemistry 101B, Botany 111B, or consent of instructor. Biochemical and physiological phenomena of growth, maturation, ripening, and senescence of fruit. (Open to qualified undergraduates.) Offered in even-numbered years.

203. Physiology of Fruit Plants (3) I, Weinbaum
   Lecture—2 hours; discussion—1 hour. Prerequisite: Biochemistry 101A-101B, Botany 111A-111B or Plant Science 102. Pomology 101 and 102 or consent of instructor. Course will consider the physiological bases of developmental phenomena specific to deciduous perennial fruit plants. Classroom discussions will include interpretation of current research as well as future research approaches. Offered in odd-numbered years.

205. Nutritional Requirements of Deciduous Fruit Crops (4) III, Carlson, Ucu
   Lecture—3 hours; laboratory—1 hour, field trips. Prerequisite: Soil Science 109, Botany 111A-111B or Plant Science 102 or the equivalent. Development and distribution of roots, irrigation and water relations, mineral nutrient status, deficiencies and excesses, symptoms, use of tissue analysis, chelates and deficiency corrections as factors in orchard management. Offered in odd-numbered years.

210. Fruit Morphology (4) III, Polito
   Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 2. The development of flower, fruit, and seed structures of representative fruit types. Offered in even-numbered years.

212. Postharvest Biology and Biotechnology (3) III, Kader
   Lecture—3 hours. Prerequisite: Plant Science 112B or the equivalent. Review of the postharvest biology of flowers and fruits in relation to postharvest procedures used in handling, emphasizing research needs. Offered in odd-numbered years.

220. Seminar (1-5) I, II, III. The Staff (Catlin in charge)
   Seminar—1 hour.

226. Group Study (1-5) I, II, III. The Staff (Sommer in charge)

229. Research (1-12) I, II, III, summer. The Staff (Sommer in charge)
   (S/U grading only.)

Psychiatry

See Medicine

Psychology

(Challenge of Letters and Science)

Alan C. Eims, Ph.D., Chairperson of the Department
Department Office, 149 Young Hall (752-1880)

Faculty

Linda P. Acredolo, Ph.D., Assistant Professor
Janis R. Bastian, Ph.D., Associate Professor
Leo M. Chalupa, Ph.D., Associate Professor
Richard G. Coss, Ph.D., Associate Professor
William F. Dukes, Ph.D., Professor Emeritus
Alan C. Eims, Ph.D., Professor
Albert A. Harrison, Ph.D., Professor
Kenneth R. Henry, Ph.D., Professor
Neal A. Kroll, Ph.D., Professor
Dale F. Lott, Ph.D., Professor (Wildlife and Fisheries Biology)
Joseph Lyons, Ph.D., Professor
William A. Mason, Ph.D., Professor
Gary Mitchell, Ph.D., Professor
Robert M. Murphey, Ph.D., Associate Professor
Thomas Natsoulas, Ph.D., Professor
Donald H. Owings, Ph.D., Associate Professor
Karen E. Paige, Ph.D., Associate Professor
Theodore E. Parks, Ph.D., Associate Professor
Stephanie A. Shields, Ph.D., Assistant Professor
Dean K. Simonton, Ph.D., Associate Professor
Robert Sommier, Ph.D., Professor
Charles T. Tart, Ph.D., Professor
Edward D. Turner, Ph.D., Associate Professor

The Major Programs

Psychology is both a science and a form of humanistic inquiry. It provides knowledge about human and animal behavior and constitutes a background for examining your own behavior and that of other people. The UCD Psychology program has several objectives: it presents an introduction to the study of individual and group behavior; it provides a liberal arts major for students looking for employment in business, government, personnel work, or other fields directly after obtaining their bachelor's degree, and it prepares students for graduate study in various areas of psychology, leading to teaching, research, and applied work. (Counseling and other careers in psychology require graduate-level training.)

The Psychology program at UC Davis is extremely broad and represents a wide variety of interests. The courses are organized around three focal points: Personality/Social emphasizes the individual in the social environment and includes such topics as personality theory, social psychology, abnormal psychology, individual differences, development psychology, humanistic psychology, and motivation. Psychobiology emphasizes the biological correlates of behavior and includes such topics as sensory psychology, physiological psychology, and comparative psychology. Cognitive Psychology emphasizes how information from the physical world is sensed, perceived and used, and stresses the roles of consciousness, language, and learning in making us what we are.

The Department offers both the Bachelor of Arts degree for the student interested in the liberal arts and the Bachelor of Science program geared for

Portuguese

See Spanish

Preforestry

(College of Agricultural and Environmental Sciences)

Preforestry students who intend to major in either General Forestry or Wood Science and Technology may be admitted to the School of Forestry and Conservation located on the Berkeley campus, following completion of the sophomore year. The programs offered at Davis provide full preparation for admission to the School. To qualify for such admission, at least 84 quarter units of credit must be completed with a grade-point average of C or higher. In addition, the prescribed preparatory subject matter requirements for the majors must be satisfied. For full details on the majors in General Forestry, Wood Science and Technology, and in the Conservation of Natural Resources please consult the Announcement of the School of Forestry and Conservation, which may be obtained from the School of Forestry and Conservation, 145 Mulford Hall, Berkeley 94720. (See also page 108.)

Preforestry Adviser. J. Major (Botany), C.C. Delschie (Land, Air and Water Resources).
students with a keen interest in either biology or mathematics. Each program involves an introduction to each of the three areas of psychology. In addition to completing the required core courses, majors may also take specialty courses on topics such as sex differences, aging and mortality, environmental awareness, altered states of consciousness, and primate behavior.

**Psychology**

**A.B. Requirements:**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>14</td>
</tr>
<tr>
<td>Biology</td>
<td>4</td>
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<tr>
<td>Biological Sciences 1; or a combination of Biological Sciences 10 and one course from Anthropology 1, Physiology 10, Genetics 10.</td>
<td>5-8</td>
</tr>
<tr>
<td>One course in sociology or cultural anthropology (may be lower or upper division)</td>
<td>4.5</td>
</tr>
<tr>
<td>Recommended: both Statistics 13 and Psychology 41.</td>
<td></td>
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<tr>
<td>Depth Subject Matter</td>
<td>47-48</td>
</tr>
<tr>
<td>Five Psychology courses, distributed as specified.</td>
<td></td>
</tr>
<tr>
<td>Group A: two courses from 130, 131, 132, 135.</td>
<td>8-9</td>
</tr>
<tr>
<td>Group B: two courses from 106, 129, 134, 150.</td>
<td>10</td>
</tr>
<tr>
<td>Group C: one course from 112, 145, 147, 168.</td>
<td>4</td>
</tr>
<tr>
<td>Additional units to achieve a total of 40 upper division units in psychology</td>
<td>6-19</td>
</tr>
<tr>
<td><strong>Total Units for the Major</strong></td>
<td>57-61</td>
</tr>
</tbody>
</table>

**Psychology**

**B.S. Requirements:**

<table>
<thead>
<tr>
<th>Requirement</th>
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<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>47-52</td>
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<tr>
<td>Psychology 1</td>
<td>4</td>
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<tr>
<td>Statistics 13</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics 16A, 16B, or 11 (or high school equivalent), 21A, 21B.</td>
<td>6-10</td>
</tr>
<tr>
<td>Physics</td>
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</tr>
<tr>
<td>Biological Sciences 1, Physiology 2, Zoology 2, 2L.</td>
<td>15</td>
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<tr>
<td>Chemistry 1, 1B, 18</td>
<td>10</td>
</tr>
<tr>
<td>One course in sociology or cultural anthropology (may be lower or upper division)</td>
<td>4-5</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>47-50</td>
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<tr>
<td>Seven Psychology courses distributed as specified.</td>
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<tr>
<td>Group A: two courses from 130, 131, 132, 135.</td>
<td>8-9</td>
</tr>
<tr>
<td>Group B: three courses from 106, 129, 134, 150.</td>
<td>10</td>
</tr>
<tr>
<td>Group C: two courses from 112, 145, 147, 168.</td>
<td>6</td>
</tr>
<tr>
<td>Additional units to achieve a total of 40 upper division units in psychology</td>
<td>8-9</td>
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<tr>
<td>Genetics 10A-10B or 115 or 120.</td>
<td>4-5</td>
</tr>
<tr>
<td>Zoology 125 or 149.</td>
<td>3-4</td>
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<td><strong>Total Units for the Major</strong></td>
<td>94-102</td>
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**Recommended**


**Mathematics Emphasis**

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<th>Requirement</th>
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<td>Preparatory Subject Matter</td>
<td>40-46</td>
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<tr>
<td>Psychology 1</td>
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<tr>
<td><strong>NOTE:</strong> For key to footnote symbols, see page 130</td>
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</tbody>
</table>

**Statistics 13**

Mathematics 11 (or high school equivalent) 0.2
Mathematics 21A, 21B, 21C, 21E 4
Chemistry 10 4
Physics 10 4
Biology 10 4
Biological Sciences 10 and one course from Anthropology 1, Physiology 10, Genetics 10. 5-6
One course in sociology or cultural anthropology (may be lower or upper division) 4-5
Recommended: Psychology 41.

**Depth Subject Matter**

<table>
<thead>
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<th>Course</th>
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<tr>
<td>Psychology 41</td>
<td>47-48</td>
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<tr>
<td>Five Psychology courses, distributed as specified.</td>
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<tr>
<td>Group A: two courses from 130, 131, 132, 135.</td>
<td>8-9</td>
</tr>
<tr>
<td>Group B: two courses from 106, 129, 134, 150.</td>
<td>10</td>
</tr>
<tr>
<td>Group C: one course from 112, 145, 147, 168.</td>
<td>4</td>
</tr>
<tr>
<td>Additional units to achieve a total of 40 upper division units in psychology</td>
<td>6-19</td>
</tr>
<tr>
<td>One course from Psychology 106-108.</td>
<td>7-8</td>
</tr>
<tr>
<td><strong>Total Units for the Major</strong></td>
<td>87-94</td>
</tr>
</tbody>
</table>

**Psychology 41**

Psychology 41 is strongly recommended for students who plan to do graduate work in a field other than clinical psychology or counseling. Psychology 41 or Statistics 13 must be taken prior to the junior year unless departmental approval is obtained.

**Major Advisors**


**Honor and Honors Program.** In order to be eligible for highest honors in Psychology, the student must both meet the major criteria and complete an empirical research project (i.e., experiment or field study) which is written in thesis form and approved by the Department. See pages 97 and 63.

**Minor Program Requirements:**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychology</td>
<td>24</td>
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<tr>
<td>One course from each of the following three groups</td>
<td></td>
</tr>
<tr>
<td>Group A: Psychology 130, 131, 132, 135</td>
<td></td>
</tr>
<tr>
<td>Group B: Psychology 108, 129, 134, 150</td>
<td></td>
</tr>
<tr>
<td>Group C: Psychology 112, 145, 147, 168</td>
<td></td>
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<tr>
<td>Additional units to achieve a total of 24 upper division units</td>
<td>11-10</td>
</tr>
</tbody>
</table>

**Graduate Study.** The Department offers programs of study and research leading to the Ph.D. degree in psychology. Information regarding graduate study may be obtained by writing the Graduate Adviser, Department of Psychology.

**Graduate Advisor.** See Class Schedule and Room Directory.

**Courses in Psychology**

**Lower Division Courses**

1. **General Psychology** (4) I, II, III. The Staff Lecture—4 hours. General introduction emphasizing empirical approach with particular focus on the areas of perception, personality, and social psychology, and biological aspects of behavior. Not a prerequisite for Psychology 15 or 16.

15. **Introductory Psychology** (4) I, II, III. The Staff Lecture—4 hours. A survey of general, evolutionary and physiological factors affecting behavior. Utilizes the comparative approach where appropriate, the relevance of biological and biosocial mechanisms to an understanding of people and their interaction with their environment will be emphasized.

16. **Psychology and Modern Life** (3) I, II, III. The Staff Lecture—3 hours. Personality development, interpersonal relationships, and the relevance of psychology to social processes.

41. **Research Methods in Psychology** (4) I, II, III. The Staff Lecture—4 hours. Introduction to experimental design, interviews, questionnaires, field and observational methods, reliability and statistical inference.

98. **Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge) By prior arrangement with individual instructor. Primarily for lower division students. (P/N grading only.)

99. **Special Study for Lower Division Students** (1-5) I, II, III. The Staff (Chairperson in charge) By prior arrangement with individual instructor. (P/N grading only.)

**Upper Division Courses**

103. **Advanced Quantitative Description of Behavior** (5) I, II, III. Turner, Kroll Lecture—5 hours. Prerequisite: Statistics 13 or course 41 or consent of instructor. Summary, inference, and prediction from psychological data, with emphasis on the theoretical aspects of statistics.

106. **Statistical Inference from Psychological Experiments** (4) II, Kroll Lecture—4 hours. Prerequisite: course 103 or consent of instructor. Probability theory, sampling distributions, hypothesis testing, statistical inference, and nonparametric statistics.

109. **Physiological Psychology** (5) I, II, III, Chalupa, Henry Lecture—4 hours. Laboratory—2 hours. Prerequisite: course 1, at least one zoology or psychology course recommended. Relationship of brain structure and function to emotion, motivation, perception, state of consciousness, language, learning, and memory in humans and other animals. Introduction to methods of physiological psychology.

112. **Developmental Psychology** (4) I, II, III. Acredolo, Mitchell, Cosse, Shields Lecture—4 hours. Prerequisite: course 1. An ontogenetic account of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction.

115. **Maturity and Aging** (4) I, II, III. Acredolo, Lyons Lecture—4 hours. Prerequisite: course 112, Biological, cognitive, personality, and social aspects of the human life span between early maturity and death, in its theoretical, methodological, and empirical aspects.

120. **History of Psychology** (4) I, II, III, Bastian, Murphey Lecture—3 hours. Term paper. Prerequisite: course 1 upper division standing; and either Philosophy 21, 22, 23, or 25 or consent of instructor. The historical development of psychological thought and research.

129. **Sensory Processes** (5) I, II, Henry, Owings Lecture—4 hours. Discussion, project, or term paper—1 hour. Prerequisite: course 2 and Zoology 2-2L. or consent of instructor. Psychology of sensory systems in man and other animals. Relationship of behavior to physiology, structure and function of the senses.

135. **Human Learning and Memory** (4) I, II, III, Kroll, Parks Lecture—3 hours. Discussion—1 hour. Prerequisite: course 1 and either Statistics 13 or course 41; or consent of instructor. Consideration of major theories of human learning and memory with critical examination of relevant experimental data.

111. **Perception** (4) I, II, III. Natsoulis, Turner, Parks, Bastian Lecture—3 hours. Independent library work. Prerequisite: course 1. The cognitive organizations related to measurable physical energy changes mediated through sensory channels. The perception of objects, space, motion, events.

132. **Language and Cognition** (5) II, Bastian Lecture—5 hours. Prerequisite: course 1, and units of upper division work in psychology or linguistics. Zoological, cultural, and individual perspectives of linguistic action: their production, perception, cognitive significance, and their roles in human conduct, enculturation, and cognitive development.

134. **Animal Learning and Motivation** (5) II, Cosse Lecture—5 hours. Prerequisite: course 1 or 15 or consent of instructor. General theories of phylic differences in learning and motivation drawing upon data from laboratory and...
Radiological Sciences
(School of Veterinary Medicine)
Timothy R. O'Brien, D.V.M., Ph.D., Chairperson of the Department
Department Office, 1114 Medical Science I (752-0184)

Faculty
Steven Book, Ph.D., Lecturer (Laboratory for Energy-Related Health Research)
Gerald L. DeNardo, M.D., Professor (School of Veterinary Medicine)
Gerald L. Fisher, Ph.D., Lecturer (Laboratory for Energy-Related Health Research)
Marvin Goldman, Ph.D., Professor (Laboratory for Energy-Related Health Research)
William J. Humof, D.V.M., Assistant Professor
Joe P. Morgan, D.V.M., Vet. med. dr., Professor
Thomas G. Nyland, D.V.M., Assistant Professor
Timothy R. O'Brien, D.V.M., Ph.D., Professor
Otto G. Raabe, Ph.D., Associate Adjunct Professor (Laboratory for Energy-Related Health Research)
Peter F. Sirer, Dr. med. vet., Professor
Jane Turel, D.V.M., Assistant Professor

Part-Time Clinical Faculty
Sam Silverman, D.V.M., Associate Clinical Professor

Courses in Radiological Sciences
Upper Division Courses
115. Bioenvironmental Consequences of Nuclear Technology (3) III. Goldman
Lecture—2 hours; discussion—1 hour, field trip is Nuclear Power Station. Prerequisite: Physics 2A and Biological Sciences 1 or the equivalent; consent of instructor. Discussion of biogenic implications of radioactivity and thermal effluents generated by nuclear technology. Hazards evaluation based on the predictions of the response of the most sensitive physiological systems will be emphasized. (Same course as Environmental Studies 115.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. Radiology Staff (P/NP grading only.)

Graduate Courses
210. Radiography Technic (6) I (extra session). Morgan and staff
Lecture—3 hours; discussion—1 hour; laboratory—4 hours. Prerequisite: A DVM degree. Duties of the radiologic technician are discussed enabling the student to become proficient in the operation of x-ray machines. Position, protocols for x-ray procedures, film quality and preparation of technic charts are covered. Course begins in late summer. (Deferred SU grading only, pending completion of course in Fall quarter.)

211. Radiology of the Skeletal System, I (6) I. Morgan and staff
Lecture—3 hours; discussion—2 hours; laboratory—2 hours. Prerequisite: A DVM degree. Course presents information on radiographic diagnosis of pathologic conditions of the vertebral column, abdomen, pelvic area, and extremities. Techniques of positioning, interpretation of films, and clinical application covered. (Deferred SU grading only.)

212. Radiology of the Abdomen, I (6) II. O'Brien and staff
Lecture—3 hours; discussion—1 hour; laboratory—4 hours. Prerequisite: A DVM degree. Course presents information on radiographic diagnosis of pathologic conditions of the abdomen. Included are diseases of the stomach and intestines. The theory and interpretation of colonic and abdominal radiographs will be covered. Offered in odd-numbered years. (SU grading only.)

213. Radiology of the Thorax, I (6) III. Sirer and staff
Lecture—3 hours; discussion—1 hour; laboratory—4 hours. Prerequisite: A DVM degree. Course presents information on the normal radiographic anatomy and radiographic diagnosis of pathologic conditions of the lungs, diaphragm, and pleura. The theory and interpretation of pleuropneumonia and bronchography is covered. Offered in odd-numbered years. (SU grading only.)

214. Radiology of the Skeletal System, II (6) I. Morgan and staff
Lecture—3 hours; discussion—2 hours; laboratory—2 hours. Prerequisite: A DVM degree. Information on the radiographic diagnosis of pathologic conditions of the axial skeleton including degenerative diseases of the intervertebral disc, trauma, infection, and neoplasia is discussed. Theory and interpretation of myelography and cerebral angiography is covered. Offered in odd-numbered years. (SU grading only.)

215. Radiology of the Abdomen, II (6) II. Nyland and staff
Lecture—3 hours; discussion—1 hour; laboratory—4 hours. Prerequisite: A DVM degree. This course presents information on radiographic diagnosis of pathologic conditions of the abdomen. Included are diseases of kidneys, ureters, urinary bladder, urethra, and prostate. The theory and interpretation of intravenous pyelography, retrograde cystography and urethrography will be discussed. Offered in even-numbered years. (SU grading only.)

216. Radiology of the Thorax, II (6) III. Sirer and staff
Lecture—3 hours; discussion—1 hour; laboratory—4 hours. Prerequisite: A DVM degree. This course presents information on radiographic diagnosis of congenital and acquired heart diseases and mediastinal diseases. The theory and techniques of cardiac catheterization, lymphangiography, and esophagogastroduodenal studies will be covered. Offered in even-numbered years. (SU grading only.)

269A-269B. Fundamentals of Radiation Biology (2-2) I-II. Goldman
Lecture—2 hours. Prerequisite: introductory courses in physics, biochemistry and physiology or consent of instructor. Biological effects of radiation including genic, teratogenic, carcinogenic responses in terms of dose, quality, and quantity. Included are discussions of dose-effect relationship, radiation therapy, environmental radioactivity, and radiation-protection criteria. Offered in even-numbered years. (SU grading only.)

298. Group Study (1-5) I, II, III. Radiology Staff (SU grading only.)

299. Research (1-12) I, II, III. Radiology Staff (SU grading only.)

Radiology
See Medicine

Range and Wildlands Science
(Percent of campus land is available for the scientific study of physical processes. This land includes: natural science study, science and engineering campuses, parks, and natural areas.

Range and Wildlands Science

The Major Program
Range and Wildlands Science is the study of the biological and physical components of land resources which are used mostly for grazing domestic livestock, but which also provide wildlife habitats, watersheds, recreation, and open space.

The major provides background in the biological, physical, and social sciences. Comprehensive study in the plant, animal, soil, and resource sciences supplements the core of range management courses. Integration of the knowledge of a variety of specialized fields is learned as a basis for land management oriented toward the multiple use concept and the maintenance of environmental quality.

The field is broad and diverse. Graduates, especially those with some experience, may be employed as consultants, range managers, or ranchers. They may also qualify for the position of Range Conservationist. In governmental agencies such as the Forest Service, Soil Conservation Service, and the Bureau of Land Management. If career work with such an agency is desired, it is recommended that the trainee gain on-the-job experience with that agency be included in the major program. In addition, the training provided by this major should give an excellent background for natural resource management positions.

Job experience, in-service training, and formal education beyond the bachelor's degree may lead to advanced professional positions in research, education, or management.

Range and Wildlands Science

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalents or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>Unit</th>
<th>Preparatory Subject Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>44-45</td>
<td>Biological Sciences I</td>
</tr>
<tr>
<td>5</td>
<td>Botany (Botany 2)</td>
</tr>
<tr>
<td>5</td>
<td>Chemistry (Chemistry 1A, 1B, 8A, 8B)</td>
</tr>
<tr>
<td>16</td>
<td>Physics (Physics 2A or 10)</td>
</tr>
<tr>
<td>3</td>
<td>Mathematics (Agricultural Science and Management 150, Mathematics 16A)</td>
</tr>
<tr>
<td>7</td>
<td>Economics (Economics 1A or Agricultural Economics 1)</td>
</tr>
<tr>
<td>4-5</td>
<td>Production of cultivated plants (Plant Science 4)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit</th>
<th>Depth Subject Matter</th>
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</thead>
<tbody>
<tr>
<td>66-71</td>
<td>Plant Science 102</td>
</tr>
<tr>
<td>4</td>
<td>Physical geography (Geography 1) or geology (Geology 1)</td>
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<tr>
<td>3-4</td>
<td>Meteorology (Atmospheric Science 20 or 105)</td>
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<tr>
<td>3-8</td>
<td>Agronomy *12-112L</td>
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<tr>
<td>3-4</td>
<td>Animal science (Animal Science 2, 118A)</td>
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<tr>
<td>4</td>
<td>Nutrition '03</td>
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<tr>
<td>4</td>
<td>Resource sciences (Resource Sciences 100)</td>
</tr>
<tr>
<td>4</td>
<td>Plant ecology (Plant Science 101 or Botany 177)</td>
</tr>
<tr>
<td>4</td>
<td>Wildlife (Wildlife and Fisheries Biology 151 or Entomology 104)</td>
</tr>
<tr>
<td>3-4</td>
<td>Animal physiology, zoology or botany</td>
</tr>
<tr>
<td>6</td>
<td>Range Management (1, 100, 102, 132, 142, 147, 150, 164, 198, 199)</td>
</tr>
<tr>
<td>18</td>
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</tr>
</tbody>
</table>
Range Management; Religious Studies

Breadth Subject Matter .......................................................... 32
English and/or rhetoric ......................................................... 8
Social sciences and humanities electives .............................. 12
Upper division science courses in at least two of the following: agricultural economics, economics, environmental studies, geography, or political science ......................................................... 12
Unrestricted Electives .............................................................. 32-38
Total Units for the Major ....................................................... 180

Major Adviser. C.A. Raguse (Agronomy and Range Science)
Graduate Study. See page 99.

Range Management
(College of Agricultural and Environmental Sciences)

Faculty
See under the Department of Agronomy and Range Science.

Major Program. See the major Range and Wildland Science, page 285.

Graduate Study. A program of study is offered leading to the M.S. degree in Range Management. Detailed information can be obtained from the graduate adviser and the Announcement of the Graduate Division.

Graduate Adviser. W.A. Williams (Agronomy and Range Science).


Courses in Range Management
Questions pertaining to the following courses should be directed to the instructor or to the Academic Advising Center, 122 Hoagland Hall.

Lower Division Course
1. Introduction to Range Management (4) I. Laude Lecture—3 hours; discussion—1 hour. Basic principles of range management and their relationships to the management of wildlands for livestock production, wildlife, water, recreation, and timber.

92. Range Management Internship (1-12) I, II, III, summer. The Staff (Department Chairperson in charge). Lecture—3 1/2 to 3 hours. Prerequisite: consent of instructor. Work experience off or on campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses
100. Range Plants (4) 1. Crampton Lecture—2 hours; laboratory—4 hours; two Saturday field trips. Prerequisite: Botany 2. Systematic relationships and identification of range grasses; legumes, forbs, and shrubs; their distribution, environmental requirements, and use.

105. Field Course (2) II. Menke, Crampton Lecture—10 hours total; laboratory—30 hours total. Prerequisite: consent of instructor. Field studies of range conditions and methods of utilization in various parts of the state. To be given between winter and spring quarters. Considered a spring course for preproficiency.

133. Graseland Ecology (3) II. Raguse Lecture—3 hours; one Saturday field trip. Prerequisite: course in plant ecology or consent of instructor. Structure, function and environment of North American graselands, with emphasis on the California annual type. Concepts and problems in measuring primary and secondary productivity. Principles of graseland and management including vegetation improvement, utilization by animals, and restoration and aesthetic values. Offered in even-numbered years.

134. Comparative Ecology of Major Rangeland Systems (4) II. Menke Lecture—3 hours; one weekend field trip to Nevada. Prerequisite: course 100 or the equivalent, or consent of instructor. Study of vegetation structure, composition, and succession in representative North American rangeland plant communities. Description and comparison of interactions between vegetation and grazing animals on grassland, desert, forested, and tundra rangelands. Discussion of management strategies used in these systems today.

142. Advanced Range Planning and Management Practices (2) II. Jones Lecture—2 hours; two Saturday field trips. Prerequisite: course 1 and/or consent of instructor. Rangeland use planning and management practices in California grasslands, oak woodlands, chaparral and sagebrush including grazing management, range seeding, fertilization, fire and herbicides; discussion of rangelands as watersheds and multiple-use areas.

147. Rizhizofy Ecology of Annual Rangelands (2) II. Phillips Lecture—2 hours. Prerequisite: Botany 117 or Plant Science 101, Soil Science 2 and Bacteriology 2 recommended. A brief discussion of plant roots and soil microorganisms in annual rangelands with emphasis on the importance of biological nitrogen fixation.

