UC/DAVIS
General Catalog
1989-90
HOW TO USE THIS CATALOG

The UC Davis General Catalog is a source of information about the Davis campus course offerings, academic programs, campus facilities, services, fees, requirements, and campus life. 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 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.)

There is a list of major publications and where you can request them in the Appendix.

The General Catalog is divided into four major sections:

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

If you are a prospective student, the first section of the catalog will answer your questions about the Davis campus—what it's like and what makes it special. 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 in the Appendix. The names of some majors may not convey to you what academic areas courses cover. So, 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 (but no course listings).

Current students should refer to the General Catalog throughout their years here to answer specific questions on regulations, requirements, and course offerings. Although every effort is made to keep the General 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 (117 Mrak Hall), for more comprehensive information on programs and their requirements.

We are always trying to make the General Catalog more helpful, so please let us know of difficulties you encounter in using it or send us your suggestions for improvement (Publications Office, Repro Graphics Building, or Office of the Registrar, 117 Mrak Hall).

IT IS THE RESPONSIBILITY OF THE INDIVIDUAL STUDENT TO BECOME FAMILIAR WITH THE ANNOUNCEMENTS AND REGULATIONS OF THE UNIVERSITY PRINTED IN THIS CATALOG AND THE CLASS SCHEDULE AND ROOM DIRECTORY.

The University of California, Davis will provide assistance to the visually impaired regarding the information contained in this catalog. Questions should be directed to the office or department concerned.

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ADDRESS DIRECTORY
University of California
Davis, California 95616
(916) 752-1011 (main campus number)

Office of the Chancellor
Mrak Hall
752-2265

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 Division
252 Mrak Hall
752-0650

School of Law
1011 King Hall
752-0243

Graduate School of Management
308 Voorhies Hall
752-7362

School of Medicine
Medical Sciences 1C
752-0331

School of Veterinary Medicine
1018 Haring Hall
752-1360

Office of Summer Sessions
376 Mrak Hall
752-1647

University Extension
1333 Research Park Drive
752-0880

Admissions
Undergraduate: Office of Admissions
175 Mrak Hall
752-2971
EOP Office of Admissions
175 Mrak Hall
752-2993

Graduate: Graduate Division Admissions
252 Mrak Hall
752-0655

Law: School of Law Admissions
151 Voorhies Hall
752-6477

Management: Graduate School of Management
311 Voorhies Hall
752-7399

Medicine: School of Medicine Admissions
Medical Sciences 1C
752-2717

Veterinary Medicine: School of Veterinary Medicine Admissions
1044 Haring Hall
752-1383

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

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

Scholarship Office
130 North Hall
752-2397
(undergraduate scholarships)

Fellowships and Graduate Scholarships
Graduate Division
252 Mrak Hall
752-7481

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

Housing
Community: Student Housing Office
752-2483

Residence Halls: Student Housing Office
752-2033

Student Family Housing: Orchard Park
752-4000

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

Disability Resource Center
101 Siso Student Center
752-3184 (voice), 752-6889 (telephone device for the speech and hearing impaired)

Memorial Union Information Desk
752-2222

News Service
334 Mrak Hall
752-1930

Relations with Schools/EOP Outreach Services
11 Mrak Hall
752-1099

Residency Matters, Attorney In
580 University Hall
University of California
Berkeley, CA 94720

Student Health Service
54A Cowell Student Health Center
752-2300 (voice, and telephone device for the speech and hearing impaired)

Information Services Office
129 Mrak Hall
752-0539
(campus tours, maps, and information)
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ACADEMIC CALENDAR*

- Pick up registration and course enrollment materials (all continuing students).
- Faculty advisers available to all students.
- Turn in course enrollment forms and student data card (all continuing students).
- Turn in fees along with fee statement (all continuing students).

- Quarter begins.
- Orientation and testing.
- In-Person Registration.
- In-Person Enrollment.

- Instruction begins.
  - Final day of late registration.
  - Final date to file petitions to change status from part-time to full-time student, or vice versa.
  - Final date to file petitions to add courses to study list without paying a $3 service fee.
  - Final date to file petitions for PELP.
  - Final date to petition to add or drop courses (thereafter permission may be granted only by the dean of your school or college and only under exceptional circumstances).
  - Final date for undergraduates to file petitions with the Dean of their college or school to take courses on a P/NP basis. Exceptions rarely approved.
  - Final date for graduate students to file petitions with the Dean of the Graduate Division to take courses on a S/U basis.
  - Final date to file Independent Study Program project proposal form with the Academic Senate Committee on Courses of Instruction.

- Instruction ends.
- Final examinations.

- Quarter ends.
- Commencement.

- Academic and Administrative Holidays.

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<td>Feb. 7-9</td>
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<td>Feb. 15-16</td>
<td>May 31-June 1</td>
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<td>June 1-Aug. 4</td>
<td>Nov. 8-14</td>
<td>Feb. 7-16</td>
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<td>Feb. 7-Mar. 2</td>
<td>May 31-Aug. 17</td>
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Sept. 25-27     Jan. 2-3       Mar. 28-29     Sept. 24-26
Sept. 25-26     Jan. 2-3       Mar. 28-29     Sept. 24-25
Sept. 27        Jan. 3         Mar. 29        Sept. 26

Thurs., Sept. 28  Thurs., Jan. 4  Fri., Mar. 30  Thurs., Sept. 27
Oct. 11          Jan. 18        Apr. 12        Oct. 10
Oct. 11          Jan. 18        Apr. 12        Oct. 10
Oct. 11          Jan. 18        Apr. 12        Oct. 10

Nov. 1          Feb. 8         May 3        Oct. 31
Nov. 1          Feb. 8         May 3        Oct. 31