150. Principles of Rangeland Vegetation Measurement, Inventory and Evaluation (4) III. Menke Lecture—2 hours; laboratory—3 hours; field trip. Prerequisite: course 100, Agricultural Science and Management 150H, or consent of instructor. Procedures and techniques of sampling grassland and shrubland vegetation cover, frequency, density, and weight. Methods and procedures for inventoring rangeland vegetation resources. Data analysis and evaluation using concepts of rangeland potential, range condition, range trend, and proper utilization.

154. Multiple Use of Rangelands (3) II. Lecture—3 hours; two optional Saturday field trips. Prerequisite: course 100 and upper division standing. Multiple use of rangelands with emphasis on North America.

192. Internship (1-12) I, II, III, summer. The Staff (Department Chairperson in charge). Lecture—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off or on campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff. (Raguse in charge) Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff. (Raguse in charge) Prerequisite: senior standing and consent of instructor. (P/NP grading only.)

Graduate Courses
208. Computer Modeling in Range Management (3) I. Williams Lecture—1 hour; discussion—1 hour. Computer programming and analysis—1 hour. Prerequisite: Agronomy 205BS or the equivalent experience. Workshop on use of computer models involving dynamic simulation (DYNAMO and CSMP) and optimization algorithms for range management problems. Modeling philosophy; assumptions, implementation, validation, and experimentation will be emphasized. Offered in odd-numbered years.

200. Seminar in Range Management (1-2) II, Raguse; III, Laude Seminar—1-2 hours. Topics of current interest in grassland ecology, range and wildlands management, and related modeling and systems analysis.

286. Group Study (1-5) I, II, III. The Staff (Williams in charge) Selected topics from current world literature in range science.

289. Research (1-12) I, II, III. The Staff (Williams in charge) Original research involving plant physiology, plant pathology, plant biochemistry, agricultural chemistry, or soil-plant relationships of rangelands and wildlands. (S/U grading only.)

Religious Studies
(College of Letters and Science)

R. David Freedman, Ph.D., Program Director
Program Office, 912 Sprout Hall (752-1219)
Committee in Charge
Paul A. Castellano, Ph.D. (Botany), Committee Chairman
Manfred P. Fleischer, Ph.D. (History)
R. David Freedman, Ph.D. (Religious Studies)
Robert J. Grigg, Ph.D. (Art)
Whalen W. Lai, Ph.D. (Religious Studies)

Faculty
R. David Freedman, Ph.D., Assistant Professor Whalen W. Lai, Ph.D., Assistant Professor Irene Lawrence, Ph.D. Lecturer Marian B. Ury, Ph.D., Associate Professor (Religious Studies; Comparative Literature)

The Major Program
The Religious Studies major is designed to give the student an understanding of religion in its manifold complexity. The study of religion must consider a vast number of elements, in particular: (1) the message of the great historical religions; (2) the thought of the main theological and philosophical spokesmen for these traditions; (3) the contribution of great literary authors having religious significance; (4) the approach of the social sciences to the study of religious phenomena; (5) the history of religious thought and institutions in political and social history of those periods in which religious questions have played a prominent role; and (6) the expression of religious beliefs through music and the arts.

Religious Studies
A.B. Requirements:

Preparatory Subject Matter .................................................. 24
History 4A, 4B, 9A .......................................................... 12
Philosophy 2 ................................................................. 4
Philosophy 105, 106, 117 ................................................. 8
Religious Studies 4A, 4B .................................................... 8

Depth Subject Matter ......................................................... 40-42
Religious Studies 193 ........................................................ 4-6

A consistent program of at least 38 upper division units dealing with various aspects of religious study, including:
(a) one course with a theological, philosophical or literary orientation (e.g., Religious Studies 140, Philosophy 105, English 171)
(b) one historical course (e.g., History 102A, 131B, Religious Studies 110)
(c) one course which exemplifies the approach of the social sciences to religious phenomena (e.g., Anthropology 124, Sociology 146)

Total Units for the Major .................................................... 64-66

Recommended
American Studies 1B; Anthropology 2; Classics 10, 41; Integrated Studies 2B; Philosophy 1. A reading knowledge of a foreign language is highly recommended. Consult major advisor for a complete list of recommended upper division courses.

Major Advisers. R. D. Freedman, W. W. Lai

Minor Program Requirements:
The following four minor program options and others responsive to students' needs are subject to approval by the major advisor or the Curriculum Committee.
<table>
<thead>
<tr>
<th>Courses in Hebrew</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Elementary Modern Hebrew (5)</td>
</tr>
<tr>
<td>Recitation—4 hours; laboratory—2 hours. Introduction to modern written and spoken Hebrew. Students who have successfully completed Hebrew 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.</td>
</tr>
<tr>
<td>2. Elementary Modern Hebrew (5)</td>
</tr>
<tr>
<td>Recitation—4 hours; laboratory—2 hours. Prerequisite: course 1 or 1AT. Introduction to modern written and spoken Hebrew. Continuation of course 1.</td>
</tr>
<tr>
<td>3. Elementary Modern Hebrew (5)</td>
</tr>
<tr>
<td>Recitation—4 hours; laboratory—2 hours. Prerequisite: course 2 or 2AT. Introduction to modern written and spoken Hebrew. Continuation of course 2.</td>
</tr>
<tr>
<td>4. Intermediate Modern Hebrew (4)</td>
</tr>
<tr>
<td>Lecture—1 hour; discussion—3 hours. Prerequisite: course 3 or 3. Review of grammatical principles by means of discussion of written exercises; readings of modern texts.</td>
</tr>
<tr>
<td>5. Intermediate Modern Hebrew (4)</td>
</tr>
<tr>
<td>Lecture—1 hour; discussion—3 hours. Prerequisite: course 4. Review of grammatical principles by means of discussion of exercise questions in readings of modern texts. Readings will reflect Hebrew literature from the Enlightenment to the present. Authors represented will include: Bialik, Tschernikofsky, Ahad Ha'am and Agnon.</td>
</tr>
<tr>
<td>35A-35B. Introduction to Biblical Hebrew (4-4)</td>
</tr>
<tr>
<td>Lecture—2 hours; discussion—2 hours. The grammar and syntax of Biblical Hebrew with the goal of reading Biblical prose.</td>
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</tbody>
</table>

**Courses in Religious Studies**

<table>
<thead>
<tr>
<th>Lower Division Courses</th>
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</thead>
<tbody>
<tr>
<td>4A. World Religions (4)</td>
</tr>
<tr>
<td>Lecture—3 hours; discussion—1 hour. Eastern religions, including Hinduism, Buddhism and Taoism from their origins to the present.</td>
</tr>
<tr>
<td>4B. World Religions (4)</td>
</tr>
<tr>
<td>Lecture—3 hours; discussion—1 hour. Western religions including ancient Near-Eastern and Mediterranean religions, Judaism, Christianity, Islam, selected aspects of contemporary Western religions.</td>
</tr>
<tr>
<td>10. Introduction to Religious Studies (2)</td>
</tr>
<tr>
<td>Lecture—2 hours. A topic of importance in more than one religious tradition of the past: an illustration of the problems and methods of religious studies. May be repeated for credit in a different subject area.</td>
</tr>
<tr>
<td>Lecture-discussion—4 hours. The religion of Israel from Abraham to the rebuilding of the Temple in post-exilic time. Emphasis will be on themes such as Covenant, Law, Prophecy, and Wisdom.</td>
</tr>
<tr>
<td>23. Basic Judaism (4)</td>
</tr>
<tr>
<td>Lecture-discussion—4 hours. The classical views of Judaism.</td>
</tr>
<tr>
<td>40. New Testament (4)</td>
</tr>
<tr>
<td>Lecture—3 hours; discussion—1 hour. New Testament literature from a historical, critical and theological perspective.</td>
</tr>
<tr>
<td>60. Introduction to Islam (4)</td>
</tr>
<tr>
<td>Lecture—4 hours. Basic beliefs and institutions of Islam. Topics include: Muhammad, the Quran, Islamic law, theology, and mysticism; relationship to Judaism and Christianity; Islamic sects; position of women; Islam and politics. Offered in even-numbered years.</td>
</tr>
<tr>
<td>70. Introduction to Buddhism (4)</td>
</tr>
<tr>
<td>Lecture—3 hours; term paper. Prerequisite: course 4A recommended. Lectures, readings, and discussions on the development of Buddhism in India, China, and Japan; its influence on various Far Eastern art forms.</td>
</tr>
<tr>
<td>98. Directed Group Study (1-5)</td>
</tr>
<tr>
<td>Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)</td>
</tr>
<tr>
<td>99. Special Study for Lower-Division Undergraduates (1-5)</td>
</tr>
<tr>
<td>Prerequisite: consent of instructor. (P/NP grading only.)</td>
</tr>
</tbody>
</table>

**Upper Division Courses**

| 100. Study of Religion: Issues and Methods (4) | III. The Staff (Chairperson in charge) |
| Lecture-discussion—3 hours; term paper. The principal issues and methods of Religious Studies and associated fields. |
| 102. Christian Origins (4) | I. Lawrence |
| Lecture-discussion—3 hours; term paper. Prerequisite: course 40; course 23 recommended. The beginning of the Christian faith seen in its relationship to the religions in which it originated. Offered in odd-numbered years. |
| 110. Religious Biographies (4) | I. The Staff (Chairperson in charge) |
| Lecture-discussion—3 hours; term paper. The lives of selected religious leaders representative of different religious temperaments and historical traditions. |
| 122. Studies in Biblical Texts (4) | III. Friedman |
| Lecture—3 hours; discussion—1 hour. Prerequisite: course 21. Study of a book from the Prophets or Writings from historical, critical, and religious perspectives. |
| 124. Topics in Judaism (4) | III. Friedman |
| Lecture-discussion—3 hours; term paper. Prerequisite: course 23. Examination of selected aspects of Jewish life, literature, and culture. |
| 12A-12B. 12A-12C. Talmud: Zeraim (2-2-2) | I, II, III. Friedman |
| Seminar—2 hours. Prerequisite: course 23; reading knowledge of Hebrew helpful. Examination of texts from the Talmudic order Zeraim (agricultural) from critical, historical, and religious perspectives. (P/NP grading only.) |
| 12A-12B. 12C. Talmud: Moed (2-2-2) | I, II, III. Friedman |
| Seminar—2 hours. Prerequisite: course 23; reading knowledge of Hebrew helpful. Examination of texts from the Talmudic order Moed (liturgical) from critical, historical, and religious perspectives. (P/NP grading only.) |

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**Religious Studies: Renewable Natural Resources**

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<tr>
<th>Units</th>
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<tbody>
<tr>
<td>Religious Studies</td>
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<tr>
<td>Upper Division courses from Religious Studies</td>
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<tr>
<td>Lower Division courses from Religious Studies</td>
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<tr>
<td>Lower Division courses from Religious Studies</td>
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**Christian Studies**

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<th>Units</th>
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<tbody>
<tr>
<td>Religious Studies</td>
</tr>
<tr>
<td>Upper Division courses from Religious Studies</td>
</tr>
</tbody>
</table>

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**Note:** For key to footnote symbols, see page 130

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**Renewable Natural Resources**

(College of Agricultural and Environmental Sciences)

**The Major Program**

The Renewable Natural Resources major is a program of study of the physical, chemical and biological features of renewable natural resources, and the economic and social considerations associated with their use, production, and management. Students who choose this major include those (1) interested in careers associated with resource utilization and management, (2) interested in pursuing post-baccalaureate and academic or professional training, or (3) contemplating a natural resources-related career but uncertain regarding the selection of a specific major.
Reproduction; Resource Sciences

The curriculum for this major provides flexibility in meeting individual needs, interests, and objectives. But, at the same time, it requires certain courses in the basic physical and biological sciences, and in the subject matter area. An upper division general resource sciences course, a resource economics course, and a specified number of units of resource-oriented courses are required of all majors. The resource-oriented courses, to be selected with the approval of the adviser, should for most students involve mainly one renewable resource, but for some students, such as those preparing for a teaching credential or science communication, for example, course work dealing with several resources may be preferable. In addition, supervised courses are available to acquire additional knowledge and skills are specified.

Positions now held by Renewable Natural Resources graduates are quite varied, but many are employed as resource analysts and planners as well as technical staff specialists with government agencies, municipalities and private firms. A significant number of graduates have undertaken further studies leading to advanced degrees in renewable natural resources.

Renewable Natural Resources

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

**UNITS**

Preparatory Subject Matter ........................................ 73

English or English and rhetoric (College requirement, page 70) ................... 8

Chemistry (Chemistry 1A, 1B) .................................. 10

Physics (Physics 2A, 2B, 3A, 3B) .................................. 8

Mathematics and statistics (Mathematics 16A, Statistics 19, and computer science) ........................................ 10

Biology (Biology 1) .................................................. 5

Animal and/or plant science ........................................ 6

Soil and/or water science .......................................... 6

Atmospheric science (Atmospheric Science 20) ......... 3

Geology or physical geography .................................... 3

Additional courses in biological/physical sciences and mathematics, to be selected with adviser's approval (e.g., Botany 2, Zoology 2, Chemistry 6B, 8B, Mathematics 16B, Physics 2C) .................. 14

Depth Subject Matter ........................................... 47

Agricultural Economics 147, 148 ................................ 3

Resource-oriented courses selected with adviser's approval .................................................. 24

Supplementary Courses ................................. 24

Written expression (in addition to College requirement) ........................................ 5

Quantitative skills (e.g., Agricultural Science and Management 150, Environmental Studies 123, Statistics 106) ............ 4

Social-political awareness in resource sciences (e.g., Environmental Studies 160, 161; Environmental Toxicology 138, Geography 161, Geology 134; Water Science 150, Wildlife and Fisheries Biology 151) .................. 3

Plant or animal ecology (e.g., Botany 117, Entomology 104, Environmental Studies 120, Plant Science 101, Zoology 125) ............... 3

Special study or internship (Resource Sciences 190, 192, 198, 199) .................. 3

**Breadth Subject Matter** .................................................. 21

Social sciences and humanities electives ........................................ 12

At least one upper division course from the following areas: .......................... 9

Agricultural economics or economics, agronomy, animal science, atmospheric science, botany, civil or agricultural engineering, environmental horticulture, environmental planning and management, environmental studies, environmental toxicology, geography, geology, plant sciences, range management, resource sciences, soil science, water science, wildlife and fisheries biology, zoology, or others with adviser's approval.

Electives ..................................................... 39

**Total Units for the Major** .............................................. 180

Major Adviser, V. V. Rendig (Land, Air and Water Resources), 752-6215/1406.

Information Center for the major is located at 122 Hoagland Hall, Resource Sciences Teaching Center, 752-1649.

Graduate Study. See page 99.

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Reproduction

(School of Veterinary Medicine)

John P. Hughes, D.V.M., Chairperson of the Department

Department Office, 1126 Medical Science I (752-1388)

Faculty

Donald L. Bath, Ph.D., Lecturer

Domenico Bencoco, D.V.M., Libera Dociena, Associate Professor

Robert F. Dunvar, D.V.M., Assistant Professor

Joan Trommashow Bowling, Ph.D., Lecturer

Edward C. Feldman, D.V.M., Assistant Professor

John P. Hughes, D.V.M., Professor

Irwin K. M. Liu, D.V.M., Ph.D., Assistant Professor

George H. Stabenfield, D.V.M., Ph.D., Professor

Part-Time Clinical Faculty

Paul A. Blackmer, D.V.M., Assistant Clinical Professor

Robert E. Dickerson, D.V.M., Associate Clinical Professor

Robert J. Harris, D.V.M., Associate Clinical Professor

James R. Howard, D.V.M., Ph.D., Associate Clinical Professor

Gerald R. Mitchell, D.V.M., Associate Clinical Professor

Frank A. Mongiul, D.V.M., Assistant Clinical Professor

Jack W. Morse, D.V.M., Associate Clinical Professor

Courses in Reproduction

Upper Division Courses

111. Immunogenetic and Electrophoretic Techniques (2) I, Stettmeyer, Lecture—1 hour, laboratory—3 hours. Prerequisite: Animal Genetics 107 (may be taken concurrently) or consent of instructor. Immunologic and electrophoretic techniques used in the exploration of heritable differences in red cell antigens, serum proteins and enzymes of domestic animals.

119. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Hughes in charge) (P/NP grading only)

Graduate Courses

231. Pathophysiology of Mammalian Reproductive Processes (3) II. Stettmeyer, Lecture—3 hours. Prerequisite: senior standing in the School of Veterinary Medicine or consent of instructor. Physiological and pathological aspects of reproductive failure in mammals considering gonadal function, fertilization, implantation, prenaalt mortality, neonatal mortality, environmental factors, anatomical and perinatal defects, infertility and behavior. Offered in odd-numbered years.

234. Applied Dairy Cattle Nutrition (2) II. Baugh, Lecture—2 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine. Application of basic nutritional principles to practical dairy cattle feeding and use of computers to formulate rations based on optimum nutritional and economic values. Lectures supplemented with visits to dairy farms to evaluate feeding programs.

250. Seminar (1-5) I, II, III. The Staff (Kendrick in charge)

252. Current Topics in Reproduction (1) I, II, III. The Staff (Stabenfeld in charge) (S/U grading only)

285. Group Study (1-5) I, II, III. The Staff (Hughes in charge) (S/U grading only)

Professional Courses

244. Theriogenology of Farm Animals (11/2 per week) I, II, III. The Staff (Kendrick and Hughes in charge) Seminar—laboratory—50 hours. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital, graduate students, or consent of instructor. Emphasis placed on preventive medicine aspects of reproduction in the horse and cow. Opportunity given for indepth study of individual animal disease problems. Seminar participation required. May be repeated for credit. (S/U grading only)

Resource Sciences

(College of Agricultural and Environmental Sciences)

Faculty

See under departments of Agricultural Economics, Agronomy and Range Science, and Land, Air and Water Resources.

Related Major Program. See the major in Renewable Natural Resources, this page.

Related Courses. See courses in Agricultural Economics, Atmospheric Science, Civil Engineering, Environmental Planning and Management, Environmental Studies, Geography, Range Management, Soil Science, Water Science, and Wildlife and Fisheries Biology.

Courses in Resource Sciences

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 122 Hoagland Hall (752-1649).

Lower Division Courses

2. Concepts in Forestry (2) I, II. Delwiche, Lecture—2 hours. An introduction to the concepts of for-
Rhetoric

College of Letters and Science

James J. Murphy, Ph.D., Chairperson of the Department
Department Office, 224 AOB-IV (752-1221)

Faculty
Gary L. Cronkhite, Ph.D., Professor
Michael A. DeSousa, M.A., Lecturer
Robert C. Johnson, Ph.D., Lecturer
Jan W. Kelly, M.A., Lecturer
Michael C. Leff, Ph.D., Associate Professor
Martin J. Mechturth, Ph.D., Assistant Professor
Gerald P. Mohrman, Ph.D., Professor
James J. Murphy, Ph.D., Professor
Ralph S. Pomeroy, Ph.D., Associate Professor
Susan B. Shimanoff, Ph.D., Assistant Professor
Bonnie M. Spellman, Ph.D., Lecturer
Michael J. Sunnafrahn, Ph.D., Assistant Professor
John L. Voho, M.A., Lecturer

The Major Program
The Department of Rhetoric offers a wide range of courses leading to a bachelor's degree. The study of human communication is approached from two broad and complementary perspectives—both humanistic and social scientific methods of study are represented by active scholars.

Rhetoric

A.B. Major Requirements:

Preparatory Subject Matter

Rhetoric, 1, 3

Depth Subjeject Matter

Rhetoric 110, 114, 120, 153

One course from the following groups

(a) Rhetoric 111, 112, 113
(b) Rhetoric 121, 122, 123
(c) Rhetoric 130, 141

Rhetoric 190, 191

Additional upper division units in rhetoric to achieve a total of 38

Total Units for the Major

46

Minor Program Requirements:

There are four study emphases offered through the minor program in Rhetoric.

Rhetoric

Preparatory Subject Matter

UNITS

Rhetoric, 1, 3

Depth Subjeject Matter

Rhetoric 110, 114, 120

One course from the following groups

(a) Rhetoric 111, 112, 113
(b) Rhetoric 121, 122, 123
(c) Rhetoric 130, 141

Rhetoric 190, 191

Additional upper division units in rhetoric to achieve a total of 38

Total Units for the Major

46

Minor Advisers:

Technical and Professional Emphasis

Rhetoric 110, 114, 120, and one course from Rhetoric 121, 122, or 123

Two additional courses from Rhetoric 110 or 120 series

Recommended preparation: units from Rhetoric 1, 10, 12

Contemporary Communication

Studies Emphasis

Rhetoric 113, 114 or 123, 153 or 141

Two additional courses from Rhetoric 105, 114, 122, 123, 130, 134, 140, 141

Recommended preparation: units from Rhetoric 3, 10, 42

Communication Skills Emphasis

Rhetoric 51 or 42

Rhetoric 151, 190, 130 or 134, and one course from Rhetoric 121, 122, or 123

One additional course from Rhetoric 110, 120, or 130 series

Recommended preparation

Rhetoric 1, 3

Minor Advisers, Contact Department Office.

Graduate Study:
The Department of Rhetoric offers programs of study and research leading to the M.A. degree in Rhetoric. Detailed information may be obtained from the Graduate Adviser, Department of Rhetoric.

Graduate Adviser, See Class Schedule and Room Directory.

Courses in Rhetoric

Lower Division Courses

1. Introduction to Public Speaking (4) I, II, III. The Staff

Lecture—4 hours. Practice in the preparation and delivery of speeches with an introduction to rhetorical theory and criticism as applied to public address.

2. Oral Interpretation (4) II, III. The Staff

Lecture—4 hours. Theory and practice in the oral reading of literature.

3. Group Communication (4) I, II, III. The Staff

Lecture—3 hours. Discussion—1 hour. Study of the rhetorical process in informal situations. Topics include interaction, leadership techniques, and decision making in groups.

4. Introduction to Communication Studies (3) II, III. Mohrman

Lecture—3 hours. Introduction to the nature and function of human communication, special reference to messages, sending, receiving, and channels.

5. Rhetoric in the News Media (4) II. Pomeroy

Lecture—2 hours. Discussion—2 hours. Study of rhetorical concepts and processes influencing the news function of television, radio, newspapers, and mass circulation periodicals. Discussions, lectures, films, and group projects on problems of media bias, objective reporting, feature writing, and editorial responsibility. Critical analysis of journalistic styles.

6. Introduction to Advocacy (4) II, III. Leff

Lecture—4 hours. Introduction to the rhetoric of controversy, with emphasis upon the nature of public debate, the analysis of issues, and the logical presentation of evidence in support of arguments.

7. Special Study for Undergraduates (1-5) II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

8. Analysis of Message Systems (4) I. Voho

Lecture—4 hours. Examination of elements of the communication process, including sources, messages, media, and receivers. Study of the effects of these elements as they are influenced by various communicative situations.

9. Semantic and Pragmatic Functions of Language (4) II. Cronkhite

Lecture—4 hours. The role of language in shaping attitudes and perceptions of self and others. The use and abuse of verbal symbols in communicative situations. Concepts of meaning in discourse.

10. Classical Rhetorical Theory (4) II, III. Murphy

Lecture—4 hours. Origins of Greek and Roman rhetorical theory, with emphasis upon the contributions of Isocrates, Plato, Aristotle, Cicero, and Quintillian.
111. Medieval and Renaissance Rhetorical Theory (4) II. Murphy
Lecture—2 hours; discussion—2 hours. Development of the European rhetorical tradition from Saint Augustine to A.D. 1700. Attention to the three medieval rhetorical genres, the reception, origins, impact and promise of printing, changes in Renaissance concepts of style as they affected rhetoric.

112. Early Modern Rhetorical Theory (4) II. Pomroy
Lecture—4 hours. English and continental theories of rhetoric to 1900, with reference to developments in psychology, philosophy, and belles-lettres. Emphasis upon the works of Ward, Burke, Mill, Campbell, Blair, and Whately.

113. Current Humanistic Trends in Rhetorical Theory (4) III. Left
Lecture—4 hours. Contemporary developments in traditional rhetorical concepts such as style, meaning, theory of argument, and persuasion.

114. Contemporary Theories of Human Communication (4) I. Connette
Lecture—3 hours; discussion—1 hour. Rhetoric as a social science, characteristics of social theories, components of theories, development and testing of hypothesis, general models, theories, and research.

120. Rhetorical Criticism (4) I. Mohrmann
Lecture—4 hours. Survey of critical methods and their use in the interpretation of rhetorical discourse.

121. Public Address in Western Culture (4) I. Left
Lecture—3 hours; discussion—1 hour. Notable and representative speeches from antiquity to the present. Speeches are examined both as dynamic and significant events in their historical contexts, and as modeled instances of rhetorical art.

122. Rhetoric in Social Controversy (4) III.
Lecture—3 hours; discussion—1 hour. Case studies of rhetoric in social, political, and economic arenas embodied in selected social movements. Examination of rhetorical devices of social movements, rhetorical strategies, and tactics, including extra-discursive means of persuasion, and the nature and effects of establishment response.

123. The Persuasive Campaign (4) I.
Lecture—4 hours; class project. Study of selected political and intellectual campaigns, illustrating progressive organized efforts to change, maintain, or deter designated behaviors in a given audience through the use of a variety of media and influences.

130. Group Communication Processes (4) III. Vohs
Lecture—4 hours. Examination of current theories of group formation, goal structure, and leadership, as they relate to communication processes.

134. Interpersonal Communication (4) I. Vohs
Lecture—4 hours. Prerequisite: course 1, 3, or 10, or the equivalent. Communication between individuals in social and task settings. Verbal and nonverbal, in developing relationships. Consideration of theory and research on relevant variables such as shyness, self-disclosure, reciprocity, games and rituals.

140. Mass Communication and the Public (4) II.
Lecture—4 hours. Current issues in mass communications policy, with emphasis on the broadcast media. Examination of the economic, social, and political influences on mass communication in the role of public broadcasting; the social impact of technological advances, including cable television and communication satellites.

141. Mass Communication Theory and Research (4) III.
Lecture—4 hours. Prerequisite: course 153, or the equivalent course in Social Science research methods. Recent developments in the study of mass communications content and effects, with emphasis on the broadcast media. Special attention to the function of television for selected audiences, the mass media, and the role of the audience in the mass media.

142A. News Policies and Practices in Television (2) III. The Staff (Chairperson in charge)
Lecture—2 hours. Prerequisite: course 140 or 141, or consent of instructor. Processes and constraints in gathering, editing and reporting the news in the broadcast media, as examined by a practicing professional.

142B. News Policies and Practices in the Press (2) III. The Staff (Chairperson in charge)
Lecture—2 hours. Prerequisite: course 140 or 141, or consent of instructor. Processes and constraints in gathering, editing and reporting the news in the print media, as examined by a practicing professional.

151. Methods of Advocacy (4) I. Pomroy
Lecture—4 hours. Prerequisite: course 51 or consent of instructor. Study and practice of methods involved in the effective advocacy of positions on current controversial issues. Relation of inquiry and explanation to advocacy. Consideration of logical and normative means of persuasion.

153. Empirical Studies in Rhetoric (4) II. Vohs
Lecture—4 hours. Prerequisite: consent of instructor. Consideration of contributions derived from sociometric and psychometric approaches to analysis of rhetorical processes.

160. Current Topics in Rhetoric (4) I., II, III. The Staff
Seminar—4 hours. Prerequisite: upper division standing in one major in Rhetoric or consent of instructor. Group study of a special topic in Rhetoric. May be repeated once for credit. Enrollment limited.

160. Rhetorical Research (2) I. II. Murphy
Lecture—2 hours; laboratory—1 hour; term paper. Prerequisite: junior standing in Rhetoric, or consent of instructor. Required for majors in Rhetoric. Methods of reporting research into various aspects of human communication. Weekly assignments in organization and writing of research reports.

191. Senior Prossemest (4) II, III. The Staff
Lecture—2 hours; seminar—1 hour. Prerequisite: course 190. Individual research on a rhetorical topic approved by a faculty committee.

192. Internship in Rhetoric (3-5) I., II, III. The Staff
Laboratory—3 hours to 5 hours. Prerequisite: 12 upper division units in rhetoric and consent of instructor. Work research project at off-campus sites under departmental supervision. (P/NP grading only.)

197. Tutoring in Rhetoric (2-4) I., II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing with major in rhetoric and consent of Department Chairperson. Tutoring in undergraduate rhetoric courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit up to six units. (P/NP grading only.)

198. Directed Group Study (1-5) I., II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) II., III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses
Seniors may take graduate courses with consent of instructor.

200. Research in Rhetoric and Communication (4) I. The Staff (Murphy in charge)
Lecture—4 hours. Survey of traditional and current approaches to the study of communication, special attention to bibliography and methodology, with sample research projects.

201. Empirical Methods in Communication (3) III. Cronkright
Seminar—3 hours. Prerequisite: courses 153 or the equivalent or consent of instructor; upper division or graduate standing. Methods and techniques of empirical communication research, epistemological assumptions, requirements of research questions, measuring communication variables, techniques of research design, statistical analysis.

202. Critical Methods (3) III. Mohrmann
Individual consultation—1 hour. Prerequisite: course 120 or the equivalent. Theory and method in rhetorical criticism since Aristotle; individual critical projects.

206. Message Analysis: Argumentation, Persuasion, and Opinion Change (3) I., Cronkright, Left
Seminar—3 hours. Prerequisite: course 151 in rhetorical theory and course 114 or the equivalent or consent of instructor. Survey of theories of argumentation, persuasion, and opinion change in classical, renaissance, early modern and contemporary literature of rhetorical and communication theory.

211. Message Analysis: Language and Style (3) III. Left
Seminar—3 hours. Prerequisite: courses 105, 120, or the equivalent. Study of the persuasive effects of the diction and syntax used in messages. Attention to both classical and contemporary theory.

212. Message Analysis: Structure (3) I. Left
Seminar—3 hours. Prerequisite: courses 110, 114, 120 or the equivalent. Study of the persuasive effects of the structure and organization of messages. Attention devoted to traditional theories of disposition and to modern empirical studies of order effects. Consideration of the relationship between formal and aesthetic aspects of structure and persuasive effect.

200. Seminar (1-4) III. The Staff (Poemroy in charge)
Seminar—1-4 hours. Selected topics in metoric and communication.

240. Group Study (1-5) I., II, III. The Staff (Chairperson in charge)
Lecture—3 hours.

299. Individual Study (1-12) I., II, III. The Staff (Chairperson in charge)
(SU grading only.)

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**Russian**

(College of Letters and Science)

Department Office (German and Russian), 416 Sproul Hall (752-2114)

**Faculty**

Virginia H. Bennett, Ph.D., Assistant Professor
C. James Gallant III, Ph.D., Assistant Professor
Lawrence J. Grant, M.A., Lecturer
Daniel Lefèvre, Ph.D., Assistant Professor
Valerie A. Tumins, Ph.D., Professor

**The Major Program**

The Department offers a major in which a student may elect to complete one of two emphases, depending upon anticipated career interest. The common basis for both programs is extensive training in the Russian language. The traditional major, the Russian Literature emphasis, concentrates on the evaluation of the literary movements and cultural trends that have expressed and shaped Russian national consciousness. This program prepares the student for graduate study in literature and a career in teaching. The second program, the Russian Language emphasis, focuses on linguistics and practical language skills. This program prepares the student for graduate study and, in conjunction with a secondary field of study, such as social or natural science, can lead to careers in government or business.

**Russian**

A.B. Major Requirements:

**Preparatory Subject Matter**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian 1 through 6 (or the equivalent)</td>
<td>0-30</td>
</tr>
<tr>
<td>Russian 41, 42</td>
<td>8</td>
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**Depth Subject Matter**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian 101A, 101B, 101C</td>
<td>12</td>
</tr>
<tr>
<td>Russian 102 or 103 or 105</td>
<td>4</td>
</tr>
<tr>
<td>Russian 121, 123</td>
<td>8</td>
</tr>
<tr>
<td>Russian 127 or 128</td>
<td>4</td>
</tr>
<tr>
<td>Additional upper division units chosen in consultation with adviser</td>
<td>4</td>
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</tbody>
</table>

**Russian Language emphasis**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian 101A, 101B, 101C</td>
<td>12</td>
</tr>
<tr>
<td>Russian 102 or 105</td>
<td>4</td>
</tr>
<tr>
<td>Russian 103 or 104</td>
<td>4</td>
</tr>
<tr>
<td>Russian 160</td>
<td>4</td>
</tr>
<tr>
<td>Additional upper division units chosen in consultation with adviser</td>
<td>4</td>
</tr>
</tbody>
</table>

**Total Units for the Major**

44-74

**Major Advisor**

L. J. Grant.

**Honors and Honors Program**

The honors program comprises at least half of the upper-division course 194H, which will include a research paper. See also page 97.
Minor Program Requirements:
Two minor programs are available to students interested in obtaining a solid background in Russian language or literature. The Literature minor does not require a knowledge of the Russian language. Individual minor programs may be designed in consultation with the undergraduate adviser.

Teaching Credential Subject Representative. C.J. Gallant. See page 105 for the Teacher Education Program.

Graduate Study. The Department offers two programs of study (one with emphasis on language and culture, the other with emphasis on literature) leading to the M.A. degree. Detailed information may be obtained by writing to the Graduate Adviser.

Graduate Adviser. C.J. Gallant.

Courses in Russian

Lower Division Courses

Course Placement. Students with two years of Russian in high school normally continue in Russian 2; those with three years, Russian 3; those with four years, Russian 4.

1. Elementary Russian (6). I, II, III. Grant and staff. Reading—5 hours; language laboratory—1 hour. Elementary Russian grammar and conversation. Students who have successfully completed Russian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.

2. Elementary Russian 1 (6) I, II, III. Grant. The three segments of course 1A correspond to course 1. Student-instructor contact consists of individual tutoring and testing periods. Students may start at any time and complete one, two, or three segments in a given quarter. (Students who have successfully completed the second or more advanced year of high school level work in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

3. Advanced Russian (15). I, II, III. Gallant and staff. Individualized Russian 2 (2-2-2) I-II-III. Grant. The three segments of course 2AT correspond to course 2. Student-instructor contact consists of individual tutoring and testing periods. Students may start at any time and complete one, two, or three segments in a given quarter.

3A. Elementary Russian (6) I, II, III. Grant and staff. Reading—5 hours; language laboratory—1 hour. Pre-requisite course 1. Elementary Russian grammar, reading, and conversation.

3B. Intermediate Russian (4) I, II, III. Grant and staff. Discussion—4 hours; laboratory—1 hour. Pre-requisite course 2. Elementary Russian grammar, reading, and conversation.

3C. Advanced Russian (4) I, II, III. Grant and staff. Discussion—4 hours; laboratory—1 hour. Pre-requisite course 3. Grammar review and conversational practice.


3E. Advanced Russian (4) I, II, III. Grant and staff. Discussion—4 hours; laboratory—1 hour. Pre-requisite course 5. Grammar review. Intermediate conversation and continued reading of literature.

10. Elementary Conversation (2) I, II, III. The Staff. Discussion—2 hours. Pre-requisite course 1; course 2 or 3 (concurrently). Conversational practice to improve pronunciation and mastery of spoken idioms. May be repeated for credit up to 4 units.

20. Elementary Scientific Translation (4) I, II, III. Gallant and staff. Discussion—3 hours; individual translation projects—1 hour. Pre-requisite course 1SC or 1SI. Combination of course 1SC or 1SI. A translation course for students in the natural sciences working on Russian articles selected from their major fields of interest.

30. Great Russian Writers (in English) (4). I, II, III. Grant. Lecture—3 hours; written reports. Introduction to the important prose and dramatic works of such writers as Gogol, Turgenev, Dostoevsky, Tolstoy, Chekhov, Sholokhov, and Pasternak.

41. Survey of Nineteenth Century Russian Literature (in English) (4). I, II, III. Berry. Lecture—3 hours; introduction to dominant literary trends, major literary figures and landmarks of Russian prose and poetry from the period of the Sentimentalism through Romanticism and Realism to the beginnings of Modernism. Offered in even-numbered years.

42. Survey of Twentieth Century Russian Literature (in English) (4). I, II, III. Berry. Lecture—3 hours; introduction to major literary trends such as Symbolism, Acmeism, Futurism, Neo-realism, and Socialist Realism. Readings from representative writers such as Gorky, Siny, Pasternak, Solzhenitsyn, and Tertz. Offered in odd-numbered years.

98. Special Study for Undergraduates (1-5). I, II, III. The Staff (Tumins in charge) (P/NP grading only.)

Upper Division Courses

101A. Advanced Russian (4). I. The Staff. Lecture—2 hours; discussion—1 hour; oral reports. Pre-requisite course 6. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary literary and journalistic texts. Conversation exercises utilizing literary and colloquial variants of current Soviet speech.

101B. Advanced Russian (4). II. The Staff. Lecture—2 hours; discussion—1 hour; oral reports. Pre-requisite course 10A. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary literary and journalistic texts. Conversation exercises utilizing literary and colloquial variants of current Soviet speech.

101C. Advanced Russian (4). III. The Staff. Lecture—2 hours; discussion—1 hour; oral reports. Continuation of course 10B. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary literary and colloquial texts. Conversation exercises utilizing literary and colloquial variants of current Soviet speech.

102. Russian Composition (4). I. The Staff. Discussion—3 hours; individual tutorial with instructor. Pre-requisite course 6. Practice in writing Russian. One composition on a different topic each week. Topics include: history, geography, politics, and literature of Russia; comparative of Soviet and American lifestyles; current events. Conducted in Russian. Offered in even-numbered years.

103. Literary Translation (4) III. Lutskov. Lecture—3 hours. Prerequisite course 101C. Translation of Russian literary texts into an equivalent idiomatic English. Offered in even-numbered years.

104. Scientific Translation (4) III. Gallant and staff. Discussion—3 hours; individual translation projects—1 hour. Prerequisite course 20. Translation of scientific texts. Science students will select articles from their field of interest. Russian students will work on materials assigned by instructor. Offered in odd-numbered years.

105. Advanced Russian Conversation (4) II. The Staff. Conversation—3 hours; prepared for leading role—1 hour. Prerequisite course 5. Intensive conversational practice and discussion based on current events and contemporary texts. Offered in even-numbered years.

116. Individual Literature and Eighteenth Century Classicism (in English) (4). III. Tumins. Lecture—3 hours; discussion—1 hour. Survey of medieval epic, chronicles, romances, and tales; early development of prose and of Baroque literature. Also Classicism and Sentimentalism will be studied. Offered in even-numbered years.

121. Nineteenth Century Russian Prose (in English) (4). II. Lutskov, Bennett, Tumins. Lecture—3 hours; term paper. Development of prose from Pushkin and Gogol, through Dostoevsky and Tolstoy, to Maxim Gorky. Other writers are selected sequentially: Turgenev, Goncharov, Psesievsky, Salykov, Chekhov, Rostand, the Naturalists, and psychological realism are covered. Offered in odd-numbered years.

122. Twentieth Century Russian Prose (in English) (4). II. Lutskov, Bennett. Lecture—3 hours; term paper. Examination of various trends including Acmeism, Symbolism, Neorealism, and Socialist Realism. Development of prose. Readings from such writers as Gorky, Zamyatin, Sholokhov, Pasternak, and Solzhenitsyn. Offered in even-numbered years.

128. The Russian Theater (in English) (4). III. Bennett, Lutskov. Lecture—3 hours; discussion—1 hour. The main works of Russian dramatists from Gogol to the present, including Turgenev, Tolstoy, Chekhov, Gorky, Bulgakov, Shvoshty, and Chaliapin. Offered in odd-numbered years.

129. Nineteenth Century Russian Poetry (4). III, IV. Bennett, Lutskov. Discussion—3 hours; term paper. Prerequisite: course 6. Introduction to the principles of Russian versification followed by historical and poetic analysis of the following figures: Derzhavin, Zhukovsky, Tcheludev, and Fet. Conducted in Russian. Offered in odd-numbered years.

132. Twentieth Century Russian Poetry (4). III, IV. Bennett, Lutskov. Discussion—3 hours; term paper. Prerequisite: course 6. Introduction to the principles of Russian versification followed by historical and poetic analysis of the following figures: Bilyayev, Blok, Akhmatova, Mandel'stamm, Esenin, Mayakovskiy, Khlebnikov, Pasternak, Evdokhienko, Voznesenski, and Brodsky. Conducted in Russian. Offered in even-numbered years.

140. Dostoevsky (in English) (4). I, IV. Tumins. Lecture—3 hours. Reading and analysis of Dostoevsky's principal works such as Crime and Punishment, The Idiot, The Brothers Karamazov, and The Diary. Study of social and political values as reflected in Dostoevsky's works. Offered in even-numbered years.

141. Tolstoy (in English) (4). I, II. Bennett. Lecture—3 hours. Study of Leo Tolstoy's literary evolution and moral quest. Readings include his Confession, a major novel such as War and Peace or Anna Karenina, and representative shorter fiction. Offered in odd-numbered years.

150. Russian Culture (4) IV. Tumins. Discussion—3 hours; term paper. Knowledge of Russian not required. Review of Russian history and literature in a broad and comparative perspective with occasional excursions into the poetry of Tarkovsky, Pasternak, and others. Offered in even-numbered years.

160. Russian Phonology and Morphology (4). III. Gallant. Lecture—3 hours; laboratory—1 hour. Prerequisite course 101A, 101B, or consent of instructor. Linguistic analysis of the Russian sound system and of Russian word-formation. Offered in odd-numbered years.

NOTE: For key to footnote symbols, see page 130.
Russian Literature and History

(College of Letters and Science)

Program Office, 176 Voothies Hall (752-1630)

Committee in Charge
Valerie A. Tumins, Ph.D. (Russian), Committee Chairperson
Robert O. Cummings, Ph.D. (History), Winter-Spring Quarters
* James Gallant, Ph.D. (Russian), Fall-Winter Quarters
Alexander J. Groth, Ph.D. (Political Science)

The Major Program

The Russian Literature and History major is designed to give the student a better understanding of Russia through the study of its literature and history, two fields closely related in its intellectual and cultural development. The program allows the student to concentrate on a single rich and creative culture other than his own. Majors are encouraged to extend their study of Russia beyond the confines of the two core subjects, literature and history, to include selected subjects such as art, economics, folklore, geography, and neighboring regions of Eastern Europe.

The major will prepare a student for graduate study in either Russian or Russian literary history or Russian literature—or in a similar combined program. In either case, students planning on graduate work should continue to study the Russian language through Russian 101A-101B-101C and beyond.

Russian Literature and History

A.B. Major Requirements:

UNITS

| Preparatory Subject Matter | 20-50 |

Three courses from History 3, 44, 4B, 4C, 10.  

30               12 |

Russian 1 through 8 (or the equivalent).  

6-30 |

Recommended: Economics 1A-1B and/or Political Science 2 or 2C highly recommended.

Depth Subject Matter | 36-37 |

Three courses from History 102F, 137A, 137B, 137C, 138.  

12-13 |

At least three courses from Russian 120, 121, 123, 126, 127, 128, 140, 141.  

12 |

At least three courses from Anthropology 121; Economics 117; Geography 123B, 124; History 143A, 143B, 143C. Political Science 131, 141, 146; Russian 150, 154, 155.  

12 |

Total Units for the Major | 56-87 |

Major Adviser: R. O. Cummings (History)

Minor program Requirements:

The minor in Russian Literature and History is open to all Letters and Science students except those with majors in History or Russian.

UNITS

Russian History and Literature | 24 |

Three courses from History 102F, 137A, 137B, 137C.  

12 |

Three courses from Russian 120, 121, 123, 126, 127, 128, 140, 141.  

12 |

Sociology

(College of Letters and Science)

Department Office, 135 Young Hall (752-0782)

Faculty
James C. Cramer, Ph.D., Assistant Professor  
Ruth Dixon, Ph.D., Associate Professor  
Bruce Hackett, Ph.D., Associate Professor  
Gary G. Hamilton, Ph.D., Associate Professor  
James P. Hawley, Ph.D., Assistant Professor  
Carl C. Jorgensen, Ph.D., Associate Professor  
Edwin M. Lemert, Ph.D., Professor Emeritus  
John Loffland, Ph.D., Professor  
Leon H. Mayhew, Ph.D., Professor  
Daniel M. Ramirez, Ph.D., Assistant Professor  
Judith Stacey, M.A., Assistant Professor  
Julius Roth, Ph.D., Professor  
John F. Scott, Ph.D., Professor  
John T. Walton, Ph.D., Professor

Scandinavian

(College of Letters and Science)

Department Office (German and Russian), 416  
Sproul Hall (752-2114)

Faculty
Fritz Sammen-Frankenegg, Ph.D., Associate Professor (Swedish, German)

Course in Scandinavian

Upper Division Course

110. Masterworks of Scandinavian Literature in Translation (4)  
Sammern-Frankenegg  
Lecture—3 hours; writing reports. Readings in English translation from Icelandic Sagas to the present, treating such major authors as Ludvig Holberg, Soren Kierkegaard, Henrik Ibsen, Sigrid Undset, August Strindberg, Selma Lagerlof, Pinar Lagerkvist. Content varies from year to year. May be repeated twice for credit.

Courses in Swedish

Lower Division Courses

1. Elementary Swedish (6)  
Sammern-Frankenegg  
Discussion—5 hours; language laboratory—two 1/2-hour sessions. (Students who have successfully completed Swedish 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary Swedish (6)  
Sammern-Frankenegg  
Discussion—5 hours; language laboratory—two 1/2-hour sessions. Prerequisite: course 1.

3. Intermediate Swedish (6)  
Sammern-Frankenegg  
Discussion—5 hours; laboratory—two 1/2-hour sessions. Prerequisite: course 2.

4. Spoken Swedish (3)  
Sammern-Frankenegg  
Discussion—2 hours. Prerequisite: course 2. Conversational practice based on everyday vocabulary of modern spoken Swedish. May be taken concurrently with course 3 (P/NP grading only).
The Major Program
Sociology focuses on the structure of human interaction and the processes or institutions that both control and emerge from it. The special features of families, tribes, communities, formal organizations, and nation-states, as well as the processes of courtship, conflict and domination, delinquency, religious conversion, and artistic creation are among the major subjects of study. Graduate degrees in the field have traditionally led into teaching careers; increasingly, however, career possibilities include the application of sociological knowledge to the areas of penology and correction, education, industrial management, regional and community planning, and the administration of hospitals and health care systems.
A student may elect to complete requirements for the general major or, if desiring to specialize, complete the Law and Society or Social Welfare option.

Sociology

A.B. Degree Requirements:

| Preparatory Subject Matter (General Major) | 25 |
| Sociology I, 165A (or the equivalent) | 13 |
| Select 12 units from Anthropology I, 2, Economics 1A, 1B, History 3, 4B, 4C, 17A, 17B, Philosophy 1, 12, 21, 22, 23, Political Science 1, 2, 3, 4, Psychology 1, 15 | 12 |
| Total Units for the Major | 61 |

Recommended
Anthropology 102, 118, 119A, 119B, 124, 128, History 101, 102, Philosophy 12, 21, 22, 23, 109, 151, 158, Political Science 150, 161; Psychology 145, Statistics 105, 106.

Sociology

A.B. Degree Requirements:

| Options: Law and Society; Social Welfare |  

| Preparatory Subject Matter | 25 |
| Sociology I, 165A (or the equivalent) | 13 |
| Select 12 units from Anthropology I, 2, Economics 1A, 1B, History 3, 4B, 4C, 17A, 17B, Philosophy 1, 12, 21, 22, 23, Political Science 1, 2, 3, 4, Psychology 1, 15 | 12 |
| Total Units for the Major | 61 |

Recommended
Anthropology 102, 118, 119, 119A, 119B, 124, 128, History 101, 102, Philosophy 12, 21, 22, 23, 109, 151, 158, Political Science 150, 161; Psychology 145, Statistics 105, 106.

Sociology

Minor Program Requirements:
The Department of Sociology has established the following minor programs for students which are open to Letters and Science students.

| Sociology | 20 |
| Eight units selected from Sociology 126, 140, 165A, 165B, 168 ... | 8 |
| Additional upper division units in Sociology | 12 |
| Sociology—Social Welfare | 20 |
| Sociology 185, 4 units selected from Sociology 131, 131, 140, 158 ... | 8 |
| Four units from Sociology 143, 154, 156, 168 | 8 |
| Additional upper division units selected from Sociology 120, 123, 127, 130, 132, 158 | 8 |
| Sociology—Law and Society | 20 |
| Sociology 152, 4 units selected from Sociology 109A, 120, 150 | 8 |
| Four units from Sociology 140, 143, 168, 180 | 8 |
| Additional upper division units selected from Sociology 123, 130, 155, 156, 158 | 8 |

Minor Advisers. Consult the Department Office.

Graduate Study.
The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in Sociology. Further information and application procedures regarding graduate study may be obtained at the department office.

Graduate Advisers. See Class Schedule and Room Directory.

Courses in Sociology

Lower Division Courses

1. Introduction to Sociology (5 I, II)
Lecture—4 hours; discussion—1 hour. Principles and basic concepts of sociology. The study of groups, culture, collective behavior, classes and caste, community and ecology, role, status, and roles.

2. Social Problems (4 II, III)
The Staff Lecture—3 hours; discussion—1 hour. General sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement.

3. Seminar in Sociological Analysis (3 I, II, III)
The Staff Seminar—3 hours; to be arranged—1 hour. Research and analysis using basic concepts of sociology, social organization, culture, socialization, stratification, and stratification in application to specific problems. May be repeated for credit with consent of instructor. Limited enrollment.

4. Sociology 131, 140, 165A, 165B, 168, 180, 185, 
6. At least 4 but not more than 8 units of Sociology 109A, 109B, 109C | 4 |
8. At least three courses from Sociology 131, 132, 143, 152, 154, 156, 158, 180 | 12 |

NOTE: For key to footnote symbols, see page 130.
Soil and Water Science: Soil Science

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parenthesis are required.)

Preparatory Subject Matter: 61-65

UNITs

Preparatory Subject Matter

Biology (Biological Sciences 1)

Botany (Botany 2)

Mathematics, including calculus, statistics, and computer programming:

Chemistry, including Chemistry 1A-1B or AA-4B and a more advanced course in

Physics (Physics 2A-25-2C or 8A-8B-8C)

Geology (Geology 2)

Economics or agricultural economics

Writing (Composition or College Requirement)

Oral expression (College Requirement)

Depth Subject Matter: 51

Physical sciences, biological sciences and/or mathematics with approval of advisor:

Soil Science 2-4

Water Science 1BC

Additional upper division units in soil science and water science

Special study or experience (198 or Soil Science 192 in the major area)

Breadth Subject Matter: 22

Social sciences and humanities

At least one upper division course from each of the following areas, with approval of advisor: resource management, environmental law, environmental economics and policy

Restricted Electives: 21

To supplement or expand areas of student interest selected with approval of advisor.

Unrestricted electives: 21-24

Total Units for the Major: 180

Major Adviser: J.W. Biggar (Land, Air and Water Resources)

Information Center for the major is the Resource Sciences Teaching Center, 122 Hoagland Hall (752-1669).

Graduate Study. See page 99.

Soil Science

(College of Agricultural and Environmental Sciences)

The Major Program

Soil and Water Science is concerned with the use and protection of our land and water resources. The major is designed to provide preparation for a career involving these resources as well as for a more general interest in resource use and protection. Programs are designed to include land use, soil survey, water management and conservation, plant nutrition, diagnostic technology, irrigation and drainage, water resources management, water quality, general soil science, and general water science. For example, the emphasis on water quality would include more than the minimum number of units of physical and biological sciences, while an emphasis in resource allocation and land use planning would include more courses in the social, political, and economic areas. The flexibility of this major makes possible a wide variety of career opportunities which includes managerial and technical positions with agri-businesses such as equipment and supply companies, farm management, and positions involving advising, planning, land appraisal, research, and teaching with private, district, county, state, federal, and international organizations dealing with soil and water development, use, and conservation.

Soil and Water Science
Courses in Soil Science

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 122 Hageland Hall (752-4989).

Lower Division Courses

2. Introduction to Soil Science (3) II. Whitlip, Ill, Munro. Lecture—3 hours. Prerequisite: Chemistry and Botanical Sciences I; Physics 1B. Recommended. Development and properties of soils; interactions between the soil, aqueous, gaseous, and biotic soil components; techniques of management, development and conservation of soils.

20. Introductory Soil Science Laboratory (1) II. Detwiler, Ill, Munro. Laboratory—3 hours. Prerequisite: course 2 may be taken concurrently and consent of instructor. Laboratory exercises illustrating and supplementing principles embodied in course 2, and providing greater depth of treatment of subject areas.

92. Soil Science Internship (1-12) I, II, III. The Staff (Chairperson for Charge). Laboratory—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work-learning experience off and on campus soil science internship supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

102. Soil and Water Chemistry (5) I. Bura. Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 2 or the equivalent preparation in introductory earth science or consent of instructor. Chemistry and properties of the mineral and organic constituents of soil, and of the soil solution; ion exchange and other colloidal phenomena including the effect of soil amendments and fertilizers; microbial processes in soils.

158. Field Studies of Soil Resources (6) Extra-session summer. Beg. Huntington On-campus—daily 1 week; study tour—daily 5 weeks. Prerequisite: consent of instructor; course 120 recommended. In situ soil studies with emphasis on the interactions between soil characteristics and kinds of land use. Field identification of various soils for agricultural, range, forest, urban, and other uses.

157. Transfer Processes in Soils (4) I. Rollston. Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 2; Water Science 2; Mathematics 16A or 214a; or the equivalent preparation in elements of soil, water, and aquatic principles of water, gas, and solute movement in soil with selected examples related to agricultural and urban use of land. Influence of soil physical properties on processes and root growth.

110. Soil Fertility and Fertilizers (4) I. Reynolds. Lecture—3 hours; laboratory—3 hours. Prerequisite: course 2 or the equivalent preparation in elements of soil science. Forms and availability of plant nutrient elements in soils; effects of fertilizers and soil amendments on crop and soil characteristics. Conduct and interpretation of soil fertility assessment.

111. Geomicrobiology (4) I. Broadhen. Lecture—3 hours; laboratory—3 hours. Prerequisites: general chemistry and an introductory course in biology. Major groups are discussed in the geosphere and the biosphere as environmental variables. Activities of microorganisms in relation to water pollution, solid waste disposal, pesticide degradation, and soil reclamation.

118. Soil Use and the Environment (4) I. Lectures—4 hours; discussion—1 hour; 2-1/2 field trips. Prerequisite: course 2 or consent of instructor. Soils are considered in terms of land use planning and environmental quality. Topics include: soil survey reports, remote sensing, land capability classification, soil erosion conservation, crops, and soil reclamation. Also soil and pollution.

120. Soil Genesis and Morphology (5) I. II. Beg. Lecture—2 hours. Prerequisites: course 2; Geology 1 or 2; or consent of instructor. Soil forming factors and how these factors influence the physical and chemical properties and soil morphological characteristics. Soil forming processes as they influence the genesis and features of the soil profile: soil-landform relationships.

120L. Soil Genesis and Morphology Laboratory (1) I, II. Beg. Laboratory—3 hours (including 4 Saturday field trips). Prerequisite: course 120 (may be taken concurrently). Identification and description of soil morphological characteristics. Use of thin sections of soil and the petrographic microscope to identify microscopic features. Field trips to study soil parent material, soil-climate, soil-vegetation, and soil-landform relationships.

121. Soil Classification and Mapping (3) III. Huntington. Lecture—2 hours; laboratory—3 hours (seven of the ten sessions are in the field). Prerequisite: course 120, 125L, course 118 recommended. Course introduces systems of soil classification to develop broader understanding of soils on the landscape and for a basis for soil resource inventory. Procedures used in soil survey introduced. Laboratory-field studies provide practice in morphological soil description and soil mapping.

122. Soil-affected Soils (3) II. Lecture—3 hours. Prerequisite: consent of instructor; a course in soil chemistry and either plant physiology or plant nutrition recommended. Soil problems in salt-alkali and sodic soils; chemical interactions with soils under alkaline conditions; salinity control in relation to environmental quality; physicochemical characteristics of native and crop plant species governing salt tolerance and sensitivity. Offered in even-numbered years.

123. Soil Taxonomy (3) III. Huntington. Lecture—11 hours; discussion—1-1/2 hours. Prerequisite: courses 120, 126, and 121, or consent of instructor. An intermediate course in soil classification. Study and analysis of the current system of classification used by the National Cooperative Soil Survey of the United States. Practice in classifying soil individuals with emphasis on evaluating their placement in the system. Offered in even-numbered years.

130. Soil and Plant Testing (3) III. Lecture—3 hours. Prerequisite: introductory course in soil science; knowledge of quantitative analytical techniques; and soil-plant relationships recommended. Methods and interpretation of soil and plant analysis for the diagnosis of problems associated with the mineral nutrition of plants.

192. Soil Science Internship (1-12) I, II, III. The Staff (Chairperson for Charge). Laboratory—11 hours. Prerequisite: completion of 40 units and consent of instructor. Work-learning experience off and on campus in soil science. Internship supervised by a member of the staff. (P/NP grading only.)

191. Directed Group Study (1-5) I, II, III. The Staff (Chairperson for Charge). Directed group study in soil science for advanced undergraduate students. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson for Charge). (P/NP grading only.)

Graduate Courses

207. Soil Physics (3) III. Rollston. Lecture—3 hours. Prerequisite: Mathematics 232 or consent of instructor; course 107 recommended. Physical processes operating in soils with emphasis on heat flow, diffusion of gases and solutes, the movement of soluble materials during leaching and irrigation, mechanical, and applications of physics and mathematics to soil systems. Offered in even-numbered years.

208. Plant Interrelationships (3) III. Randy. Lecture—3 hours. Prerequisite: course 2; Botany 111B; or consent of instructor. Processes and reactions involved in the acquisition by plants of nutrients from soils; the root-soil interface; physiological reactions involved in the assimilation of nutrients by the plant.

211. Soil Microbiology (2) I. Broadhen. Lecture—2 hours. Prerequisite: Chemistry 8B, course 102, or consent of instructor. Activities of some important groups of soil-microorganisms, metabolism of organic substances in soil including pesticides; influence of microbial activities on soil properties, microbial activities in soil in relation to some environmental problems.

214. Soil Mineralogy (5) I. Whitlip. Lecture—2 hours; discussion —1 hour; laboratory—6 hours. Prerequisite: a course in soil chemistry or consent of instructor. Nature, properties, and occurrence of the major common minerals in soils and rocks. Application of mineral analysis methods, including X-ray, thermal and chemical for characterization of mineral systems, and in the study of properties of soils and weathering of minerals. Offered in even-numbered years.

215. Physical Chemistry of Soils (3) Ill. Bura. Lecture—3 hours. Prerequisite: Chemistry 167B or 110B, or consent of instructor. Physicochemical, colloidal, and surface aspects of the soil system. Offered in even-numbered years.


290. Special Topics in Soil Science (1) I, II. Delwiche Seminar—1 hour. Prerequisite: graduate standing in Soil Science; Plant Physiology, Ecology, or related subject, and consent of instructor. The current literature in plant nutrition and soil-plant relationships will be reviewed and discussed. Each participant will prepare and present reports to the seminar. (SU grading only.)

296. Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge). (SU grading only.)

Spanish

(College of Letters and Science)
Robert M. Scari, Ph.D., Chairperson of the Department
Department Office (Spanish and Classics), 616 Spruol Hall (752-3935)

Faculty
Reed Anderson, Ph.D., Associate Professor
Donald G. Castanien, Ph.D., Professor
Mariano González, Ph.D., Lecturer
Oliver T. Jaén, Ph.D., Professor
Danie S. Kelker, Ph.D., Associate Professor
Guillermo Rojas, Ph.D., Associate Professor
Eduardo A. Sánchez, Professor
Antonio Sánchez-Roncalo, Ph.D., Professor
Robert M. Scari, Ph.D., Professor
Maximo Torreblanca, Ph.D., Associate Professor
Hugo J. Verani, Ph.D., Associate Professor

The Major Program
The major in Spanish is designed to develop competence in the spoken and written language and to provide the possibility of emphasis either in language or on literature, depending upon each student's professional goal. The program, alone or in combination with other major programs, may lead to advanced study of the language or literatures of Spain and Spanish America, and to careers not only in teaching but also in other professions such as business, science, law, medicine, and in government, social service, or business. Spanish majors are strongly encouraged to complement their work in the department through study in related areas such as modern Spanish American studies, international relations, linguistics, comparative literature, art, history, and philosophy.

Spanish

A.B. Major Requirements:

Preparatory Subject Matter

Latin 1 or 1AT, 2 or 2AT, 3 or 4 in Greek 1 or 2, 5 or 6 in Greek 1 or 2, 3 or 7B, or 3 or 7C (or the equivalent)

- 33
Courses in Portuguese

Lower Division Courses

1. Elementary Portuguese (4) I. The Staff Laboratory—2 hours; recitation—3 hours. Portuguese grammar, conversation, and reading. (Students who have successfully completed Portuguese 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a PNP grading basis only. Although a passing grade will be charged to the student's PNP option, no petition is required. All other students will receive a letter grade unless a PNP petition is filed.)

2. Elementary Portuguese (4) II. The Staff Laboratory—2 hours; recitation—3 hours. Prerequisite: course 1. Continuation of course 1.

3. Elementary Portuguese (4) III. The Staff Laboratory—2 hours; recitation—3 hours. Prerequisite: course 2. Continuation of course 2.

Upper Division Courses

*104. Survey of Brazilian Literature: Prose Fiction (4) I. Lecture—3 hours; individual and group conferences. Prerequisite: course 5.

*105. Survey of Brazilian Literature: Poetry (4) II. Lecture—3 hours; individual and group conferences. Prerequisite: course 5.

106. Survey of Brazilian Literature: Drama and Essay (4) III. Lecture—3 hours; individual and group conferences. Prerequisite: course 5.

Courses in Spanish

Lower Division Courses

1. Elementary Spanish (6) I, II, III. The Staff (Samariego in charge) Laboratory—two 1/2-hour sessions; recitation—5 hours. An introduction to the fundamentals of Spanish grammar, listening and speaking emphasized. (Students who have successfully completed Spanish 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a PNP grading basis only. Although a passing grade will be charged to the student's PNP option, no petition is required. All other students will receive a letter grade unless a PNP petition is filed.)

1A1A-1ATB-1ATC. Individualized Instruction in Elementary Spanish (2-2-2) I-II-III. Samaniego The three segments of course 1 AT correspond to course 1. Student-instructor contacts consisting of indirect tutoring conversation practice and testing periods. Students may start at any point and complete one or more two-unit segments in a given quarter. (Students who have successfully completed Spanish 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a PNP grading basis only. Although a passing grade will be charged to the student's PNP option, no petition is required. All other students will receive a letter grade unless a PNP petition is filed.)

2. Elementary Spanish (6) I, II, III. The Staff (Samariego in charge) Laboratory—two 1/2-hour sessions; recitation—5 hours. Prerequisite: course 1. Continuation of course 1.

2A1A-2ATA-2ATC. Individualized Instruction in Elementary Spanish (2-2-2) I-II-III. Samaniego The three segments of course 2 AT correspond to course 2. Student-instructor contacts consisting of indirect tutoring conversation practice and testing periods. Students may start at any point and complete one or more two-unit segments in a given quarter.

3. Intermediate Spanish (6) I, II, III. The Staff (Samariego in charge) Laboratory—1 hour recitation—5 hours. Prerequisite: course 2 or 2ATA-2ATA-2ATC. Continuation of course 2ATA-2ATA-2ATC.

4. Intermediate Spanish (5) I, II, III. The Staff (Gonzalez in charge) Discussion—1 hour; recitation—4 hours. Prerequisite: course 3. Grammar review through oral and written exercises, and expansion of vocabulary through reading of modern texts.

108A. Spanish-American Prose of the Twentieth Century (4) III.
Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C. Emphasis on the development of the novel. Offered in odd-numbered years.

108B. Spanish-American Prose of the Twentieth Century (4) III.
Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C. Emphasis on the essay. Offered in even-numbered years.

109. Spanish Drama of the Golden Age (4) III. Sánchez-Romerol
Lecture—4 hours, conferences and reports. Prerequisite: course 28 or 7C. Offered in odd-numbered years.

110. Advanced Spanish Composition I (4) (4). I. Staff Discussion—3 hours: written reports. Prerequisite: course 28 or 7C. Practice in expository writing, with an aim toward refinement and expansion of vocabulary.

111. Don Quijote (4) II. Castañer
Lecture—3 hours. Prerequisite: course 28 or 7C. Offered in even-numbered years.

114. Spanish Romantic Literature (4) I. Scari
Lecture—3 hours, conferences and reports. Prerequisite: course 28 or 7C. Practice in creative writing, with an aim toward refinement and appreciation of written expression and expansion of vocabulary.

115. Lyric Poetry of the Golden Age (4) III. Sánchez-Romerol
Lecture—3 hours. Prerequisite: course 28 or 7C. Offered in odd-numbered years.

119. Spanish Novel of the Nineteenth Century (4) III. Scari
Lecture—3 hours. Prerequisite: course 28 or 7C. Offered in odd-numbered years.

120A. Twentieth-Century Spanish Prose (4) I. Anderson
Lecture—3 hours. Prerequisite: course 28 or 7C. Offered in odd-numbered years.

120B. Twentieth-Century Spanish Drama (4) III.
Anderson Lecture—3 hours. Prerequisite: course 28 or 7C. Offered in odd-numbered years.

120C. Twentieth-Century Spanish Poetry (4) III. Anderson, Sánchez-Romero
Lecture—3 hours. Prerequisite: course 28 or 7C. Offered in even-numbered years.

124. Chicano Culture (4) I. Rojas
Lecture—3 hours. Prerequisite: course 28 or 7C. Offered in odd-numbered years.

125A. Modernism: The Precursors (4) I.
Lecture—3 hours. Prerequisite: course 28 or 7C. Offered in even-numbered years.

125B. Modernism: The Major Poets (4) I.
Lecture—3 hours. Prerequisite: course 28 or 7C. Offered in even-numbered years.

126. Chicano Literature (4) I. Rojas
Lecture—3 hours. Prerequisite: course 28 or 7C. Offered in odd-numbered years.

127. Poetry of Post-Modernism and Vanguardism (4) III. Verani
Lecture—3 hours; conferences. Prerequisite: course 28 or 7C. Offered in even-numbered years.

128. Contemporary Spanish-American Short Story Writers (4) II.
Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C. Literary trends in the development of the short story in Spanish America as seen in the representative works of major contemporary authors. Offered in even-numbered years.

130A. Spanish-American Prose of the Twentieth Century (4) III.
Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C. Emphasis on the development of the novel. Offered in odd-numbered years.

130B. Spanish-American Prose of the Twentieth Century (4) III.
Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C. Emphasis on the essay. Offered in even-numbered years.

131. Modern Spanish Syntax (4) I. Keller
Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C or consent of instructor. Study of word order and sentence structure in modern Spanish, with special attention to syntax of verbs.

132. Introduction to Spanish Linguistics (3) III. Torreblanca
Lecture—3 hours. Prerequisite: course 28 or 7C or consent of instructor. Principles of classical phonemics and morphemics together with more recent developments: descriptive analysis of modern Spanish sounds and forms. Theoretical and practical comparison with English and other Romance Languages.

133. Spanish Phonetics (3) I. Torreblanca
Lecture—3 hours. Prerequisite: course 28 or 7C or consent of instructor. The sound structure of modern Spanish; theoretical analysis of selected problems in pronunciation. Strongly recommended for prospective teachers.

134. Survey of Spanish Culture (4) I. González
Lecture—3 hours. Prerequisite: course 28 or 7C or consent of instructor.

135. Survey of Mexican Culture (4) II. Rojas
Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C or consent of instructor. Offered in even-numbered years.

136. Spanish-American Culture (4) II. The Staff (Chairperson in charge)
Lecture—3 hours; term paper. Prerequisite: course 28 or 7C. Major developments in the arts and social institutions of Spanish-American areas other than Mexico. Readings, lectures and discussions in Spanish.

138. Contemporary Spanish-American Drama (4) I. Keller
Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C or consent of instructor. Significant trends, as well as origins and development of the genre.

140. Order and Chaos: Latin-American Literature in Translation (4) I. Zuniga
Lecture—3 hours; conferences and reports. Reading, lectures, and discussion in English of works by Neruda, Vallejo, Borges, García Márquez, Paz, and others. May not be counted towards major in Spanish.

150. Masterpieces of Spanish Literature (4) I. Scari
Lecture—3 hours. Reading, lectures, and discussion in English. May not be counted as part of the major in Spanish.

151. Study of a Major Writer (4) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 28 or 7C. May be repeated for credit with consent of instructor.

157. Introduction to Literary Theory and Criticism (4) I. Zuniga
Lecture—3 hours; conferences. Prerequisite: course 28 or 7C. Basic concepts for the analysis of literary analysis on Spanish literary and critical theory applied to Spanish literature.

193. Internship in Spanish (1-4) I, II, III. The Staff (Chairperson in charge)
Field work. Prerequisite: course 28 or 7C; junior standing, major in Spanish, Mexican-American (Chicano) studies, or a related field. Internships in fields where Spanish language skills can be used and perfected (teaching, counseling, translating-interpreting, etc.) May be repeated for credit for a total of 8 units; credit will not count toward the Spanish major. (P/NP grading only.)

196. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III.
The Staff (Chairperson in charge) (P/NP grading only)
241A. Spanish-American Novel, 1900-1920 (4) I. Seminar—3 hours. Offered in even-numbered years.
241B. Spanish-American Novel, 1920-1940 (4) II. Seminar—3 hours. Offered in odd-numbered years.
243. Spanish-American Short Story (4) IV. I, II. Seminar—3 hours. Works by major writers, with emphasis on twentieth-century authors such as Górriz, Borges, García Márquez, Cortázar, and Pinto.
245. Darío and His Contemporaries (4) VI. Seminar—3 hours. Offered in even-numbered years.
246. New Directions in Spanish-American Poetry (4) VII. Verano—3 hours. Offered in even-numbered years.
251. Study of a Major Writer (4) IX, X, XI, XII. The Staff—3 hours. Critical study of the works of a major writer and his intellectual and literary milieu. May be repeated with permission of instructor.
299. Research (2-5) I, II, III. The Staff (Chairperson in charge). (Open to graduate students only.)
Professional Courses
300. The Teaching of Spanish (3) III. Samaniego Lecture—3 hours. Prerequisite: senior or graduate standing. A major or minor in Spanish.
330A. Problems in Teaching Spanish at College Level (3) IV. Samaniego Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of graduate teaching assistants.
330B. Problems in Teaching Spanish at College Level (3) V. Samaniego Discussion—1 hour. Prerequisite: graduate standing. Theoretical instruction in modern teaching methods and demonstration of their practical application. Intended primarily for graduate teaching assistants.

Statistics
(Intercollegiate Division)
Julius B. Blum, Ph.D., Chairperson of the Division and Associate Dean of Statistics
Division Office, 469 Kerr Hall (752-2367)

Faculty
Julius B. Blum, Ph.D., Professor
Alan P. Fenech, Ph.D., Associate Professor
Charles E. Frantl, Ph.D., Professor (Statistics. Community Health)
Wesley O. Johnson, Ph.D., Assistant Professor
Norman D. Krieger, Ph.D., Assistant Professor
Francisco J. Samaniego, Ph.D., Associate Professor
Jessica M. Utte, Ph.D., Assistant Professor
Alvin D. Wiggins, Ph.D., Associate Professor

Statistics is a subject which touches our lives virtually every day in a variety of ways, from the amount we pay for insurance to the television shows which are left on the air. It has been developed to enable us to make inferences about entire populations, based on samples extracted from those populations. Thus, statistical methods can be applied to problems from almost every discipline and they are vitally important to researchers in agricultural, social, engineering, and medical sciences.

The Division of Statistics offers courses to fulfill requirements at all levels. A minor in statistics gives the student a basic grounding in both theory and applications and would be a valuable complement to almost any major program. An undergraduate major in statistics is sufficient preparation for either a career or graduate study in the field.

The first statistics course a student takes will depend on both background and motivation. The most elementary courses require no mathematics beyond high school algebra, and are designed to acquaint students with the basic ideas and techniques of probability and statistics. The upper-division entry-level courses, Statistics 130 and 132, which have calculus as a prerequisite, cover statistical techniques along with the probabilistic motivation and theory from which they are derived. Other courses focus on varied aspects of statistical theory, data analysis and statistical computing.

The Major Programs
Probability models and statistical methods are used in a great many fields, including the biological and social sciences, business and engineering. The wide applicability of statistics has created in both the public and private sectors a strong demand for graduates with statistical training. The Bureau of Labor Statistics has estimated that the demand for trained statisticians in government and industry will exceed the supply by at least 1,500 persons by the end of the year 1985. Current employment opportunities include state and federal government positions with a statistician designation, industrial positions (e.g., in the actuarial field or in the data management unit in a health science facility), and teaching positions.

The major programs in statistics are designed to allow students to choose from a variety of areas, including mathematics and computer science, and to tailor their studies to their individual interests. The Bachelor of Arts degree is flexible, facilitating a double major or extensive elective coursework in a field in which statistics is applied. The Bachelor of Science degree places a stronger emphasis on mathematics, with a special emphasis on the application of statistical methods.

The concurrent study of statistics and a field of applications at an advanced level will serve students well in preparing for a career in an area of application or in preparing to graduate study. Students with strong interest in a quantitative discipline are encouraged to pursue a double major combining statistics and this discipline. Students play a vital role in statistical applications, and advanced courses in computer programming are strongly recommended.

Students who wish to pursue a joint statistics/computer science degree may wish to explore the University’s individual major option (see page 231). For others, a statistics undergraduate major is a sound choice.

Statistics
A.B. Major Requirements:

Statistics
Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
<th>Statistics</th>
<th>Preparatory Subject Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Calculus, Mathematics 21A, 21B, 21C</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Linear Algebra, differential equations</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Mathematics 22A, 22B</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Computer Science, Engineering 5 or 6</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Mathematics 29</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Statistics through computers, Statistics 32</td>
<td>3</td>
</tr>
</tbody>
</table>

Statistics
B.S. Major Requirements:

Preparatory Subject Matter

Calculus, Mathematics 21A, 21B, 21C | 12 |
Linear Algebra, differential equations | 6 |
Mathematics 22A, 22B | 6 |
Computer Science, Mathematics 29 or Engineering 5 | 3 |
Statistics through computers, Statistics 32 | 3 |

Depth Subject Matter

Analysis of variance, multiple regression, and analysis of variance, multiple regression | 4 |
Statistics 106, 108 or the equivalent | 7 |
Probability and mathematical statistics, Statistics 131A, 131B, 131C | 12 |
Three courses with Statistics 131 as a prerequisite | 9 |
Related elective courses | 9 |
Three upper division courses approved by a major advisor | 3 |
They may be in mathematics, computer science, or statistics | 3 |

Designing a Program. Sometime before or during the first quarter of the junior year each student planning to major in statistics should consult with a faculty advisor to plan the program of his or her undergraduate program. Students are encouraged to meet with an advisor to design a program as early as possible.

Major Advisors. A.P. Fenech.

Minor Program Requirements:

The Division offers a minor program in Statistics that consists of a survey at the upper division level of the fundamentals of mathematical statistics and of the most widely used applied statistical methods.

Minor Statistics

<table>
<thead>
<tr>
<th>Units</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Statistics 106, 108, and 1304-1308 or 131A-131B</td>
</tr>
<tr>
<td>15</td>
<td>One course in Statistics 1308 or 131B as a prerequisite</td>
</tr>
<tr>
<td>3</td>
<td>Preparation Statistics 13 or 32</td>
</tr>
</tbody>
</table>

Graduate Study. The Graduate Group in Statistics offers study and research leading to the M.S. and Ph.D. degrees in Statistics. Detailed information concerning these degree programs, as well as information on admissions and financial support, is available from the Division of Statistics.

Graduate Advisor. F.J. Samaniego.

Statistical Consulting. The Division provides a consulting service for researchers on campus. For more information, call the Statistical Laboratory Office or the Division Office.

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Statistics; Surgery

Courses in Statistics

Lower Division Courses
12. Introduction to Discrete Probability (3 I) I, II, III. The Staff
Lecture—3 hours. Prerequisite: two years of high school algebra. Random experiments; countable sample spaces; elementary probability axioms; counting formulas; conditional probability; Independence: Bayes theorem; expectation; gambling problems; binomial, hypergeometric, Poisson, geometric, negative binomial and multinomial models; limiting distributions; Markov chains. Applications in the social, biological and engineering sciences. Offered in even-numbered years.

13. Elementary Statistics (4) I, II, III. The Staff
Lecture—4 hours. Prerequisite: two years of high school algebra. Measures of central tendency and dispersion; binomial, normal, and chi-square distributions; testing hypotheses; nonparametric statistics; regression and correlation theory. Students having had courses 130A or 131A may not take course 13 for credit.

32. Basic Statistical Analysis Through Computers (3) II. The Staff

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Special topics in statistics appropriate for study at the lower division level. (P/NP grading only.)

Upper Division Courses
102. Introduction to Probability Modeling and Statistical Inference (4) I, II. The Staff
Lecture—4 hours; discussion—1 hour. Prerequisite: two years high school algebra, and upper division standing. Introductory probability and statistics at a rigorous yet pre-calculus level. Topics include: probability models — binomial, Poisson, geometric, normal and sampling distributions; statistical graphics, exploratory data analysis; parametric and nonparametric estimation and testing; analysis of variance; regression computing with MINITAB package. Students who have had course 13 may receive only 2 units of credit for course 102.

104. Applied Statistical Methods: Nonparametric Statistics (3) II. The Staff

106. Applied Statistical Methods: Analysis of Variance (4) II, III. The Staff
Lecture—4 hours. Prerequisite: course 13 or 102. One-way and two-way fixed effects analysis of variance models. Randomized complete and incomplete block design. Latin squares. Multiple comparisons procedures. One-way random effects model.

108. Applied Statistical Methods: Regression Analysis (3) I. The Staff
Lecture—3 hours. Prerequisite: course 13 or 102. Simple linear regression, multiple regression, variable selection techniques, stepwise regression, analysis of covariance.

110. Applied Statistical Methods: Multivariate Analysis (3) I. The Staff
Lecture—3 hours. Prerequisite: courses 13 or 102, and 106 or 111A. Estimation of mean vector and covariance matrix of a multivariate population. Multiple comparisons methods. Estimation of simple, multiple and partial correlation coefficients. One-way MANOVA. Linear discriminant functions. Principle component analysis. Factor analysis. Offered in odd-numbered years.

120A-120B. Mathematical Statistics, Brief Course (4-4) I- II.
The Staff
Lecture—4 hours; discussion—1 hour. Prerequisite: Mathematics 16B. Course in mathematical statistics for non-majors. Concepts of probability and sampling, principles of estimation, measures of estimators, sampling distributions, bivariate normal and principles of testing.

131A. Introduction to Probability Theory (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 33B. Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment-generating functions, laws of large numbers and the central limit theorem.

131B-131C. Introduction to Mathematical Statistics (4-4) I- II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 131A. Sampling, point estimation, exact sampling distributions, confidence intervals, hypothesis testing, linear regression and analysis of variance.

134. Nonparametric Inference (3) III. The Staff
Lecture—3 hours. Prerequisite: course 130B or 131B. Selected topics in nonparametric statistical inference from one-sample and a-k-sample point of view. Topics include Kolmogorov-Smirnov type tests; confidence intervals for quantities, location and scale parameters; rank tests; dispersion tests; efficiency. Offered in odd-numbered years.

135. Multivariate Data Analysis (3) III. The Staff
Lecture—3 hours. Prerequisite: course 130B or 131B. Quantitative description and analysis of social and biological problems. Multivariate statistical procedures implemented through computer methods. Applied time series, factor and cluster analysis.

141. Statistical Computing (2) I. The Staff
Lecture—2 hours. Prerequisite: an elementary course in computer programming, and either course 131B or 130B, or consent of instructor. Monte Carlo simulation; numerical methods for nonlinear estimation: computational techniques for linear models; comparison of packaged computer programs. Offered in odd-numbered years.

142. Reliability (3) III. The Staff
Lecture—3 hours. Prerequisite: course 130B or 131B or consent of instructor. Stochastic modeling and inference for reliability systems. Topics include: coherent systems, statistical failure models, notions of aging, maintenance policies and their optimization. Offered in odd-numbered years.

144. Sampling Theory of Surveys (3) II. The Staff
Lecture—3 hours. Prerequisite: course 130B or 131B. Description and analysis of sample surveys with application in the social and biological sciences. Stratified and cluster sampling. Ratio estimation. Problem of nonresponse. Offered in even-numbered years.

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Special topics in statistics appropriate for study at the upper division level. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Special topics in statistics appropriate for study at the upper division level. (P/NP grading only.)

Graduate Courses
205. Statistical Methods for Research (3) III. The Staff
Lecture—3 hours. Prerequisite: course 106 or the equivalent. Topics in experimental design include: Latin squares, Youden squares, balanced and partially balanced. Complete block designs, factorial experiments, randomized block designs, split-plot designs, lattice designs, fractional factorial designs, response surfaces, designs. Optimal designs. Offered based on various criteria, analysis of covariance.

211A-211B-211C. Mathematical Statistics (3-3-3) I-III. The Staff
Lecture—3 hours. Prerequisite: course 131C. Distribution theory, decision theoretic methods, estimation and hypothesis testing, multivariate techniques, large sample theory.

223A-223B. Linear Model Theory (3-3) I-II. The Staff
Lecture—3 hours. Prerequisite: course 131C. Estimation and testing for the general linear hypothesis, components of variance, multiple comparisons. Offered in even-numbered years.

233. Design of Experiments (3) III. The Staff
Lecture—3 hours. Prerequisite: course 131C. Topics from balanced and partially balanced incomplete block designs, fractional factorial designs, and response surfaces. Offered in odd-numbered years.

234. Advanced Regression Analysis (3) III. The Staff
Lecture—3 hours. Prerequisite: course 131C or 130B, 106, or consent of instructor. Techniques of variable selection. Problems of multicollinearity. Nonlinear regression. Special topics. Offered in even-numbered years.

236A-236B-236C. Advanced Mathematical Statistics (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: course 231C. Statistical theory of invariance, robustness, sequential analysis, non-parametric theory. Offered in odd-numbered years.

290. Seminar in Statistics (1-6) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Seminar on advanced topics in probability and statistics. (S/U grading only.)

296. Group Study (1-8) I, II, III. The Staff (Chairperson in charge)
Special topics in statistics appropriate for study at the graduate level.

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Special topics in statistics appropriate for study at the graduate level. (S/U grading only.)

Subject A
See under University Requirements, page 60; or English A course, page 196

Surgery
(School of Veterinary Medicine)
Eugene P. Steffey, V.M.D., Ph.D., Chairperson of the Department
Department Office, 2112 Medical Science 1A
(752-3999)

Faculty
Cleta S. Bailey, D.V.M., Ph.D., Assistant Professor
Eugene M. Breznock, D.V.M., Ph.D., Associate Professor
Murray P. Brown, D.V.M., Assistant Professor
Ned Buyukmihci, V.M.D., Assistant Professor
Robert M. Cello, D.V.M., Professor
I. M. Gourley, D.V.M., Ph.D., Professor
Steve G. Haskins, D.V.M., M.S., Assistant Professor
Terra A. Holliday, D.V.M., Ph.D., Professor
Andrew B. Kelly, Jr., D.V.M., Assistant Professor
Robert L. Leighton, V.M.D., Professor
Bruce R. Madewell, D.V.M., Associate Professor
Susan V. Manley, D.V.M., Professor
Dennis M. Melagher, D.V.M., Ph.D., Professor
Harold R. Parker, D.V.M., Ph.D., Professor
Harold D. Snow, D.V.M., Associate Adjunct Professor (School of Medicine, Los Angeles campus)
Eugene P. Steffey, V.M.D., Ph.D., Professor
Gordon H. Theilen, D.V.M., Professor
Philip Vasseur, D.V.M., Assistant Professor
John D. Wheat, D.V.M., Professor
Ailda P. Wind, D.V.M., Lecturer

Part-Time Clinical Faculty
Gregory Ferraro, D.V.M., Assistant Clinical Professor
Alan D. MacMillan, D.V.M., Ph.D., Assistant Clinical Professor
Charles T. Robinson, D.V.M., Assistant Clinical Professor
Randall H. Scaglitti, D.V.M., Assistant Clinical Professor

Courses in Surgery
Upper Division Course
198. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Wheat in charge)
(P/NP grading only.)
Textiles and Clothing

(College of Agricultural and Environmental Sciences)

S. Haig Zeronian, Ph.D., Chairperson of the Division

Division Office, 129 Everson Hall (752-6650)

Faculty

Cheryl Lynn M. Carrie, Ph. D., Lecturer
Emory Manelee, Ph. D., Adjunct Professor
Mary Ann Morris, Ph. D., Professor
Howard L. Needles, Ph. D., Professor
Allen G. Pittman, Ph. D., Adjunct Professor
Margaret H. Rucker, Ph. D., Assistant Professor
Howard G. Schultz, Ph. D., Professor
S. Haig Zeronian, Ph.D., Professor

The Major Program

The Textiles and Clothing major is concerned with the study of the socioeconomic and physical science aspects of textiles and clothing including physical and chemical properties, applications, structure, and care of fibers and fabrics, and their production and end-use. All students in the major are required to take a common core of preparatory subject matter balanced between the social sciences humanities, physical sciences and depth subject matter in textiles and clothing as well as in business. The student is expected to have a particular area of emphasis in textiles through careful selection of restricted electives in consultation with an advisor. This major prepares you for a career in textiles and clothing and related fields including merchandising and marketing, production, testing, quality control, technical service, textile journalism, and design. Those interested in careers in extension service and teaching should consult with their advisor. Graduates are qualified to enter the graduate program in Textiles, and Textiles and Clothing or Textile Science programs at other universities.

Textiles and Clothing

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. courses shown without parentheses are required.)

NOTE: For key to footnote symbols, see page 130.

Swedish

See Scandinavian

Textiles and Clothing

Preparatory Subject Matter: 74-76
Cultural anthropoff (Anthropology 2) 4
Introduction psychology (Psychology 1) 4
Sociology (Sociology 1) 5
Economics, including general principles and accounting (Economics 1A-1B, 11A-11B) 17
Written expression, two courses (see College requirement) 4
Oral expression, one course (see College requirement) 4
Chemistry including organic Chemistry 1A, 1B, 5A, 5B 16
Statistics, one course (Statistics 13 or Economics 19) 4.5
Physics (Physics 1A, 1B) 6
Computer science (Mathematics 19) 3
History of art or design, one course 3-4
Depth Subject Matter: 45
Textiles and Clothing 6, 7
Agricultural Economics 18, 112, 113 12
Design 143 4
Restricted Electives: 25
Courses selected from the following:

Total Units for the Major 180

Restrained Electives: 34-36

Major Adviser: H. L. Needles.

Graduate Study. A program of study is offered leading to the M.S. degree in Textiles. Information can be obtained from the graduate adviser. Also see page 99.

Related Courses. See courses in Consumer Science and Design.

Courses in Textiles and Clothing

Questions pertaining to the following courses should be directed to the instructor or to the Division of Textiles and Clothing.

(Note—Each course is listed under one of three groups: a. Clothing, b. Textiles, c. Field, Group, and Special Study.)

2) Clothing

7. Social and Psychological Aspects of Dress (3)[I. III. Carrie

Lecture—3 hours. Prerequisite: introductory courses in anthropology, sociology and/or psychology recommended. A study of dress in relation to culture, society and the individual.

17A. Clothoing Structure (4) I, II

Lecture—3 hours, laboratory—3 hours. Prerequisite: clothing construction skills; courses 6 and 7 recommended. Principles of clothing design through the medium of drafting and fit pattern. Construction principles are applied.

17B. Clothing Structure (4) III

Lecture—2 hours, laboratory—4 hours. Prerequisite: course 17A. Principles of clothing design through the medium of draping in various textile fabrics.

17C. The Textile and Apparel Industries (3) Rucker

Lecture—3 hours. Prerequisite: course 10 0, 17. An introduction to the apparel design process (1A or 18). A study of the technology not covered by the production, distribution and consumption of textile goods.
Textile Science; Vegetable Crops

b) Textiles

6. Introduction to Textiles (4 L, 1 R), Morris
   Lecture—3 hours; laboratory—2 hours. Introduction to the structure and properties of textiles. Consumer use and fabric characteristics are emphasized.

100. Principles of Polymer Materials Science (3 L), Needles, Zeronian
   Lecture—3 hours. Prerequisite: Chemistry 1A-1B or 4A-4B, Chemistry 68A-B or Engineering 45; introductory physics. The basic principles of polymer science are presented including polymer structure, thermodynamics, synthesis, polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing.

161. Structure and Properties of Fibers (3 L), Zeronian
   Lecture—3 hours. Prerequisite: course 6 and Chemistry 68B. The structure, properties and reactions of natural and man-made fibers; the relations between molecular structure of fibers and their physical properties; interactions of fibers and detersgents.

161L. Textile Chemical Analysis Laboratory (1 L), Zeronian
   Laboratory—3 hours. Prerequisite: course 161 may be taken concurrently. Laboratory methods and procedures employed in qualitative and quantitative analysis of textile fibers.

162. Textile Fabrics (3 L), Morris
   Lecture—3 hours. Prerequisite: course 6. Properties of fabrics as related to serviceability, comfort, and appearance.

162L. Textile Fabrics Laboratory (1 L), Morris
   Laboratory—3 hours. Prerequisite: course 162 (may be taken concurrently). Laboratory methods and procedures employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance.

163. Textile Coloration and Finishing (3 L), Needles
   Lecture—3 hours. Prerequisite: course 6, Chemistry 68B, Physics 1B. Basic principles of dyeing, printing, and finishing of textiles; color theory, structure and properties of dyes and finishes; the effect of variables and auxiliaries on dyeing, printing, and finishing; dye and finish fixation and fastness.

163L. Textile Coloration and Finishing Laboratory (1 L), Needles
   Laboratory—3 hours. Prerequisite: course 163. May be taken concurrently. Laboratory demonstrations of various aspects of dyeing, printing, and finishing of textile substrates including the effect of fiber and finish type, and physical and chemical variables on dyeing and finishing processes and on the properties of the resultant textile.

164. Principles of Apparel Production (3 L), Morris
   Lecture—3 hours. Prerequisite: course 17B, Agricultural Economics 113. Overview of research, theoretical basis, technology and processes in the apparel manufacturing industries including study of product engineering, materials utilization and fabrication, management concepts, merchandising, production engineering.

165. Principles of Textile Processes (3 L), Needles
   Lecture—3 hours. Prerequisite: course 6, Chemistry 68B, Physics 1B. Emphasizes the physical and chemical processes involved in production of textiles from the individual fiber to the finished fabric. Includes polymerization, spinning, texturing, yarn formation, weaving preparation, weaving and knitting, non-wovens, tufting, scouring, bleaching, and physical/chemical finishing.

210. Textile Physical and Chemical Processes (3 L), Needles
   Lecture—3 hours. Prerequisite: courses 6, 161, organic chemistry (Chemistry 64A, 68A); or consent of instructor. Theoretical aspects of physical and chemical treatment of textile fiber yarns and fabrics. Fabric pre- and post-treatment, physical processing, chemical finishing, and dyeing. Effect of processes on textile and end-use properties and on the environment. Offered in odd-numbered years.

220. Textile Product Quality and Standards (3 L), Zeronian
   Lecture—3 hours. Prerequisite: course 161. Principles involved in establishing standards for implementation of government laws and regulations concerning textiles and clothing and quality controls for textile products. Offered in even-numbered years.

230. Behavioral Science Concepts in Textiles (3 L), Rucker
   Lecture—3 hours. Prerequisite: course 7, upper division or graduate courses in statistics (e.g., Agricultural Science and Management 150) and one in a behavioral science (e.g., Psychology 145); or consent of instructor. An examination of theories and research concerning relationship between clothing and human behavior with emphasis on research techniques, including methods of measuring clothing variables.

250. Recent Advances in Textiles (2 L), Zeronian
   Lecture—2 hours. Prerequisite: course 161 or consent of instructor. Critical reading and evaluation on selected topics of current interest in textiles. May be repeated for credit.

c) Field, Group, and Special Studies

47. Field Study (1-12 L), Zeronian
   Seminar—one-hour session, field trip—2 days. Prerequisite: consent of instructor; registration in advance required. Field trip to observe commercial aspect of the design, production, development, distribution and maintenance of textiles and clothing. To be given between winter and spring quarters. Considered a spring course for preenrollment. (PINP grading only.)

90. Challenges and Opportunities in Textiles and Clothing (1-11 L), Zeronian
   Seminar—1 hour. One hour per week at which students in selected areas of textiles and clothing study and share their present in today's industry, indicating challenges, opportunities and prospects for the appropriately trained university graduate. May be repeated for credit. (PINP grading only.)

92. Internship in Textiles and Clothing (1-12 I-I, II, III), Zeronian (on charge)
   Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-experience off campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (PINP grading only.)

99. Special Study for Lower Division Students (1-5 I-I, II, III), Zeronian (on charge)
   (PINP grading only.)

104A-106B. Introduction to Research in Textiles and Clothing (2-2 I-I, II, III), Zeronian (on charge)
   Prerequisite: text, major of senior standing. Senior thesis on independent research problem. Research begun in 104A will be continued and completed in 106B. (Deferred grading only; pending completion of sequence.)

192. Internship in Textiles and Clothing (1-12 I-I, II, III), Zeronian (on charge)
   Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-experience off campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (PINP grading only.)

197T. Tutoring in Textiles and Clothing (1-5 I-I, II, III, Zeronian (on charge)
   Discussion-Laboratory—3-15 hours. Prerequisite: upper division, textiles-related major and consent of instructor. Tutoring of students in Textiles and Clothing courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit if tutoring another textiles course. (PINP grading only.)

199. Directed Group Study (1-5 I-I, II, III, Zeronian (on charge)
   Laboratory—critically reviewed of selected topics of current interest in textiles. (SU grading only.)

296. Group Study (1-5 I-I, II, III, Zeronian (on charge)
   Research (1-12 I-I, II, III, Zeronian (on charge) (SU grading only.)

Textile Science

B.S. Major Requirements:

(For convenience in program planning the Usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITs

Preparatory Subject Matter

85-88 units

Chemistry, including organic and analytical: Chemistry 1A-1B, 1C (128C, 129A)

Mathematics, including calculus, statistics, computers (Mathematics 16A-16B-16C or 21A-21B-21C, 19 or 29 Statistics 13)

Physics (Physics 2A, 2B, 2C)

Economics (Economics 1A-1B)

Written and oral expression (see College requirement, page 70)

Social sciences or human specialization in Textile Science 12

Depth Subject Matter

30 units


Agricultural Science and Management 150

English 104

Restricted Electives

25 units

Select courses from the following:

Agricultural Economics 18, 112, 113, 117, 171A, 171B, 178, 179

Chemistry 2, 3, 107A

Mathematics 107B, 108, 109, 110, 111, 113, 121, 131, 135

Economics 11A, 11B, 100, 101

Mathematics 22A, 22B, 32

Physics 3A, 3B, 3C


Unrestricted Electives

37-40 units

Total Units for the Major

180 units

Major Adviser: H. L. Needles (Textiles and Clothing)

Graduate Study. A program of study is offered leading to the M.S. degree in Textiles. Information can be obtained from the graduate adviser. Also see page 99.

Textile Science

(Graduate College of Agricultural and Environmental Sciences)

The Major Program

The Textile Science major is concerned with the physical, chemical, and structural properties of fibers and fabrics, textile dyeing and finishing, polymer science and the relation of these aspects to fibers and fabrics as related to textiles. All students in this major are required to take a common core of coursework in chemistry, physics, and mathematics coupled with selected social sciences-humanities courses, and depth subject mat-

ter in textile science, statistics, and technical writing. The student is expected to emphasize a particular aspect such as physical sciences, mathematics, economics, or textiles and clothing through selection of appropriate restricted electives in consultation with an adviser. The major prepares the student for a career in textiles or fiber science and other polymer-related areas including research and development, technical service, technical marketing, production, quality control, and science teaching (on completion of an additional year in the teaching credential program). Graduates are prepared to enter the graduate program in Textiles or Agricultural and Environmental Chemistry or human specialization in Textile Science, Chemistry, and Textile Science or Fiber and Polymer Science programs at other universities.

Vegetable Crops

(Graduate College of Agricultural and Environmental Sciences)

Lawrence Rappaport, Ph.D., Chairperson of the Department

Department Office, 152 Hunt Hall (752-0516)

Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.
Veterinary Medicine, School of:

107. Principles of Anesthesia and Surgery (5 I) Leigh, L. Lecture—5 hours; laboratory—6 hours. Prerequisite: second-year standing in School of Veterinary Medicine. Course in the principles of surgery and anesthesia including introduction in surgical anatomy and techniques of surgery and anesthesia.

135. Hemolymphatic System: Normal Structure and Function (3 I) Price, J. Lecture—14 sessions; laboratory—13 3-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. Consideration of the development, structure and functions of erythrocytes, leucocytes, platelets, and hematopoietic and lymphoid tissues; hemopoiesis and its regulation; hemoglobin synthesis; blood groups, hemostasis and blood coagulation; methods of study including laboratory exercises.

Graduate Courses

203. Epidemiology, Statistics and Experimental Design (3 I) Huppmann Lecture—20 hours total; laboratory—10 hours total. Prerequisite: fourth-year standing in the School of Veterinary Medicine or consent of instructor. Course concentration on basic techniques for (1) statistical and biological follow-up, as applied to (2) laboratory-type operations (feedlots, breeder farms, etc.) and (3) bioreactor type operations (dairies, cow-calf ranches, egg producers, etc.)

205. Equine Surgery (2) I. Wheeler Lecture—2 hours. Prerequisite: fourth-year standing in the School of Veterinary Medicine or consent of instructor. Course designed to allow senior veterinary students additional training and experience with surgical procedures in the horse.

207. Small Animal Anesthesiology (2) I. Johns Lecture—1 hour; video tapes and home study. Prerequisite: third-year standing; candidates for DVM degree in animal anesthesiology emphasizing the influence of pathophysiology on anesthetic homeostasis and techniques suitable for animals of poor physical status using opioids, relaxants and dissociative agents.

211. Laboratory Animal Medicine (2) I. Sedgwick Lecture—2 hours (includes demonstrations). Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Diagnostic, therapeutic and preventive methods for diseases of rabbits, guinea pigs, hamsters, and coron related laboratory rodents will be presented to serve needs of clinical and research veterinarians.

216. Medical and Diseases of Captive Wildlife (2) I. Ferraro Lecture—2 hours. Prerequisite: enrollment in Zoological Medicine Track of Veterinary School, graduate student or consent of instructor. Prevention, diagnosis and therapy of medical problems in rabbits, guinea pigs, hamsters, mice, rats and other laboratory species.

217. Medical Primatology (2) I. Heinrich Lecture—2 hours. Prerequisite: enrollment in Zoological Medicine Track, graduate student or consent of instructor. Major diseases, medical management and husbandry of captive nonhuman primates. (SU grading only.)

218. Management and Diseases of Captive Wildlife (2) I. Ferraro Lecture—2 hours. Prerequisite: enrollment in Zoological Medicine Track of Veterinary School, graduate student or consent of instructor. Prevention, diagnosis and therapy of medical problems in captive wild animals.

219. Aquatic Animal Medicine (2) I. Fowler Lecture—2 hours. Prerequisite: fourth-year standing in the School of Veterinary Medicine. Etiology, pathology, diagnosis, treatment and prevention of diseases of fish and of some selected aquatic arthropods and mammals. Preventive management of diseases in aquaculture.

220. Gate Bird Medicine (1) I. Fowler Lecture—1 hour. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Medical and surgical problems of caged birds: handling and restraint, feeding, nutrition, respiratory, infectious diseases, anesthesia and surgery, plus problems of veterinary systems.

221. Diseases of Free Living Wildlife (2) I. Fowler Discussion—2 hours. Prerequisite: enrollment in Zoological Medicine Track of Veterinary School, graduate student or consent of instructor. Directed discussions following the reading of selected papers on free-living wildlife medicine topics. Discussions will emphasis ecological implications, geographical distribution and epidemiology.

222. Veterinary Abnormal (4) I. Holliday Lecture—26 hours; laboratory—six 2-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Abnormal function of the nervous system and diseases affecting the nervous system in animals. The

NOTE: For key to footnote symbols: see page 130
223. Small Animal Ophthalmology (2) (3). Buyumdini Lecture—2 hours. Prerequisite: course 422. The diagnosis and treatment of common ocular diseases of small animals.

226. Advanced Small Animal Cardiology (1)(3) III. Thomas Lecture—15 hours total for course. Prerequisite: course 425B or the equivalent. Cardiovascular diseases of canine and feline species.

228. Food Animal Medicine (2) (II). Hjerpe in charge Lecture—2 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine, or consent of instructor. Selection and use of antimicrobial agents in production and therapeutic uses in food animals and swine are discussed, with emphasis on pathogenesis, treatment and control. Major areas include respiratory diseases of sheep and swine, urogenital, and diseases of the bovine mammary system.

228L. Food Animal Medicine (I) (1). Baker and staff Discussion—laboratory—3 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine. Selected topics of food animal disease with emphasis on control of mastitis and internal and external parasites.

229. Herd Health Management (3) (III). Hjerpe in charge Lecture—3 hours. Practical systems for delivering veterinary service to feedlot, dairy, cow-calf, stocker, sheep and swine production units are covered, with emphasis on preventive health care.

235. Hemolympathic: Abnormal (6) I. Carlson Lecture—39 hours total; laboratory 42 hours total. Prerequisite: third-year standing in School of Veterinary Medicine. Abnormal properties of blood, regulation and disease and medical and surgical treatments of hemolympathic disease will be discussed.

245. Small Animal Theriogenology (1) (II). Feldman Lecture—1 hour. Prerequisite: third-year standing in School of Veterinary Medicine. Conditions affecting the reproductive system in the dog and cat, with emphasis on symptoms, diagnosis and therapeutic treatment. Development of diagnostic and therapeutic approaches to the clinical patient will be stressed.

246. Food Animal Theriogenology (3) (II). Kandrick Lecture—2 hours. Laboratory—3 hours. Prerequisite: course 445A. Conditions affecting the reproductive system in the cow, sow, ewe and goat, with emphasis on symptomatology, pathophysiology, treatment and control.

247. Equine Theriogenology (3) (II). Hughes Lecture—2 hours. Laboratory—3 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine, or consent of instructor. Special problems of equine reproduction with emphasis on methods of diagnosis and the interpretation of clinical signs.

249. Summer Clinics (5 or 16) Extra-session summer lecture Hjerpe Active participation in clinic—40 hours (either four or six weeks). Prerequisite: completion of first-year of study in School of Veterinary Medicine. Diagnosis and treatment of animal diseases. Students responsible for case records, care of patients, physical examinations, and participation in surgery. Graded determined by the teaching faculty by observation of student’s performance of assigned duties by rounds and discussions. The preparation of case records, and correctness and responsibility shown in the care of patients is stressed. In some sessions, students serve in the emergency on-call capacity. Students have option of completing one to two sessions. (S/U grading only.)

255. Integumentary System (5) (I). Sannard Lecture—14 hours total. Prerequisite: third-year standing in School of Veterinary Medicine. Course covers structure, function, pathologic and clinical aspects of the integumentary system and diseases of the integumentary system of animals.

260. Emergency and Critical Patient Care (2) (II). Parker in charge Lecture—14 meetings total: laboratory—3 meetings total. Prerequisite: fourth-year standing in School of Veterinary Medicine. To introduce the fourth-year veterinary student to the role of the health care professional in care of emergency and critically ill patients.

261. Small Animal Orthopaedics (2) (II). Wind Lecture—15 meetings total. laboratory—3 meetings total. Prerequisite: in School of Veterinary Medicine. Surgical approaches to joints of the shoulder, hip, elbow and stifle, and fractures of the humerus, radius ulna, pelvis, femur and tibia.

262. Radiographic Diagnosis—Small Animal (3) (I). Suter and staff Lecture—3 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine. Diagnostic radiography of small animals for the student electing small animal and mixed practice in the profession. Radiology and special procedures will be discussed as they relate to the thorax, abdomen, and musculoskeletal system.

266. Equine Lameness and Radiology (4) (III). Meagher, O’Brien, Lecture—4 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Principles in the radiographic diagnosis of lameness in the equine. Analytical techniques will be emphasized. Methods used in large animal radiography will be illustrated and the latest technique for treating equine lameness will be discussed. Equine lameness and radiology of some areas of the musculoskeletal system will also be presented.

266L. Equine Lameness and Radiology (1) (III). Louhe, Pool, O’Brien Discussion—2 hours, laboratory—3 hours. Prerequisite: third-year standing in School of Veterinary Medicine, and course 266 (concurrently).

Professional Courses

400A. Veterinary Medicine Orientation (0) (I). McGowan Discussion—2 hours total. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. An overview of the veterinary medical profession emphasizing career planning.

400B. Veterinary Medicine Orientation (1) (II). McGowan Lecture—8 hours total. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. Discussion of problems related to the medical and professional aspects of the veterinary medical profession.

401. The Normal Animal, Examination and Topographic Anatomy (3) (III). Kitchell Lecture—10 hours. Prerequisite: ten-2 hour sessions; laboratory—ten 3-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine. Anatomical structure, function, and relevance of gross topography of the study of organ systems, the performance of physical examination, routine diagnostic and therapeutic procedures.

402A. Cell Biology (3.5) I. Popper Lecture—22 hours. Discussion—five 2-hour sessions; laboratory—eight 3-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine. A functional and structural study of cells and their organelles with emphasis on the organization and specialization of cells to form the primary tissues of the body.

403A. Principles of Pharmacology (1.75) III. Joy Lecture—15 hours total. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. Designed to provide veterinary medical students with a basic foundation for the application of basic principles usually reserved to used to restore diseased animals to normal health. Course introduces principles of pharmacology and begins a consideration of drugs by classes.

403B. Principles of Pharmacology (3.5) I. Gir Lecture—3 hours total. Laboratory—demonstration—five 3-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Course examines the mechanisms and effects of drugs on various organ systems from a comparative, animal oriented viewpoint. The laboratories are designed to demonstrate the application of such material to therapeutics.

404. Fundamentals of Radiology (2.75) III. Horrof, Turrel Lecture—24 one-hour sessions; laboratory—3 three hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Ionizing radiation and its interaction with matter. Basic principles of radiologic imaging, principles of diagnostic radiology, radiotherapy and nuclear medicine; diagnostic applications of x-rays and basic principles of veterinary radiology.

405A. Parasitology (3.8) II. Lapovice Lecture—28 hours. Prerequisite: ten-one hour-demonstration laboratories. Prerequisite: first-year standing in School of Veterinary Medicine. Concepts to serve as an introduction to the veterinary parasitology. Emphasis is placed on the recognition, life cycle and ecology of anthelmintic and protozoan parasitic diseases. The relationship of these parasites to disease is briefly discussed.

405B. Clinical Parasitology (3) III. Baker Lecture—2 hours. Laboratory—ten 3-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Ecology, pathology, diagnosis, and therapeutics of the more important parasites of domestic animals.


408. Nutrition and Nutritional Diseases in Animals (3.8) II. Mott Lecture—36 hours total: one 3-hour feldrop; laboratory—one 3-hour session. Prerequisite: first-year standing in School of Veterinary Medicine. Principls of nutrition and their application to the feeding of small and large animals. Selected clinical material will be discussed in relation to deficiency symptoms, pathology and clinical treatment.

409. Epidemiology (2) II. Ruppner Lecture—20-1 hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine. Introduction to epidemiology and its applications in veterinary medicine.

410. Veterinary Toxicology (2.8) III. Fowler Lecture—28 hours total. Prerequisite: third-year standing in School of Veterinary Medicine. Diseases of animals caused or exacerbated in large animals and they relate to the prevalence of toxic agents in the environment and exposure of animals to them: the incidence, pathology, pathogenesis, diagnosis and treatment of diseases produced by poisons will be discussed.

411. Integrative Physiological Chemistry (6.6) I. Hansen Lecture—47 hours total; discussion—10 hours total; laboratory—three 3-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine. Functional and chemical principles underlying biological processes; intermediary metabolism and its control. Course will emphasize structure and functional relations of enzymes to the tissue level to give a background for understanding.


420A. Musculoskeletal Basis of Locomotion (4.9) II. Hyde Lecture—18 hours total; laboratory—31 hours total. Prerequisite: first-year standing in School of Veterinary Medicine. Gross, subgross, light microscopic, electron microscopic, functional anatomy of the musculoskeletal system of selected domestic animals.

420B. Musculoskeletal System-Abnormal Functions (4.5) III. Wind Lecture—36 hours total; laboratory—7 hours total. Prerequisite: third-year standing in School of Veterinary Medicine. Abnormal function of the musculoskeletal system and diseases affecting the musculoskeletal system in animals. The manifestations, pathology, pathogenesis, diagnosis and medical and surgical treatments of musculoskeletal disease will be discussed.

421A. Neurosciences (4.2) II. Kitchell Lecture—33 hours total: laboratory—3 3-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine. An integrated study of the nervous system including gross and microscopic anatomy, neuropsychology and neurophysiological examination of animals.

422. Veterinary Ophthalmology (2.8) I. Cello Lecture—21 hours total; laboratory—7 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Normal structures of the eye. The response of the eye to disease. All species of domestic animals will be included. Discussion of selected ocular disorders of various species.

425. Cardiopulmonary and Renal Systems—Normal Form and Function (8) III. Heusner Lecture—56 hours total: laboratory—24 three-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine. Correlated presentation emphasizing anatomical, physiological aspects of the cardiovascular, respiratory and re-
nial systems of common domesticated animals. Homeosta-
sic mechanisms governing body fluids and electrolytes will be
include.

tics detail the function of the circulatory, pulmonary, and renal systems and disease affecting these systems. Manifestations, pathogenesis, diagnosis, and medical and surgical treatment of cardiovascular, pulmonary, and renal diseases will be discussed. (Deferred grading only, pending completion of two-quarter sequence.)

427. Equine Internal Medicine (3) III. Carlson
Lecture—30 hours total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Advanced equine medical diseases including sections on general medicine, respiratory and gastrointestinal diseases, cardiology, dermatology, neurology, oncology, and ophthalmology.

430A. Structure and Function of the Gastrointestinal System (3.5) III. Curry
Lecture—24 sessions total; laboratory—11 sessions total. Prerequisite: first-year standing in School of Veterinary Medicine. Structure and function of the normal gastrointestinal system, including intestinal, as a base for understanding the disease process. Emphasis will be placed on integrating morphology and physiology with respect to gastrointestinal secretions, motility, absorption, and allied processes.

430B. Gastrointestinal Diseases: Gastroenterology (Abnor-
mal) (5) III. Strombeck
Lecture—24 hours total. Prerequisite: second-year standing in School of Veterinary Medicine. Abnormal function of the digestive system and diseases affecting the digestive system. The manifestations, pathology, pathogenesis, diagnosis including special diagnostic procedures, and medical and surgical treatments of gastrointestinal disease including diseases of the liver and pancreas.

431. Metabolism (1.5) II. Black, Freedland
Lecture—15 hours total. Prerequisite: first-year standing in School of Veterinary Medicine. Interaction of carbohydrate, lipid, and protein metabolism with emphasis on physiological control mechanisms in animals; factors affecting metabolic control including hormones, nutrition and diet, exercise, and role of metabolism in homeostasis. Significance of these processes in health and in disease.

432. Infectious Diseases (5.4) III. Pedersen
Lecture—54 sessions total. Prerequisite: third-year standing in School of Veterinary Medicine. An overview of select infectious diseases of companion and food animals including poultry. (Deferred grading only, pending completion of two-quarter sequence.)

436. Public Health and Food Safety (2.1.1) Geringer
Lecture—2 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Introduction to the preventive aspects of veterinary medicine as they relate to zoonoses, environmental hygiene and the safety of foods of animal origin.

440. Reproduction and Developmental and Abnormal Structure and Function (2.1.1) Kennedy
Lecture—24 hours total: discussion—three 3-hour ses-
sions; laboratory—one 3-hour session. Prerequisite: second-year standing in School of Veterinary Medicine. A correlated presentation of the structure and function of the normal and diseased endocrine glands of domesticated animals.

445A. Reproduction (6.6) II. III. Kendrack and staff
Lecture—44 hours total: laboratory—22 hours total. Prereq-
us: second-year standing in School of Veterinary Medicine. Course covers structure, function, pathologic and clinical aspects of reproduction (normal and abnormal).

450. Immunology (3.3) I. Osboild
Lecture—21 hours total; laboratory—12 two-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Concepts of immunobiology. Dynamics of infection and host defense. Pathogenetic mechanisms in immunological diseases, allergy, cancer immunology.

451. Veterinary Bacteriology and Mycology (5.7) I. Biber-
stein, Buchanan, Hish
Lecture—18 hours total: laboratory—20 two- and one-half hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. An introduction to the nature of bacterial pathogens and their relation to animal diseases and the methods of diagnosing bacterial and mycotic disease. (Deferred grading only, pending completion of two-quarter sequence.)

452. General Pathology (4.2) I. Moore, Moultou, Schwartz
Lecture—24 sessions total; laboratory—36 sessions total. Prerequisites: second-year standing in School of Veterinary Medicine. Basic pathologic processes, especially their nature and pathogenesis, includes degenerative changes, circulatory disturbances, inflammation and repair, abnormalities of cell growth and differentiation, and basic immunopathology.

453. Viral Pathogenesis of Animals (2.8) II. Zee
Lecture—16 hours total; laboratory—10 hours total. Prereq-
us: second-year standing in School of Veterinary Medi-
cine. The biology of infectious diseases caused by viruses. Virus-host relationship with emphasis on pathogenesis, immu-
nity and diagnosis.

456. Jurisprudence and Law for the Veterinarian (2) II. Wilson
Lecture—20 hours total. Prerequisite: third-year standing in School of Veterinary Medicine. Introduction to principles of veterinary medical jurisprudence and legal concepts pertinent to professional activities.

459. Veterinary Clinical Cytolgy (1.5) I. Zink
Lecture—8 hours total: laboratory—7 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Cytology of effusions, aspirates, washings and impression smears of organs and tissues having neoplastic, inflammatory and degenerative lesions.

470A-470B-470C. Hospital Practices (2.2-2.2) III-III.
The Staff [Director VMTH in charge]
Clinic—4 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Assignments in the medical and surgical services and clinical diagnostic laboratories of the Veterinary Medicine Clinic. (S/U grading only, pending completion of three-quarter sequence.)

471. Urban Practice Clinics (7.5-15 per quarter) I-III.
The Staff (Director VMTH in charge)
Veterinary clinical practices—30-45 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine. Clinical training for veterinary students enrolled in track programs. May be repeated for credit. (Deferred grading only, pending completion of three-quarter sequence.)

472. Animal Laboratory Practice Clinics (7.5-5.5 per quarter) I-III.
The Staff (Director VMTH in charge)
Veterinary clinical practices—30-45 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine. Clinical training for students enrolled in track programs. May be repeated for credit. (Deferred grading only, pending completion of three-quarter sequence.)

473. Equine Practice Clinics (7.5-1 per quarter) I-III.
The Staff (Director VMTH in charge)
Veterinary clinical practices—30-45 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine. Clinical training for students enrolled in track programs. May be repeated for credit. (Deferred grading only, pending completion of three-quarter sequence.)

474. Food Animal Practice Clinics (7.5-5 per quarter) I-III.
The Staff (Director VMTH in charge)
Veterinary clinical practices—30-45 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine. Clinical training for students enrolled in track programs. May be repeated for credit. (Deferred grading only, pending completion of three-quarter sequence.)

475. Zoological Practice Clinics (7.5-15 per quarter) I-III.
The Staff (Director VMTH in charge)
Veterinary clinical practices—30-45 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine. Clinical training for students enrolled in track programs. May be repeated for credit. (Deferred grading only, pending completion of three-quarter sequence.)

480A-480B-400C. First-Year Clinic Rounds (1.2) I-II-III.
The Staff (Director VMTH in charge)
Discussion—two 1½ hour sessions total. Prerequisite: first-year standing in School of Veterinary Medicine. Discussion of selected cases from the clinic. (S/U grading only, pending completion of three-quarter sequence.)

481A-481B-481C. Second-Year Clinic Rounds (1.2) I-II-III.
The Staff (Director VMTH in charge)
Discussion—two 1½ hour sessions total. Prerequisite: second-year standing in School of Veterinary Medicine. Discussion of selected cases from the clinic. (S/U grading only, pending completion of three-quarter sequence.)

NOTE: For key to footnote symbols, see page 130.
Viticulture and Enology: Water Science

A. Dinsmoor Webb, Ph.D., Chairperson of the Department
Department Office, 1023 Wickson Hall (752-0380)

Faculty

Curtis J. Alley, Ph.D., Lecturer
Maynard A. Amerine, Ph.D., Professor Emeritus
Harold W. Berg, M.S., Professor Emeritus
Roger B. Boulton, Ph.D., Assistant Professor
James A. Cook, Ph.D., Professor
Richard E. Kepner, Ph.D., Professor
W. Mark Klewer, Ph.D., Professor
Ralph E. Kunkee, Ph.D., Professor
Lloyd A. Lider, Ph.D., Professor
Carole D. Meredith, Ph.D., Assistant Professor
Klaxon E. Nelson, Ph.D., Professor
Ann C. Noble, Ph.D., Associate Professor
Harold P. Domo, Ph.D., Professor Emeritus
Cornelius S. Ough, Ph.D., Professor
Vito S. Pollio, Ph.D., Assistant Professor
Pomology

Vernon L. Singleton, Ph.D., Professor
Robert J. Weaver, Ph.D., Professor
A. Dinsmoor Webb, Ph.D., Professor
Lynn A. Williams, Ph.D., Assistant Professor

Albert J. Winkler, Ph.D., L.L.D., Professor Emeritus

Related Major Programs. See majors in Fermentation Science (page 210) and Plant Science (page 276).

Related Courses. See courses in Food Science and Technology, Plant Science 112, 112L.

Courses in Viticulture and Enology

Lower Division Courses

Lecture-2 hours; discussion-1 hour. An introduction to wine technology and the influences of alcohol, history of wine, fermentation, production practices, wine types, and the wine industry of California and other wine producing areas.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Webb in charge)
(PNP grading only)

Upper Division Courses

106. Grape Growing (3) III. Weber
Lecture-2 hours; discussion of vineyard site-1 hour. Prerequisites: Plant Science 2 or consent of instructor. Basic principles of viticulture, botany, and agriculture: or consent of instructor. Grape growing including the selection of the vineyard site and location, viticulture practices, and factors affecting the composition of the fruit during growth and maturation; fruit handling; and quality analysis.

116A. General Viticulture (3) III. Kunkel
Lecture-2 hours; laboratory-3 hours. Prerequisite: Plant Science 2 and consent of instructor. The principles and practice of wine analysis.

123. Analysis of Muses and Wines (3) I. Ough
Lecture-1 hour; discussion-1 hour. Laboratory-3 hours. Prerequisite: Chemistry 5; Food Science and Technology 153 recommended. The principles and practice of wine analysis.

126. Wine Production (3) I. Weber
Lecture-2 hours; laboratory-3 hours. Prerequisite: Bacteriology 2. Chemistry 6, 8B. Recommended: courses 3 and 123 (may be taken concurrently). The principles and practice of making various types of wines, including fermentation, yeast selection, and aging.

130. Wine and Sensory Evaluation (3) III. Noble
Lecture-1 hour; discussion-1 hour. Laboratory-3 hours. Prerequisite: Chemistry 5; Food Science and Technology 107, 107L, and courses 3, 123, and 124. Major types of wines and the factors influencing their quality: principles of sensory evaluation.

135. Wine Processing (3) III. Boulton
Lecture-2 hours; laboratory-3 hours. Prerequisite: Bacteriology 2. Chemistry 5, 8B. Recommended: Chemistry 10, 107B. Plant Science 2 and courses 3, 123, 124 and 125. Principles and theory of nonbacterial disorders: metal, tartrate, protein, color, oxidation and their control by clarification, filtration, and addition of sulfur dioxide.

136. Wine Processing Equipment (1) III. Boulton
Lecture-1 hour; field trip. Prerequisite courses 123, 124; Food Science and Technology 110A, 110B recommended. A course for undergraduates which provides a systematic description of unit operations and processing equipment utilized in modern commercial winemaking. Emphasis is given to the principles and techniques of the performance of this equipment with grapes, juices and wines.

143. Distilled Beverage Technology (4) II. Williams
Lecture-3 hours; laboratory-3 hours. Prerequisite: Chemistry 8B or the equivalent and Food Science and Technology 110A recommended. Distillation principles and practices: production technology of brandy, whiskey, and other distilled beverages, characteristics of raw materials, fermentation factors, distillation and aging, chemical analysis and sensory evaluation.

192. Internship (1-12) I, II, III. Summer. The Staff (Department Chairperson in charge)
Laboratory-3-36 hours. Prerequisite: completion of 64 units. Work-experience related to Fermentation Sciences (Enology) or Plant Science (Viticulture) majors. Responsibilities must be approved and supervised by a member of the Department of Enology or the Department of Viticulture or other qualified faculty.

199. Directed Group Study (1-5) I, II, III. The Staff (Webb in charge)
Prerequisite: consent of instructor. (PNP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Webb in charge)
(PNP grading only)

Graduate Courses

208. Plant Hormones and Regulators (3) I. Weaver, Labautical (Pomology)
Lecture-3 hours. Prerequisite: Botany 111B. Chemistry 8B, or consent of instructor. A course for upper division students. History, occurrence, extraction, measurement, chemical nature, developmental and physiological effects, role, and the theories of action of plant hormones and growth regulators; methods of application of growth regulators and factors affecting effectiveness: application in the control of plant and fruit diseases.

217. Microbiology of Wine Production (3) III. Kunkel
Lecture-1 hour; laboratory-6 hours. Prerequisite: courses 123, 124; Bacteriology 3, Biochemistry 101A; Chemistry 8B. Recommended: courses 124, 125, 126. Nature of fermentation, development, physiology, biochemistry, and control of yeasts and bacteria involved in the making, aging, and spoilage of wines.

219. Plant Pathology (3) I. Singleton
Lecture-3 hours. Prerequisites: Biochemistry 101B or the equivalent and consent of instructor. Mitochondrial and other natural polyphenolic substances of plants and their chemical, nutritive, and biochemical aspects, relation to animal diets, and relation to properties of foods and other products.

253. Winery Design and Economics (2) II. Boulton
Lecture-3 hours; 4 design classes; field trip. Prerequisite: course 135. Food Science and Technology 110A-110B, and Engineering or Mathematics 18. A graduate course which specializes in the design and economic evaluation of modern winemaking enterprises. Emphasis is given to the design of new wineries and the interaction of size, grape and bottle prices on the economic feasibility of the venture. (Offered in odd-numbered years.)

290. Seminar (1-3) I, II, III. Webb Seminar-1 hour. Prerequisite: consent of instructor.

291. Advances in Viticulture (1) II. Emphasis-1 hour. Prerequisite: consent of instructor. Expects in various fields of Viticulture and Enology will lead discussions on recent advances in their fields of expertise. Emphasis and topics will vary from year to year and course may be repeated for credit. (SU grading only)

292. Advances in Enology (1) III. Kunkel Seminar-1 hour. Prerequisite: courses 3, 123, 124, 125, 126 (3, 125 may be taken concurrently). Discussions of previously assigned reading material, usually in the form of two or three reprints. Discussions led by staff enologists to acquaint students with current research interests. (SU grading only)

298. Group Study (1-5) I, II, III. The Staff (Webb in charge)
(SU grading only)

299. Research (1-12) I, II, III. The Staff (Webb in charge)
(SU grading only)

Water Science

(College of Agricultural and Environmental Sciences)

See under the Department of Land, Air and Water Resources.
122. **Biography of Running Waters** (3) I. Knight

Lecture—4 hours. Prerequisite: Introductory introduction to biological study of aquatic ecosystems. An introduction to the study of aquatic organisms and their interactions with the environment. Topics include aquatic ecology, water quality, and the role of aquatic organisms in ecosystems.

140. **Groundwater Hydrology** (3) II. Luthi

Lecture—3 hours. Prerequisite: Course 100. Groundwater hydrology: theory and applications. An introduction to the study of groundwater systems, including groundwater flow, recharge, and discharge processes.

154. **Water and Related Resource Allocation from Economic Principles** (2) I. Grimes

Lecture—2 hours. Prerequisite: Mathematics 16A or consent of instructor. An introduction to the principles of economic principles for the allocation of water and related resources.

156. **Water Application Systems (4) II. I. Biggar

Lecture—4 hours. Prerequisite: Chemistry 5 and introductory courses in soil science and environmental science. An introduction to the principles of water application systems, including irrigation, drainage, and water conservation.

158. **Chemistry of the Hydrophile** (3) III. Tarni

Lecture—3 hours. Prerequisite: Chemistry 5 and introductory courses in soil science and environmental science. An introduction to the chemistry of water and its interactions with soil and other materials.

163. **The Biology of Streams** (3) III. Knight

Discussion—2 hours. Prerequisite: Introduction to aquatic ecosystems. A discussion of the biology of streams, including stream ecology, stream morphology, and stream processes.

168. **Directed Group Study** (1-5) II, III. The Staff (Chairperson in charge)

(PNP grading only.)

169. **Special Study for Advanced Undergraduates (1-5)** I, II, III. The Staff (Chairperson in charge)

Prerequisite: senior standing. (PNP grading only.)

**Graduate Courses**

200. **Water-Soil-Plant Relationships in Irrigation Programming** (3) III. H. Black

Lecture—3 hours. Prerequisite: course 104 or consent of instructor. Selected topics including the role of crop responses to irrigation, evapotranspiration, and water requirements, crop growth and development, soil and water management, and irrigation planning and operations for optimizing water use and crop production under conditions of limited water supply.

201. **Advanced Plant-Water Relations (3)** I. Haislo

Lecture—3 hours. Discussion sessions. Prerequisite: course 104 or Plant Science 101 or Botany 114A; elementary knowledge of metabolism and nutrition of monosaccharides or equivalent experience. An advanced study of the physiology of water and mineral uptake, transport, and metabolism in plants.

202. **Evapotranspiration (2)** II. Prutt

Lecture—2 hours. Prerequisite: Atmospheric Science 20-202 or 205, or consent of instructor. An introduction to the principles of evapotranspiration and its role in the water cycle.

205. **Water-Resource Systems Analysis: Deterministic Models (3)** I. Manito

Lecture—3 hours. Prerequisite: Mathematics 22A or consent of instructor. Course 141A or consent of instructor. Applications of deterministic models to water-resource systems design. An introduction to the principles of water-resource systems analysis.

215. **Advanced Topics in Water and Soil Chemistry (3)** II. Biggar

Lecture—3 hours. Prerequisite: Physical chemistry or consent of instructor. Advanced topics in water chemistry, including the role of water in chemical reactions and the behavior of water in solution.

217. **Hydrochemical Models (3)** I. Tarni

Lecture—2 hours. Laboratory—3 hours. Prerequisite: physical chemistry, calculus, and computer programming or consent of instructor. Mathematical models of hydrochemical processes in natural systems. An introduction to the principles of hydrochemical models.

220. **The Biology of Streams (5)** I. Knight

Discussion—2 hours. Seminar—1 hour. Laboratory—6 hours. Prerequisite: course 104 or 106. An introduction to the biology of streams, including stream ecology and the role of streams in aquatic ecosystems.

250. **Physics of Soil Water Movement** (3) II. Niesen

Lecture—3 hours. Prerequisite: Mathematics 22C or consent of instructor. Course 141A or consent of instructor in physics of soil-water systems recommended. The physics of fluid flow through porous media and immiscible fluids. An introduction to the theory of capillary pressure and pore size distribution with emphasis on unsaturated flow problems: physical aspects of porosity, permeability, and capillary pressure.

290. **Seminar (1)** I. Knight

Seminar—1 hour. Prerequisite: graduate standing. Critical review of relevant water quality studies and research literature.

291. **Seminar in Water-Soil-Plant Relations and Irrigation (1)** I, II, III. H. J. Henderson, S. Haas

Seminar—1 hour. Prerequisite: graduate standing and background in water-soil-plant relations. Informal presentation of current developments in water-soil-plant relations, principles of water use, and irrigation management. Associated discussion analyzes research approaches and techniques and data interpretation. (S/U grading only.)
Wildlife and Fisheries Biology
(College of Agricultural and Environmental Sciences)
Dennis G. Raveling, Ph.D., Chairman of the Division
Division Office, 64 Briggs Hall (752-6586)

Faculty
Daniel W. Anderson, Ph.D., Associate Professor
Louis W. Bostford, Ph.D., Assistant Professor
Joseph J. Crittenden, Ph.D., Assistant Professor
Ralph E. Hidore, Ph.D., Professor
Nadine K. Laboratories, Ph.D., Assistant Professor
Dave L. Lott, Ph.D., Professor
Rex E. Martin, Ph.D., Lecturer
Peter B. Moyle, Ph.D., Associate Professor
Dennis G. Raveling, Ph.D., Professor
Robert G. Schwab, Ph.D., Associate Professor

The Major Program
The Wildlife and Fisheries Biology major deals with the interface between the needs of man and wildlife which must be maintained for the sake of future generations for ecological stability, recreation, and food supply. Certain species of wildlife are threatened because they cannot adapt to man’s actions, whereas others have thrived so well under man-made changes in the environment that their numbers must be controlled. Emphasis is placed on biological and physical sciences, with specialization in wildlife or fisheries. This program provides training in biology appropriate to careers as wildlife or fisheries biologist, animal control specialists, game or fish technicians, or, occasionally, additional academic preparation for careers in teaching, research, and administration in those areas.

Wildlife and Fisheries Biology

B.S. Major Requirements:
For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.

Preparatory Subject Matter
Biology (Biological Sciences 1) 4
Botany (Botany 1) 5
Chemistry (Chemistry 1A, 1B, 8A, 8B) 16
Computer science (Engineering 5, Animal Behavior) 3
Mathematics (Mathematics 16A, 16B) 6
Physics (Physics 2A, 2B, 2C) 9
Zoology (Zoology 5-23) 6

Breadth Subject Matter
Ecology (Environmental Studies 100) 6
Botany (Botany 104) 16
Entomology 104, or Zoology 125) 16
Genetics (Genetics 120 or 120A) 8
Pharmacology (Pharmacology 110) 5
Vertebrate anatomy (Zoology 105 or 106 and 108) 5
Evolution (Zoology 148, 149, Genetics 103, or the equivalent) 5

Additional Courses (select 1 Plan or 1 Plan II)

Plan I: Wildlife Biology Specialization

1. Statistics (Statistics 13) plus one upper division course selected with advisor’s approval, or Agricultural Science and Management 150 4
2. Botany (Botany 102 or 108, 117) 8
3. Wildlife and Fisheries Biology 101, 110, 111, 114 16

Plan II: Fisheries Biology Specialization

1. Aquatic entomology (Entomology 118) 3
2. Limnology (Chester 150, or Fisheries Biology 102, 120, 121) 14

Unrestricted Electives
(Variable)

Total Units for the Major (minimum) 180

Major Advisor, N. K. Jacobsen
Graduate Study. See page 99

Related Courses. A selection of courses may depend on each student’s special interests. A set of related courses is available from advisers.

Courses in Wildlife and Fisheries Biology

Lower Division Course

10. Wildlife Biology (4). The Staff Lecture—4 hours. Introduction to the biological sciences 1 recommended. Introduction to the biology and ecology of aquatic and terrestrial wildlife, and basic principles of management.

96. Internship. (1-6). I, II, III. The Staff (Department Chairperson in charge)
Laboratory—3-18 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

101. Field Studies in Wildlife Biology (6) Extra session summer. The Staff Lecture—1 hour: laboratory—40 hours: field study—4 weeks, and data analysis and presentation—2 weeks. Prerequisite: upper division course in ecology and/or biology of birds or mammals; consent of instructors. Intensive 4-week field study of the biology and management of wildlife. Laboratory work follows each day’s field study and may involve laboratory work. A summary report is due at the end of the field study period. The purpose of the course is to give the student the opportunity to develop field and laboratory skills in relation to management of wildlife.

102. Field Studies in Fisheries Biology (6) Extra session summer. The Staff Lecture—1 hour: laboratory—40-80 hours: field study—4 weeks, and data analysis and presentation—2 weeks. Prerequisite: upper division course in ecology and fish biology; consent of instructors. Intensive field study of the biology and ecology of fish distribution followed by field experience. Processing, data analysis and presentation. Emphasis on individual projects that utilize knowledge gained from other courses on fish and fisheries.

110. Mammalian Biology and Ecology (5) II, Schwab Lecture—2 hours: discussion—1 hour: laboratory—6 hours. Prerequisite: Biological Sciences 1, Botany 2, and Zoology 2-3, or the equivalent. Course in ecology recommended. Introduction to the biology and ecology of noncarnivorous mammals. Emphasis on natural history, taxonomy, geographical distribution, and population dynamics of mammals and their environment, and research methods and techniques.

111. Biology and Management of Wild Birds (3) I, Anderson, Raveling Lecture—3 hours. Prerequisites: upper division course in ecology or consent of instructor. Phylogeny, distribution, reproduction, behavior, and management of birds. Emphasis on adaptations to environments, sex ratios, and management considerations.

111L Laboratory in Biology and Management of Wild Birds (2) I, Anderson, Raveling Laboratory—6 hours. Prerequisites: course 111 may be taken concurrently; consent of instructor. Laboratory exercises in bird species identification, anatomy, nests, age and sex, specialized adaptations, behavior, and research and management techniques.

120. Biology of Fish (4) I, Moyle Lecture—3 hours: laboratory—3 hours. Prerequisite: Zoology 2 or consent of instructor. Introduction to ecology, morphology, evolution, and systematics of freshwater and marine fishes. Laboratory emphasizes morphology and identification, lectures emphasize ecology and their relation to fisheries management.

121. Physiology of Fishes (4) II, Czech Lecture—3 hours: laboratory—3 hours. Prerequisite: upper division courses in nutrition, physiology or consent of instructor. Comparative physiology, growth, reproduction, behavior, and energy requirements of fishes.

122. Dynamics of Exploited Animal Populations (3) I, Bostford Lecture—3 hours. Prerequisite: upper division ecology courses. Mathematics 16A, 16B, Statistics 13. A critical evaluation of the ecological bases for exploiting animal populations (vertebrates and invertebrates). Application of form logical to quantitative concepts of population analysis and strategies of hypothesis testing. Simulation gaming will be used in teaching decision-making skills.

130. Physiological Ecology of Wildlife (5) I, Jacobsen Lecture—4 hours: discussion—1 hour. Prerequisites: course 110 may be taken concurrently), or 111 or 120. Physiology 110 and Zoology 125 or the equivalent. A study of animal functions, adaptations, and ecological energetics of wildlife. Nutrition metabolism, thermoregulation, and productivity are emphasized as a pattern of relationship for understanding the distribution and abundance of wildlife in time and space.

136. Ecology of Waterfowl and Game Birds (3) II, Raveling Lecture—2 hours: laboratory—3 hours: field trip. Prerequisite: courses 111 and 111L or the equivalent. Detailed examination of distribution, behavior, population dynamics, and management of waterfowl and upland game birds. Offered odd-numbered years.

140. Ecology and Evolution of Vertebrate Social Organization (3) II, Lott Lecture—3 hours. Prerequisite: Zoology 2 and upper division biology. Spacing, cooperation, group selection, and mating of wild vertebrates are described and analyzed as adaptive products of their evolutionary history and ecology. Minimal contraception is given to man and the other primates.

151. Wildlife Ecology (3) I, Howard Lecture—3 hours. Consideration of the ecology of wildlife species in relation to the biogeochemical aspects of wildlife behavior in relation to reforestation, range management, and pollution; the relationships of wildlife to recreation and wildlife; and resources conservation in the human ecosystem.

152. Principles of Vertebrate Control (3) III. Howard Lecture—3 hours. Prerequisite: course 151 recommended. The physiological, historical, ecological, behavioral, and economical basis for regulating population levels of species of terrestrial vertebrates found throughout the world.

153. Wildlife in Political and Administrative Contexts (3) Lecture—3 hours. Prerequisite: introductory courses in organic chemistry, ecology, statistics, and physiology or consent of instructor. Environmental politics and the role of vertebrate ecologists in the effects and mechanisms of various forms of pollution; review of instances of pollution interfering with the ecological consequences, effects on individuals, philosophical considerations. Offered even-numbered years.

160. Prospective in Wildlife Biology (4) I, III, The Staff (Raveling in charge) Seminar—1 hour. Prerequisite: senior standing in Wildlife and Fisheries Biology or consent of instructor. Reports and discussions of recent significant papers related to wildlife and fisheries biology, (P/NP grading only.)

192. Internship (1-12) I, II, III, summer. The Staff (Department Chairperson in charge)
Laboratory—3-6 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off
and on campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only.)

108. Directed Group Study (1-5) I, II, III. The Staff (Raveling in charge) (P/NP grading only.)

109. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Raveling in charge) (P/NP grading only.)

Graduate Courses

270. Seminar (0) I, II, III. The Staff (Raveling in charge) Seminar—3 hours. Prerequisite: consent of instructor. Seminar devoted to a highly specific research topic in any area of wildlife or fisheries biology. Special topic selected for a quarter will vary depending on interests of instructor and students.

271. Fish Ecology Seminar (2) I. Moyle Seminar—3 hours. Prerequisite: Graduate status or consent of instructor. Current research and advances in fisheries biology and fish ecology.

278. Group Study (1-5) I, II, III. The Staff (Raveling in charge) Lectures and/or discussions—1-5 hours.

279. Research (1-12) I, II, III. The Staff (Raveling in charge) (SU grading only.)

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Work-Learn Program

Orville E. Thompson, Ph.D., Program Director
Work-Learn and Career Planning and Placement Center
2nd Floor, South Hall (752-2855)

Program Areas

Agricultural and Environmental Sciences
Joe J. Slusale, Ph.D., Program Coordinator
Engineering and Physical Sciences
Walter E. Buski, Program Coordinator
Health and Biological Sciences
Linda Hughes, Program Coordinator
Liberal Arts and Education
Donald J. Hagerty, Program Coordinator

Internship Experience

This is a campus-wide internship program facilitated through the Work-Learn and Career Planning and Placement Center. All internships, both credit and non-credit, can be taken for Transcript Notation with completion of a required evaluation report. The notation briefly describes the nature and location of the internship experience. Questions pertaining to credit and Transcript Notation may be directed to the Work-Learn and Career Planning and Placement Office.

Courses in Work-Learn

Internship courses (numbered 92 and 192) are available at credit on a variable-unit and Passed/Not Passed grading basis. A maximum of 12 units of 92 and/or 192 courses may be counted toward the 180-unit minimum required for graduation. To qualify for the 192 course, students must have acquired 84 units of credit. All credited internships require approval and sponsorship by a faculty member from an appropriate discipline. Arrangements may be made through the department of the sponsoring faculty member and facilitated by Work-Learn staff.

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Zoology

(College of Letters and Science)
Robert D. Grey, Ph.D., Chairperson of the Department
John H. Crowe, Ph.D., Vice-Chairperson of the Department

Department Office, 2320 Storer Hall (752-1272)

Faculty

Peter B. Armstrong, Ph.D., Professor
Ronald J. Baskin, Ph.D., Professor (Zoology, Physiology)
John H. Crowe, Ph.D., Professor
David W. Deamer, Ph.D., Professor
Carol A. Erickson, Ph.D., Assistant Professor
Robert D. Grey, Ph.D., Professor
Milton Hildebrand, Ph.D., Professor
Everett W. Jameson, Jr., Ph.D., Professor
Robert A. Metcalfe, Ph.D., Assistant Professor
Milton A. Miller, Ph.D., Professor Emeritus
Brian Mulloney, Ph.D., Associate Professor
Richard L. Nurchielle, Ph.D., Assistant Professor
David W. Phillips, Ph.D., Assistant Professor
Lauren E. Rosenberg, Ph.D., Professor Emeritus
Robert L. Rudd, Ph.D., Professor
George W. Salt, Ph.D., Professor
Arthur M. Shapiro, Ph.D., Professor
Herman T. Spieth, Ph.D., Professor Emeritus
Judy Stamps, Ph.D., Associate Professor
Catherine A. Tott, Ph.D., Assistant Professor
Charles Van Ripper III, Ph.D., Adjunct Assistant Professor
Kenneth E. F. Watt, Ph.D., LL.D., Professor
Stephen L. Wolfe, Ph.D., Associate Professor

The Major Programs

The Zoology major presents animal biology from the subcellular and molecular to the community and ecosystem levels. As a basic life science major, it is suitable for students who plan to pursue a professional career in Zoology, to do graduate work in Zoology or another life science, or who intend to apply to professional schools in the health sciences. The major is structured to insure breadth of preparation while still allowing individualization of each student's program in accordance with his or her interests.

Students majoring in Zoology in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

Choice of College. The Bachelor of Arts degree is offered only in the College of Letters and Science. The Bachelor of Science degree is offered in both the College of Letters and Science and the College of Agricultural and Environmental Sciences.

Zoology

A.B. Major Requirements:

UNITS

Preparatory Subject Matter.............................................. 43-45

Chemistry 1A, 1B, 8A, 8B.................................................. 16

Biological Sciences................................................................ 5

Zoology 2-2C................................................................. 2-5

Statistics 13 or 102......................................................... 4-6

Mathematics 16A............................................................... 4

Physics 2A, 2B................................................................. 4-6

One course from Bacteriology 2, 102, Botany 2, Physics 2C............. 3-5

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Work-Learn Program; Zoology

Depth Subject Matter .................................................. 38-38

Genetics 100A-100B or 115............................................ 4-6

One course from Zoology 148, Genetics 103. Geology 107, 111A, Anthropology 151........................... 3-5

Additional upper division coursework in biological science to achieve a total of 36 units or more: 25-29

Include at least (a) 15 units in zoology, and
(b) one course or course sequence from three of the five Areas of Study shown below.

Total Units for the Major.................................................. 79-83

Recommended

Geology 3, Biochemistry 101A-101B or Physiology 101A-101B.

Zoology

B.S. Major Requirements:

UNITS

Preparatory Subject Matter.............................................. 55-61

Chemistry 1A, 2A............................................................ 16

Chemistry 8A-8B or 120A-128B........................................... 6-9

Biological Sciences 1.................................................... 5

Zoology 2-2L................................................................. 2-6

Mathematics 16A-180 or 21A-21B........................................ 6-8

Physics 2A, 2B, 2C........................................................... 9

Statistics 13................................................................. 4

One course from Bacteriology 2, 102, Botany 2......................... 3-5

Depth Subject Matter .................................................. 45-48

Biochemistry 101A-101B or Physiology 101A-101B. Genetics 100A-100B or 115 or 120............................................ 4-6

One course from Zoology 148, Genetics 103. Geology 107, 111A, Anthropology 151........................... 3-5

Additional upper division coursework in biological science to achieve a total of 45 units or more: 29-32 include at least (a) 15 units in zoology,
(b) 4 units (or 12 hours) of laboratory, and (c) one course or course sequence from four of the five Areas of Study shown below.

Breadth Subject Matter

College of Agricultural and Environmental Sciences students: 24

English and/or rhetoric................................................. 8

Social sciences and/or humanities.................................... 16

Additional requirements as described on page 70

College of Letters and Science students: refer to page 93 for a description of requirements to be completed in addition to the major.

Total Units for the Major.................................................. 100-109

Recommended

Chemistry 5, Mathematics 16C or 21C, Geology 3.

Areas of Study


3. Cell biology: Zoology 121A, 121B, 121L, 166, Botany 130L, 130L.


5. Physiology: Zoology 142, 142L, 143, 144, 146, Physiology 110, 110L.

Biological Sciences Electives

The following courses are acceptable toward the fulfillment of the upper-division biological sciences requirement in the major programs and may be selected without advisor approval. Other elective courses are approved on an individual basis by petition through an advisor.

Anatomy 100

Anthropology 150, 151, 152, 153A, 153B, 154A, 154B, 155, 156

Bacteriology, all upper division courses

Biochemistry and biophysics, all upper division courses

Biological Sciences, all upper division courses

Botany, all upper division courses

Chemistry 107A, 107B

Clinical Pathology 101, 101L, 122

Entomology, all upper division courses except 110, 112

Genetics, all upper-division courses

Geology 106, 106L, 107, 107L, 111A, 111B, 150C
Major Advisers. Students transferring to Davis from another institution and majoring in Zoology must consult an adviser immediately upon matriculation so that their transfer credits can be applied to the major requirements. All new students in the major should contact the Zoology Department Office for adviser assignment. A list of approved upper division courses for the Zoology major is available from the Department Office. Substitution of other courses for major requirements are arranged through the adviser.

Preprofessional students should establish contact with the Health Sciences Advising Office, in South Hall, to learn what specific courses are required on their transcripts.

Teaching Credential Subject Representative. Students planning for a teaching career should consult the Department of Education in regard to preparation for credential courses. See page 105 for the Teacher Education Program.

Graduate Study. The Department of Zoology offers programs of study and research leading to the M.A. and Ph.D. degrees. For detailed information regarding graduate study write to the Graduate Adviser, Department of Zoology.

Graduate Advisers. See Class Schedule and Room Directory.

Courses in Physiology

Lower Division Courses

2. Introductory Physiology (4) I. Nuccitelli Lecture—4 hours. Prerequisite: Biological Sciences 1. Physiology of muscular contraction, nervous integration, sensation, circulation, respiration, excretion, and digestion.

2L. Introductory Physiology Laboratory (2) I. Nuccitelli Laboratory—6 hours. Prerequisite: course 2 (completed or in progress).

10. Elementary Physiology (4) III. Deamer Lecture—3 hours; discussion—1 hour. Prerequisite: not open to credit. 92. Students who have had Biological Sciences 1 Introductory course in physiology for non-science majors.

Courses in Zoology

Lower Division Courses

2. General Zoology (4) I. Toft; II. Phillips; III. Stamps Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1 strongly recommended. Survey of the diversity of animal life and the basic principles of adaptation, evolution, and integration in animals.

2L. Laboratory in General Zoology (2) I. Toft; II. Phillips; III. Stamps Laboratory—8 hours. Prerequisite: course 2 (preferably taken concurrently). Laboratory on the diversity of animal life and basic principles of biological policy. (P/NP grading.)

92. Internship (1-12) I., II., III. The Staff (Chairperson in charge) Laboratory—36 hours. Prerequisite: lower division standing and consent of instructor. Work experience offered on and on campus in all subject areas offered in the Department of Zoology. Internships supervised by a member of the faculty. (P/NP grading.)

99. Special Study for Lower Division Students (1-5) I., II., III. The Staff (Chairperson in charge) Directed study of a specific topic selected by the student and the instructor. (P/NP grading.)

Upper Division Courses

100. Embryology (4) I. Armstrong; II. Grey; III. Erickson Lecture—4 hours. Prerequisite: Biological Sciences 1 and courses 2-2, concurrent enrollment in course 100, strongly recommended. Events and mechanisms of embryonic development, including fertilization, morphogenesis, cell differentiation and organogenesis, with emphasis on vertebrates.

100L. Laboratory in Vertebrate Embryology (2) I. Armstrong; II. Grey; III. Erickson Laboratory—6 hours. Prerequisite: course 100 (concurrently). Comparative analysis of the embryonic development of vertebrates. Limited enrollment. (P/NP grading only.)

101. Experimental Analysis of Animal Development (3) III. Grey; Armstrong Discussion—1 hour; laboratory—6 hours. Prerequisite: courses 100, 100L, Biochemistry 101A, 101B; and consent of instructor. Principles and techniques of genetic procedure and embryonic manipulation; applications of techniques such as microsurgery, tissue culture, and radiolabile labeling to experimental studies of developmental problems, with emphasis on sea urchins, amphibians, and chickens. Limited enrollment. Offered in even-numbered years.

106. Phylogenetic Analysis of Vertebrate Structure (5) II. Hildebrand Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2. The structure of the classes and subclasses of vertebrates is described and interpreted in terms of phylogeny.

106L. Functional Analysis of Vertebrate Structure (3) III. Hildebrand Lecture—2 hours; laboratory-demonstration—4 hours. Prerequisite: course 2. Mechanical principles are used to interpret the structure associated with supporting the body, running, digging, swimming, and feeding. Emphasis is on the skeletal system of mammals.

106P. Project on the Functional Analysis of Vertebrate Structure (1) II. Hildebrand Project report. Prerequisite: course 106 (may be taken concurrently). A project, about 2,000 words, or a dissertation with explanation, analyzing the function of a selected aspect of vertebrate structure.

110. Principles of Environmental Sciences (4) II. Powell Lecture—3 hours; discussion—1 hour. The principles basic to biological ecology, human ecology, and planning. (Same course as Environmental Studies 110.)

112A. Invertebrate Zoology (5) II. Mulloney Lecture—3 hours; laboratory—6 hours; two field trips to the ocean. Prerequisite: course 2-2L. The structures, development, and natural history of the jellyfishes and corals, the unsegmented worms, the seashells, sea urchins, and the sea asp. The laboratory emphasizes observation and comparison of living animals.

112B. Invertebrate Zoology (3) III. Phillips Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 2-2L, physiology, morphology, and embryology of the protozoans.

112N. Principles of Animal Resource Management (5) I., II. Lecture 3 hours; laboratory—3 hours; special projects. Prerequisite: Biological Sciences 1; Statistics 13: Mathematics 16A. Population dynamics and management of marine, freshwater, and terrestrial animal resources. Analysis of problems in management of animal resource production.

121A. Cell Biology (4) I. Nuccitelli Lecture—4 hours. Prerequisite: introductory course in biochemistry. This is an introduction to cell biology emphasizing the metabolism of the membrane components of cells and the structure and function of sub-cellular organelles.

121B. Cell Biology (4) I. Wolfe Lecture—4 hours. Prerequisite: introductory course in biochemistry. This is an introduction to cell biology which concentrates on the nucleus and covers recent findings related to DNA, RNA, protein synthesis and molecular processes.

121L. Cell Biology Laboratory (3) II. Baskin, Deamer Lecture—1 hour; laboratory—6 hours. Prerequisite: Biochemistry 101A-101B required. Course 121A-121B recommended, or consent of instructor. Exercises illustrating the principles of cell biology, emphasis on individual research employing one or more advanced techniques.

122. Histology (4) II. Crowe Lecture—3 hours; laboratory—2 hours. Prerequisite: course 121A-121B. Histology is essential. Functional morphology of animal tissues and organs. Emphasis is placed on the use of structural studies in elucidating mechanisms underlying physiological and metabolic processes.

122L. Histology Laboratory (3) II. Crowe Laboratory—6 hours. Prerequisite: course 122 (may be taken concurrently). Laboratory techniques in histology: use of such techniques in research. Design and execution of a research project is required.

123. Animal Ecology (3) I. Satt; II. Toft Lecture—3 hours. Prerequisite: courses 2-2L. A general survey of the concepts of animal ecology.

133A. Patterns in Vertebrate Biology (3) II. Jameson Lecture—3 hours. Prerequisite: course 2. Introduction to physiology, distribution and behavior of vertebrates such as mammary, migration, food, reproduction and predation.

133B. Patterns in Vertebrate Biology (3) III. Jameson Lecture—3 hours. Prerequisite: course 2. Vertebrate biology with respect to thermo-regulation and water balance, sexual dimorphism, migration, food, reproduction and predation.

133L. Systematics and Field Studies in Cold-Blooded Vertebrates (3) III. Jameson Laboratory—6 hours. Field trips. Prerequisite: course 133 and consent of instructor. Systematic and faunal studies on poikilothermic vertebrates.

136. Mammalogy (2) I. Rudd Lecture—2 hours. Prerequisite: course 125 or equivalent general course in ecology. Systematics, life history, reproduction, distribution and physiology of wild mammals.

136L. Mammalogy Laboratory (3) I. Rudd Laboratory—6 hours. extensive weekend field-trips. Prerequisite: course 125, or 136 and consent of instructor. Systematics of California mammals; techniques of study in professional mammalogy. May be taken concurrently with course 136.

137. Ornithology (2) I. Rudd Lecture—2 hours. Prerequisite: course 125 or the equivalent course in ecology. Distribution, physiology, and population dynamics of birds.

137L. Ornithology Laboratory (3) I. Rudd Lecture—6 hours. Prerequisite: course 125 or 137 (may be taken concurrently) and consent of instructor. Systematics, behavior, population dynamics and reproduction of California birds. Individual study and field trips strongly emphasized.

138. Ecology of Tropical Habitats (3) III. Rudd Lecture—3 hours. Prerequisite: courses 2-2L or the equivalent; course in introductory ecology recommended. Physical and biological aspects of tropical zones. Distributions, number, ecological and evolutionary relationships of tropical animals.


142. Invertebrate Physiology (4) I. Crowe Lecture—3 hours; term paper; individual conferences. Prerequisite: either course 112A or 112B. Chemistry 1A, 1B, Physics 2B, Biochemistry 101A, 101B recommended. Comparative physiology of invertebrate organ system.

142L. Invertebrate Physiology Laboratory (3) I. Crowe Laboratory—4 hours. Introduction to research project. Prerequisite: course 142 (may be taken concurrently). Experiments on the physiological mechanisms of invertebrate organ systems. Designs and execution of research projects.

144. Cellular and Developmental Neurobiology (4) I. Muloney Lecture—3 hours; extensive reading. Prerequisite: course 2-2L, Biochemistry 101A-101B or the equivalent. Neurological structure: impulse transmissions; synapses; transmitters and neurotransmitter pharmacology; receptors; growth and differentiation of neurons and nervous systems; genetics of behavior. Only three units of credit allowed students who have received credit for course 144. Offered in odd-numbered years.

143L. Neurobiology Laboratory (4) I. Muloney Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: course 143 or 144 and consent of instructor. Physics 28 recommended. Students will learn to record action potentials and synaptic circuits, to interpret quantitatively their recordings, and to use vital dyes and intracellular stains. Limited enrollment.

144. Cellular Basis of Behavior (4) I. Muloney Lecture—3 hours; discussion—1 hour. Prerequisite: courses 2-2L. Neurons and nervous systems, sensory systems, and behavior. Emphasis on sensory modulation of behavior; analysis of neural substrates of stereotyped behavior; long-term changes in CNS. Only three units of credit allowed students who have received credit for course 143.

147. Zoogeography (4) I. Jameson Lecture—3 hours. Prerequisite: courses 2-2L or Entomology 100. Movements of terrestrial animals. The role of geographic, climatic, and biologic changes in the geographic distribution of animals.
146. Animal Phylogeny and Evolution (4) Il, Metcalf
Lecture—4 hours. Prerequisite: course 2 or the equivalent and Genetics 100: ecology and biochemistry recommended. Introduction to current evolutionary theory. The place of evolution as the central unifying theory to biology will be emphasized.

149. Evolution of Ecological Systems (4) Il. Shapiro
Lecture—3 hours; term paper. Prerequisite: course 125 or Environmental Studies 100 (or the equivalent) and course 148 or Genetics 103 (or the equivalent). Evolution as an organizing force in natural communities. Coadaption in trophic and competitive relationships. Ecology of polymor-
phisms, clines, and speciation.

155. Behavior of Animals (5) II. Stamps
Lecture—3 hours; discussion—1 hour, term paper. Basic principles, mechanisms and evolution of behavior, with special reference to the significance of behavior under natural conditions.

158. Evolution of Behavior (3) Il, Metcalf
Lecture—3 hours. Prerequisite: course 148. Genetics 103, or consent of instructor. Course in population genetics strongly recommended and basic course in behavior, ecology, and physiology recommended. Current interpretations of the adaptive significance of behavioral patterns and the mechanisms of their evolution. Emphasis on the genetic basis of behavioral evolution through examination of data and theoretical models.

166. Advanced Cell Biology (4) Il, Baskin
Lecture—3 hours; extensive reading and research report. Prerequisite: Biochemistry 101B and Mathematics 168. The physical-chemical basis of cell structure and function, including a discussion of aspects of biological thermodynamics, the ionic basis of excitation, and the molecular basis of contractility.

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learning experience off and on campus in all subject areas offered in the Department of Zoology. Internship supervised by a member of the faculty. (PINP grading only.)

197. Senior Colloquium in Zoology (2) III. The Staff
Lecture-discussion—2 hours. Prerequisite: senior standing. The consideration of innovation and synthesis in broad areas of zoology. (PINP grading only.)

197. Tutoring in Zoology (1-5) I, II, III. The Staff (Chair-
person in charge)
Discussion—1-2 hours. Prerequisite: major in zoology; con-
sent of instructor. Experience in teaching zoology under guidance of staff. (PINP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chair-
person in charge)
(PINP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Directed study of a specific topic selected by the student and the instructor. (PINP grading only.)

Graduate Courses

202. Biometrics (6) II. Warf
Lecture—4 hours; laboratory—4 hours. Prerequisite: two courses in calculus, three courses in statistics. Mathemati-
cal aspects of physiology, ecology, and epidemiology: development and testing of models; mathematical descrip-
tion of biological systems; measurement, analysis, simulation and optimization in biology. Offered in odd-numbered years.

203. Global and Regional Modelling (6) III. Watt
Lecture—1 hour; discussion—1 hour; seminar—3 hours; laboratory—3 hours. Prerequisite: Mathematics 164-168; Statistics 106 and 108 or 131A-131B-131C; FORTRAN. Use of statistical analysis of data, mathematical modeling, and computer simulation of the world or regions to provide basis for policy recommendations and new legislation. Offered in even-numbered years.

204. Cellular Basis of Morphogenesis (4) I, Armstrong
Lecture—3 hours; term paper. Prerequisite: course 100. Development of form and structure; morphogenetic move-
ment, mechanisms of cellular motility, cell adhesion, inter-
cellular invasion, interaction of cells and tissues in develop-
ment.

205. Developmental Biology (3) II. Erickson
Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: course 100 and consent of instructor: Bio-
chemistry 101 recommended. Introduction to research in development. Observations and experiments involving a variety of developing systems and experimental methods, with critical interpretation of the results. Open to qualified undergraduates. Offered in odd-numbered years.

205. Biology of Fertilization (3) III. Gey
Lecture—2 hours; term paper. Prerequisite: course 121A or the equivalent and consent of instructor. The morphology, physiology and biochemistry of gametes and the mechan-
ism and consequences of their union. Offered in even-
numbered years.

206. Cellular Biology of the Malignant Transformation (1) II. Armstrong
Lecture—1 hour. Prerequisite: course 100; course 121A or 21B; or Biochemistry 101A and 101B. Topics include: fac-
tors causing the malignant transformation of cells, control of growth of tissue cells (and loss of control in transformed cells), mechanisms of intercellular invasion, natural defense mechanisms against transformed cells. Emphasis is at the cellular and molecular levels.

207. Experimental Animal Ecology (4) II. Salt
Lecture—2 hours; 3 weekend field trips, 2 written critiques. Prerequisites: course in animal ecology. Discussion of means of generating ecological hypotheses and methods of testing those hypotheses. Topics will include analysis of field observation, experimental design in both field and laboratory, and interpretation of results. Limited enrollment.

208. Muscle Physiology (4) Il, Baskin
Lecture—2 hours; discussion—1 hour, term paper. Prereq-
quisite: Biochemistry 101A-101B and Mathematics 181 or 21B; or consent of instructor. The physical and chemical aspects of muscle function.

240. Topics in Cell Biology (3) II, Baskin, Deamer
Lecture—2 hours; discussion—1 hour. Prerequisite: gradu-
ate standing and consent of instructor. Discussion and re-
view of current topics in the area of cell biology. May be repeated for credit.

241. Membrane Biology (3) I, Deamer
Lecture—3 hours. Prerequisite: course 121A-121B or Bio-
chemistry 101A-101B recommended, or consent of instruc-
tor. Course emphasizes biological aspects of membrane function and structure. The general approach will be to discuss cell biology from the viewpoint of membranous components of cells. Offered in odd-numbered years.

243. Topics in Cellular and Behavioral Neurobiology (3) Ill, Muldowney
Seminar—2 hours. Prerequisite: consent of instructor. An advanced examination of several current problems in neu-
robology. Topics will vary in different years; may be re-
peated for credit. (SU grading only.)

266. Seminar in Cell Biology (2) II. Wolfe, II, Baskin
Seminar—2 hours. Prerequisite: consent of instructor. Dis-
cussion of recent literature on the physical and chemical aspects of organization and function of living systems, topics of current interest in ultrastructure and function of cells. Organizational and functional properties on the molecular and cellular levels of biological systems.

Seminar—2 hours. Prerequisite: consent of instructor. Pre-
sentation and critique of faculty and graduate student re-
search in developmental biology. Intended primarily for graduate students. (SU grading only.)

287. Seminar in Animal Behavior (2) Il, Stamps
Seminar—2 hours. Prerequisite: consent of instructor. Re-
ports and discussion on the principles and recent develop-
ments in invertebrate and vertebrate animal behavior.

292. Seminar in Development (2) II. Armstrong, Grey, Erick-
son, Nuccitelli
Seminar—2 hours. Prerequisite: consent of instructor. Re-
ports and discussion on embryology, morphogenesis and de-
velopmental mechanisms.

293. Seminar in Invertebrate Zoology (2) II. Crowe
Seminar—2 hours. Prerequisite: either course 112A or 112B, or consent of instructor. Critical review of the literature in selected topics and taxa in the invertebrates. Open to qualified undergraduates.

294. Seminar in Animal Ecology (2) I, II, Rudd
Seminar—3 hours. Prerequisite: course 125 and graduate standing. Readings and discussions of advanced topics in the population and community ecology of animals.

295. Seminar in Marine Invertebrate Zoology (2) II. Phillips
Seminar—2 hours. Prerequisite: course 112A or 112B; con-
sent of instructor. Reports and discussions on current topics in marine invertebrate ecology. Open to qualified undergraduates.

296. Seminar in Geographical Ecology (2) II. Shapiro
Seminar—2 hours. Prerequisite: course 125 or 140 or Gene-
tics 103 or consent of Instructor. Recent developments in theoretical and experimental biogeography, the biology of colonizing species, and related topics.

297. Seminar in Systematic Zoology and Evolution (2) II. Rudd
Seminar—2 hours. Prerequisite: consent of instructor. Prin-
ciples of animal classification, speciation and the evolution of higher categories. Emphasis on modern concepts and pertinent contributions from the fields of genetics and paleontology.

298. Group Study (1-5) I, II, III. The Staff
(PINP grading only.)

299. Research (1-12) I, II, III. The Staff (Gray in charge)
(SU grading only.)

NOTE: For key to footnote symbols, see page 130.
Appendix

STATEMENT ON LEGAL RESIDENCE AT THE UNIVERSITY OF CALIFORNIA

Each new student entering the University of California (and each former student returning after an absence of one or more quarters) is required to submit a Statement of Legal residence to the Office of the Registrar. This Statement is used by the Deputy to the Attorney in Residence Matters in determining the legal residence of each student for fee assessment purposes.

Students who have not been legal residents of California for more than one year immediately prior to the residence determination date for each quarter in which they propose to attend the University are charged, along with other fees, a tuition fee of $800 for the quarter.

The residence determination date is the day instruction begins at the last of the University of California campuses to open for the quarter.

Establishing Legal Residence for Tuition Purposes

In order to be classified as a resident for tuition purposes at the University of California, an adult student must have established his or her residence in California for more than one year immediately preceding the residence determination date for the term during which he or she proposes to attend the University and have relinquished any prior residence. An adult student must couple his or her physical presence within this state for one year with objective evidence that such presence is consistent with his or her intent in making California his or her permanent home and, if these steps are delayed, the one-year durational period will be extended until BOTH presence and intent have been demonstrated for one full year. Indeed, physical presence within the state solely for educational purposes does not constitute the establishment of California residence under State law regardless of the length of his or her stay in California.

Relevant indicia which can be relied upon to demonstrate one’s intent to make California his or her permanent residence include, but are not limited to, the following: registering and voting in California elections; designating California as his or her permanent address on all school and employment records, including military records if one is in the military service; obtaining a California driver’s license or California Identification Card, if a non-driver; obtaining California vehicle registration; paying California income taxes as a resident, including income earned outside this state; establishing an abode where one’s permanent belongings are kept within California; licensing for professional practice in California; and the absence of these indicia in other states during any period for which residence in California is asserted. Documentary evidence may be required. No single factor is controlling or decisive. All relevant indicia will be considered in the classification determination.

The student must petition to have his or her status changed at the Office of the Registrar at the campus attended, and documentation of residence (driver’s license, voter registration receipt, etc.) may be requested at that time. All changes of status must be initiated prior to the late registration period for the quarter or semester for which the student intends to be reclassified.

The residence of the parent with whom an unmarried minor (under age 18) child maintains his or her place of abode is the residence of the unmarried minor child. When the minor lives with neither parent his or her residence is that of the parent with whom he or she maintained his or her last place of abode. The minor may establish his or her residence when both parents are deceased and a legal guardian has not been appointed. The residence of an unmarried minor who has a parent living cannot be changed by his or her own act, by the appointment of a legal guardian, or by relinquishment of a parent’s right of control.

A man or a woman establishes his or her residence. A woman’s residence shall not be derivative from that of her husband, or vice versa.

The student is cautioned that this summation is not a complete explanation of the law regarding residence. The student should also note that the rate of nonresident tuition and the residence requirements are subject to change. Regulations have been adopted by The Regents, a copy of which is available for inspection in the Registrar’s Office of the campus.

Those classified incorrectly as residents are subject to reclassification and to payment of all nonresident fees not paid. If incorrect classification results from false or concealed facts (by the student), the student also is subject to University discipline. Resident students who become nonresidents must immediately notify the Attorney in Residence Matters’ Deputy.

Inquiries from prospective students regarding residence requirements for tuition purposes should be directed to the Attorney in Residence Matters, 590 University Hall, 2200 University Avenue, Berkeley, California 94720. No other University personnel are autho-
ized to supply information relative to residence requirements for tuition purposes. Any student, following a final decision on residence classification by the Residence Deputy, may make written appeal to the Attorney in Residence Matters at the above address within 120 days after notification of the final decision by the Residence Deputy.

Exceptions

1. A minor student who remains in this state after his or her parent, who was a resident of California for at least one year immediately prior to leaving but has established residence elsewhere shall be entitled to retain resident classification if the student enters the University within one year after the parent moves, so long as continuous attendance is maintained at the University.

2. Nonresident students who are minors or 18 years of age who can show that they have been totally self-supporting through employment and actually present within California for the entire year immediately prior to the residence determination date and have demonstrated the intent to make California their permanent home may be eligible for resident status.

3. A student shall be entitled to resident classification if immediately prior to the residence determination date he or she has lived with and been under the continuous direct care and control of any adult other than a parent for not less than two years, provided that the adult having such control has been a California resident during the year immediately prior to the residence determination date. This exception continues until the student has attained the age of majority and has resided in the state the minimum time necessary to become a resident student, so long as continuous attendance is maintained at an institution. No support can be given the student by either parent.

4. Exemption from payment of the nonresident tuition fee is available to the natural or adopted child, stepchild or spouse who is a dependent of a member of the United States military stationed in California on active duty. Such resident classification may be maintained until the student has resided in California the minimum time necessary to become a resident. If a student is enrolled in an institution and the member of the military is transferred on military orders to a place outside the United States immediately after having been on active duty in California, the student is entitled to retain resident classification under conditions set forth above.

5. A student who is a member of the United States military stationed in California on active duty, except a member of the military assigned for educational purposes to a state-supported institution of higher education, shall be entitled to resident classification until he or she has resided in the state the minimum time necessary to become a resident.

6. Alien students who (1) have been admitted to the United States for permanent residence and have resided in California for one year after such admission, (2) are minors who have been admitted to the United States for permanent residence and whose parent(s) have been admitted to the United States for permanent residence and have resided in California for one year after such admission, (3) are refugees who have been granted parole, conditional entrant or indefinite voluntary departure status and who have resided in California for one year (effective until June 30, 1981), and (4) hold certain nonimmigrant visa classifications may be entitled to resident classification. For complete information, please contact the Residence Deputy in the Registrar's Office.

7. Children of deceased public law enforcement or fire suppression employees, who were California residents and who were killed in the course of law enforcement or fire suppression duties, may be entitled to resident status.

Waivers Of Nonresident Tuition

To the extent funds are available, nonresident tuition waivers may be granted to spouses and dependent, unmarried children under age 21 of University faculty members who are qualified for membership in the Academic Senate; to unmarried, dependent children under age 21 of a full-time University employee whose permanent assignment is outside California and who has been employed by the University for more than one year immediately prior to the opening of the term. Inquiries regarding these waivers normally should be directed to the Deputy in Residence Matters, Registrar's Office, of the campus the student proposes to attend.

In addition, certain student Teaching Assistants and Teaching Fellows, and certain graduate students designated as University Fellows and distinguished Scholars may be eligible for nonresident tuition waivers or fellowships. Such students should contact the Graduate Division at their campus for further information.
DISCLOSURE OF STUDENT RECORDS

In accordance with the Federal Family Educational Rights and Privacy Act of 1974 and the University of California Policies Applying to the Disclosure of Information from Student Records, students at the University have the right:

- To inspect and review records pertaining to themselves in their capacity as students;
- To have withheld from disclosure, absent their prior consent for release, personally identifiable information from their student records, with exceptions as noted in Section 10.72 of the Policies;
- To inspect records maintained by the campus of disclosure of personally identifiable information from their student records;
- To seek correction of their student records through a request to amend the records or a request for a hearing; and
- To file complaints with the Department of Health, Education and Welfare regarding alleged violations of the rights accorded them by the Federal Act.

These rights are implemented on the Davis campus by UCD Policy and Procedure Manual Section 320-21, "Disclosure of Information for Student Records."

Questions about these rights should be referred to Bob Franks, Office of Student Activities and Conduct, telephone 752-1128. Copies of the Federal Act, the full text of the UC Policies and the UCD Policy and Procedure Manual Section 320-21 may be consulted at the Reference Desk of the Shields Library. Copies of the UC Policies and Policy and Procedure Manual Section 320-21 may be obtained at the Office of Student Activities and Conduct.

Categories of personally identifiable information designated by the campus as public information are: name, address, telephone listing, date and place of birth, major field of study, dates of attendance, degrees and honors received, the most recent educational institution attended, participation in intercollegiate athletics and the name, weight, and height of the participants on intercollegiate University athletic teams; provided, however, that address and telephone numbers are not public information with respect to interns, residents, and fellows, and that with respect to these students, public information also includes primary hospital assignment, field of residency training, and name of medical school awarding the M.D. degree.

Students may request, in writing, by the last day of registration, that any or all personally identifiable information from their records not be regarded as public information. Students who desire to withhold their addresses and telephone listings may so indicate on the Student Data Card included in the registration packet. Students who desire to withhold any other item of information in the list from the category of public information must file a form in the Registrar’s Office indicating which items they wish withheld.

Students availing themselves of this right should understand what the consequences of this action may be. For example, if a request is made to withhold from disclosure a student’s name and degrees and honors received, the campus cannot make public any honors received by the student, e.g., the award of a Regents Scholarship or election to Phi Beta Kappa, and cannot include the student’s name and degree earned in the campus commencement program without the written consent of the student. Similarly, if a request is made to withhold from disclosure a student’s name and dates of attendance, a student’s status as a student cannot be verified for potential employers without written consent of the student. Furthermore, if a student’s last instruction to the campus was to withhold from disclosure the degree granted to that student and the date on which the degree was conferred, that information cannot be confirmed for a third party in connection with the appointment of that graduate to a new position or published in connection with an honor that individual subsequently receives. Students may reverse the decision of a previous quarter at registration for a new quarter on the student data form, or at any time by filing a form with the Registrar’s Office indicating which items they now wish released.
RETENTION DATA' AND GRADUATION RATES AT UCD

Freshmen

(Retention and graduation rates for regularly admissible undergraduates entering UCD as freshmen.)

<table>
<thead>
<tr>
<th>Fall Quarter of Initial Enrollment</th>
<th>Number of Students</th>
<th>Percent Enrolled in 4th Quarter</th>
<th>*Percent Graduating in 4 Years</th>
<th>5 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>1,801</td>
<td>85%</td>
<td>40%</td>
<td>59%</td>
</tr>
<tr>
<td>1972</td>
<td>1,959</td>
<td>85%</td>
<td>39%</td>
<td>60%</td>
</tr>
<tr>
<td>1973</td>
<td>1,940</td>
<td>86%</td>
<td>36%</td>
<td>60%</td>
</tr>
<tr>
<td>1974</td>
<td>2,004</td>
<td>84%</td>
<td>31%</td>
<td>—</td>
</tr>
</tbody>
</table>

Transfer Students

(Retention and graduation rates for regularly admissible undergraduates transferring to UCD as juniors.)

<table>
<thead>
<tr>
<th>Fall Quarter of Initial Enrollment</th>
<th>Number of Students</th>
<th>Percent Enrolled in 4th Quarter</th>
<th>*Percent Graduating in 2 years</th>
<th>3 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>1,159</td>
<td>79%</td>
<td>43%</td>
<td>71%</td>
</tr>
<tr>
<td>1973</td>
<td>1,261</td>
<td>78%</td>
<td>42%</td>
<td>67%</td>
</tr>
<tr>
<td>1974</td>
<td>1,193</td>
<td>75%</td>
<td>39%</td>
<td>64%</td>
</tr>
<tr>
<td>1975</td>
<td>1,253</td>
<td>76%</td>
<td>39%</td>
<td>67%</td>
</tr>
<tr>
<td>1976</td>
<td>1,006</td>
<td>76%</td>
<td>31%</td>
<td>—</td>
</tr>
</tbody>
</table>

* These are not necessarily years of continuous enrollment. Students may drop out or go on Planned Educational Leave for a quarter or longer, and then resume their studies.
1 Source: Research and Evaluation, University of California, Davis (March 1980).

PROPORTION OF UCD GRADUATES FINDING WORK IN THEIR FIELD OF CHOICE'

The percent of UCD alumni whose full-time job is in the field of their choice is shown by field of study and number of years since receiving the bachelor’s degree.

Field of Study*

<table>
<thead>
<tr>
<th>Years Since Graduation</th>
<th>Animal Science</th>
<th>Applied Economics</th>
<th>Food Science</th>
<th>Plant Science</th>
<th>Bio-science</th>
<th>Resource Science</th>
<th>Engineering</th>
<th>Humanities</th>
<th>Physical Science</th>
<th>Social Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>66</td>
<td>78</td>
<td>79</td>
<td>76</td>
<td>51</td>
<td>65</td>
<td>88</td>
<td>47</td>
<td>76</td>
<td>49</td>
</tr>
<tr>
<td>4 years</td>
<td>73</td>
<td>75</td>
<td>87</td>
<td>65</td>
<td>71</td>
<td>65</td>
<td>95</td>
<td>56</td>
<td>94</td>
<td>71</td>
</tr>
</tbody>
</table>

* Source: A 1977 survey of 1976 UCD graduates conducted by Student Affairs Research and Evaluation, University of California, Davis.
* Fields of study are a group of related undergraduate majors. For example, "Animal Science" would include such majors as UCD as Animal Science, Avian Sciences, and Wildlife and Fisheries Biology.

SALARY AND EMPLOYMENT INFORMATION
AVERAGE MONTHLY SALARY OFFERS TO GRADUATES WITH BACHELOR’S, MASTER’S, AND DOCTORATE DEGREES'

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>Bachelor’s Average Monthly Salary</th>
<th>Master’s Average Monthly Salary</th>
<th>Doctorate Average Monthly Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Sciences</td>
<td>$1,162</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>1,183</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Business</td>
<td>1,232</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Chemistry</td>
<td>1,332</td>
<td>1,662</td>
<td>2,079</td>
</tr>
<tr>
<td>Computer Science</td>
<td>1,483</td>
<td>1,697</td>
<td>$</td>
</tr>
<tr>
<td>Engineering</td>
<td>1,667</td>
<td>1,823</td>
<td>2,382</td>
</tr>
<tr>
<td>Health Professions</td>
<td>1,062</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Humanities</td>
<td>983</td>
<td>944</td>
<td>$</td>
</tr>
<tr>
<td>Mathematics/Statistics</td>
<td>1,356</td>
<td>1,689</td>
<td>1,875</td>
</tr>
<tr>
<td>Physical and Earth Sciences</td>
<td>1,473</td>
<td>1,699</td>
<td>$</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>982</td>
<td>1,172</td>
<td>$</td>
</tr>
</tbody>
</table>

* Source: A 1980 national survey of a representative group of colleges and universities conducted by the College Placement Council. It should be noted that a wide variation in starting salaries exists within each discipline based on job location, type of employer, personal qualifications of the individual, and employment conditions at the time of job entry.
OTHER USEFUL PUBLICATIONS

Undergraduate Admissions Circular
A complete statement of the University's requirements for admission as an undergraduate.
Office of Undergraduate Admissions, 175 Mrak Hall, or from your high school or community college counselor. (No charge.)

Answers for Transfers
A question-and-answer booklet for students who want to attend a community college before transferring to the University. Gives information about University admission requirements, costs, financial aid, and advice on planning your program and transferring courses to UC.
Available from University Admissions Offices and Relations with Schools Offices, and at community college counseling offices. (No charge.)

29 Questions and Answers about UC Davis
Some answers to commonly asked questions about UCD.
Office of Undergraduate Admissions, 175 Mrak Hall. (No charge.)

Announcement of the Graduate Division, UC/Davis
Brief descriptions of the graduate programs and research resources including admission requirements, procedures and dates for filing applications, degrees offered, fields of study, degree requirements, fees and expenses, financial aid and student services, and sources of additional information. Course descriptions are not included.
Dean of the Graduate Division, 252 Mrak Hall. (No charge.)

College of Engineering Bulletin
A detailed description of College of Engineering programs, majors, and course offerings.
College of Engineering Dean's Office, 2120 Bainer Hall. (No charge.)

Graduate School of Administration Bulletin
Admission requirements, description of academic programs, courses of instruction, faculty, and general information.
School of Administration, 111 Voorhies Hall, University of California, Davis 95616. (No charge.)

School of Law Bulletin
A detailed description of admissions requirements, academic programs, courses of instruction, faculty, law school activities, and general information about the School of Law.
Office of Admissions, School of Law, University of California, Davis 95616. (No charge.)

School of Medicine Bulletin
A detailed description of academic programs, courses of instruction, faculty, student activities, admissions requirements, and general information about the School of Medicine.
Office of Admissions, School of Medicine, University of California, Davis 95616. (No charge.)

Class Schedule and Room Directory
Issued quarterly. Lists times and place of meeting for specific classes, instructors, and units of credit. Also contains information on registration and enrollment in classes.
Available for 25 cents at the UCD Bookstore. (Not available by mail.)

Summer Sessions Bulletin
Complete information about Summer Session courses and instruction.
Office of the Summer Sessions, 375 Mrak Hall. (No charge.)

Educational Opportunity Program (EOP) Brochure
Information on applying to the EOP program; application dates.
EOP, Office of Admissions, 175 Mrak Hall. (No charge.)

Financial Aid Handbook
Information on financial aid: grants, loans, and work-study at UCD.
Financial Aid Office, North Hall. (No charge.)

Student Viewpoint
Student-compiled evaluations of courses and professors by in-class surveys. ASUCD Catalog of student services and organizations and Student Directory of student names, addresses and phone numbers.
Student Viewpoint Office, 13 Lower Freeborn. (No charge. Available by mail.)

Venture
University Extension quarterly catalog. Complete information about Unex courses, including times and locations.
University Extension, 4445 Chemistry Addition. (No charge.)

City of Davis Information
Chamber of Commerce, 620 4th Street, Davis, CA 95616.
GLOSSARY

**Academic Senate** The faculty governing body of the University. Consists primarily of the regular faculty and certain administrative officers. Determines conditions for the admission of students and for granting certificates and degrees; develops educational policy; and authorizes and supervises all courses in the University.

**Academic year** Starts at the beginning of the Fall Quarter, ends at the close of the Spring Quarter; does not include Summer Sessions.

**Advanced degree** Any degree beyond the bachelor's degree.

**AOB** Stands for "Academic Office Building," a building that houses administrative and academic offices. AOB is the informal designation until the building is officially named.

**ASUCD** (Associated Students of the University of California, Davis) The undergraduate student body governing organization at UCD.

**College** A subdivision of the campus instructional system (e.g., College of Letters and Science). The Colleges are further divided into departments (e.g., English, Zoology, etc.) which offer specialized curricula.

**Continuing student** One who was registered for the immediately preceding quarter.

**Credential** A license for public school teaching in California. Programs offering the multiple-subject (elementary) or single-subject (high school) teaching credential are supervised by the Graduate Division in coordination with the Department of Education.

**Curriculum** (plural, curricula) All the courses of study offered by the University. May also refer to a particular course of study (major) and the courses in that area.

**Drop/Add Petition** A petition used when you want to drop, change or add a course to your study list.

**Enrollment** The actual placing of a student in classes; to be on record as officially registered in a class.

**Good standing** An undergraduate student who has at least a 2.0 grade-point average in all work completed at the University of California, and who has maintained his or her minimum unit progress requirement for UCD, is considered a student in good standing.

**Grade-point average (GPA)** The GPA is computed in the following manner. You receive a certain number of points for each grade received. An "A" grade is worth 4 points, a "B" worth 3, a "C" worth 2, "D" worth 1, and an "F" worth 0. The total number of points accumulated is then divided by the number of course credits taken for a letter grade. The result is the grade-point average. Passed, Not Passed, or Incomplete grades are not computed in the quarterly grade-point average. (Exception: Incompletes are counted as "F" at the end of a student's undergraduate studies when determining whether a bachelor's degree candidate has achieved the required 2.0 average.) Only grades received for courses completed at the University of California are computed.

**Graduate student** A student who is enrolled in the Graduate Division for an advanced degree. Graduate courses at UCD are numbered 200-499.

**GSA** (Graduate Student Assembly) The elected representative body for graduate students at UCD.

**Independent studies** Special courses involving independent work supervised by a faculty member. Such courses for undergraduates are numbered 98, 99, 198, and 199. Those for graduate students are numbered 298, 299, 398, 399, 498, and 499. These courses are restricted to qualified students for a designated number of units.

**International student** A student enrolled in nonresident status who is a citizen or resident of another country.

**Lower Division** Freshman and sophomore standing at UCD (fewer than 84 units completed); also refers to UCD courses numbered from 1 through 99.

**Major** The area of academic concentration in which the degree is conferred.

**Matriculate** To enroll for a degree in a college or school.

**Minimum progress** Refers to the number of units a student must have completed and passed by the end of a specific number of quarters at UCD.

**New student** A student beginning work at any level at UCD is considered to be a new student. After one quarter's attendance at Davis, a student is considered to be a continuing student. Graduate students who were enrolled at UCD as undergraduates are considered to be new students for their first quarter of graduate work.
Part-time student A student enrolled in the Part-Time Degree Program.

Passed/Not Passed (P/NP) A system used to encourage undergraduate students to experiment in fields outside of their major areas. The "P" grade is given for a grade of C- or better. P/NP grades are not included in a student's grade-point average, but the units are counted toward the 180-unit graduation requirement.

Petition A request, usually written on a standard form, to adjust a study list or curriculum to fit an individual situation. Also, a request for an exception to a policy or regulation.

Prerequisite A necessary condition for enrollment in a course or a major. Prerequisites for courses usually consist of a previous course or courses in a related subject and/or the instructor's permission. Prerequisites are indicated in the course descriptions.

Professional school student A student enrolled in the School of Law, Administration, Medicine, or Veterinary Medicine.

Probation An indication that performance is below standard because of academic deficiencies; a trial period in which a student is permitted to redeem failing grades or deficient units.

Quarter A subdivision of the academic year at UCD, consisting of three 10-week terms (Fall, Winter, and Spring Quarters). The two 6-week Summer Sessions provide a quarter's work in a more concentrated format, but are not considered regular quarters. (Attendance at both Summer Sessions, however, may count as one quarter in residence.)

Quarter units Academic work at the University is measured by quarter units of credit which determine the amount of time a student has formally devoted to a given subject. To convert these units to semester units multiply by 2/3; from semester to quarter units multiply by 3/2.

Registration The process by which a student informs the University that he or she plans to begin attendance or continue attendance. Registration typically involves paying fees and enrolling in classes.

Registration card (sometimes called a "reg card") Given to a student who is registered and has paid all fees for the current quarter. You will need your registration card to secure grades, gain student admittance to campus events, and to identify yourself as a UCD student. If you lose your registration card there is a $3 replacement fee.

Regular session Refers to Fall, Winter, and Spring Quarters. Students in the School of Medicine also attend a Summer Quarter.

Residence This word is used in a number of senses in this catalog; care must be taken to determine the meaning of the word each time it is used: (1) to denote registration in a regular session (i.e., when a student is "in residence" during Fall, Winter, or Spring Quarters); (2) to denote the period of time that a student must be registered at UCD in order to be eligible for graduation (i.e., academic residence); (3) to denote a student's state of residence (e.g., California) to determine if nonresident tuition must be paid (i.e., legal residence); (4) to indicate the student's place of residence (i.e., living quarters).

Sabbatical A leave of absence granted to a University professor for travel, research, etc. may be from one quarter to a full year.

Satisfactory/Unsatisfactory The equivalent of Passed/Not Passed for graduate students. The "S" grade is given for a grade of B- or better in graduate courses and C- or better in undergraduate courses.

Semester A subdivision of the academic year into two sessions, usually Fall and Spring, each lasting approximately 18 weeks. Only the School of Law uses the semester system at UCD. To convert semester units to quarter units, multiply by 3/2.

Study List The official program of courses for which a student registers. The Study List is submitted to the Registrar at the time of registration each quarter. In the College of Agricultural and Environmental Sciences, the Study List also refers to a student's long-term academic plan.

Subject A The University's requirement in English composition which must be completed to receive the bachelor's degree.

Summer Sessions Two 6-week summer sessions are offered between the close of Spring Quarter and the opening of Fall Quarter. Regular instruction, both undergraduate and graduate, is offered for full credit.

TA (Teaching Assistant) TAs are graduate students, usually on the doctoral level, who teach on a part-time basis while pursuing their degrees. They are selected, trained, and supervised by senior faculty members in each department.

TB Stands for "temporary building," usually a trailer or pre-fabricated building not intended as a permanent facility.

TBA Stands for "to be announced." In the Class Schedule and Room Directory course listings, TBA may refer to class meeting time, instructor's name, or room number for class meeting.

Tenure Denotes security of employment until retirement; may be granted to a faculty member after a specified number of years at the University.

Term A regular quarter (Fall, Winter, or Spring).

Transcript An official copy of your academic record (grades) at an educational institution such as the University of California.

Undergraduate A college student who is pursuing a bachelor's degree.

Unit Courses are assigned a unit value based on one unit of credit for every three hours of work (in-class and preparation time) per week by the student. A student's progress in the University and class level are determined in part by the number of units completed.

Upper Division Junior and senior standing at UCD, based upon completion of at least 84 units; also refers to UCD courses numbered 100-199.

Work-Learn A program providing on-the-job experience in a student's field of interest. Participation may be full time (during the summer or academic year) or part time, and may be paid or volunteer. Academic credit may also be earned.

Work-Study A financial aid program which provides eligible students with part-time jobs on campus or with off-campus nonprofit organizations.
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