Fri., Dec. 8  Thurs., Mar. 15  Thurs., June 7  Fri., Dec. 7
Sat., Dec. 16   Fri., Mar. 23     Fri., June 15  Sat., Dec. 15
Thurs-Fri.,     Mon., Jan. 15       Mon., May 28    Thurs-Fri.,
Nov. 23-24      Mon., Feb. 19       Mon., Nov. 22-23     Nov. 22-23
Mon.-Tues.,     Mon., Mar. 26       Mon.-Tues.,     Mon.-Tues.,
Dec. 29-Jan. 1  

Candidates for Degrees
Undergraduates
- Filing period for those who expect to complete work for bachelor's degree to file an Announcement of Candidacy with the Registrar.
- Final date for Agricultural and Environmental Sciences students who plan to complete work for a minor program to file applications with the Dean's Office.
- Final date for Letters and Science students who plan to complete work for a minor program to file applications with the Dean's Office.

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<tr>
<td>Final date for Letters and Science students who plan to complete work for a minor program to file applications with the Dean's Office.</td>
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*Dates are subject to change and should be checked with appropriate Class Schedule and Room Directory.
Note: Thursday, March 15, treated as Monday for class schedule purposes.
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.
  
  FALL 1989
  Mon., Oct. 2
  WINTER 1990
  Fri., Jan. 12
  SPRING 1990
  Thurs., Mar. 1
  FALL 1990
  Fri., June 1
  (for Sept. '90)
  Mon., Oct. 1
  (for Dec. '90)

- Final date for candidates for master's degrees to file theses with the committee in charge.
  
  Wed., Nov. 1
  Fri., Feb. 9
  Mon., May 7
  Mon., July 23
  (for Sept. '90)
  (for Sept. '90)

- Final date for candidates for master's degrees to file theses or final report on comprehensive examination with the Dean of the Graduate Division.
  
  Fri., Dec. 15
  Fri., Mar. 23
  Fri., June 15
  Fri., Sept. 14
  (for Sept. '90)

- 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.
  
  Mon., Aug. 14
  Mon., Nov. 13
  Thurs., Feb. 1
  Mon., May 21
  (for Sept. '90)
  Wed., Aug. 15
  (for Dec. '90)

- Final date for candidates for the degrees of Doctor of Philosophy and Doctor of Engineering to file theses with the committee in charge.
  
  Mon., Oct. 2
  Mon., Jan. 8
  Mon., Apr. 2
  Mon., July 2
  (for Sept. '90)

- 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.
  
  Fri., Dec. 1
  Thurs., Mar. 1
  Fri., June 1
  Mon., Sept. 3
  (for Sept. '90)

Admission Deadlines

- Applications for admission to undergraduate standing, including applications for intercampus transfer and EOP/SAA, must be filed with complete credentials with the Office of Undergraduate Admissions on or before this date.
  
  Nov. 30
  (1988)
  July 31
  (1989)
  Oct. 31
  (1989)
  Nov. 30
  (1989)
  June 1

- Applications for admission to graduate standing, with complete credentials, must be filed with the Dean of the Graduate Division on or before this date.
  
  June 1
  June 1

- Applications for admission to the Graduate School of Management for 1990-91 must be filed with the School on or before this date.
  
  June 1

- Applications for admission to the School of Law for 1990-91 must be filed with the School on or before this date.
  
  Apr. 1

- Applications for admission to the School of Medicine for 1990-91 must be filed with the School on or before this date.
  
  Feb. 1

- Applications for admission to the School of Veterinary Medicine for 1990-91 must be filed with the School on or before this date.
  
  Nov. 1
  (1989)

- Applications for readmission to undergraduate status must be filed with the Registrar on or before this date.
  
  Nov. 1
  (1989)

- Applications for readmission to graduate status must be filed with the Graduate Division on or before this date.
  
  Fri., Aug. 25
  (1989)
  Fri., Dec. 1
  Fri., Feb. 23
  Fri., Aug. 24
  Tues., Aug. 1
  Wed., Nov. 1
  Thurs., Feb. 1
  Wed., Aug. 1

Financial Aid Deadlines

- Applications for grants, loans, work-study, and California Student Aid Commission awards for 1990-91 must be filed with a processor during this filing period for priority consideration.

- Applications for fellowships and graduate scholarships for 1990-91 must be filed with the Graduate Division on or before this date.

  Jan.1-Mar. 2
  Jan. 15
Introduction
THE DAVIS CAMPUS

Theodore L. Hullar, chancellor of UC Davis, administers this campus of 21,800 students, and almost 1,700 teaching faculty.

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, Management, Medicine, and Veterinary Medicine. Approximately 5,300 students are engaged in graduate or professional study.

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, Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology, American Chemical Society, American Society of Landscape Architects, the Commission for Teachers Preparation and Licensing, and the Joint Commission on Accreditation of Hospitals. Students interested in reviewing the accreditation documents may do so by scheduling an appointment with the Office of Vice Chancellor—Academic Affairs, Mrak Hall.

UCD's History

The Davis campus grew out of legislation passed in 1905 establishing a "University Farm" where young men and women could combine the scientific whys with technical hows in agriculture. The land for the campus was purchased in 1906, and the first students came to Davis in 1908, some for limited course work and some from UC Berkeley for practical training in agriculture.

The demand for greater educational opportunities in the city increased rapidly and in 1922, in conjunction with the UC Berkeley College of Agriculture, the degree of Bachelor of Science in Agriculture was granted those who completed the Davis program. A few years later, the Davis campus had its own College of Agriculture and, in 1948, 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 Management began holding classes in the fall of 1981.

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), a $25,000 prize for undergraduate teaching and scholarly achievement (believed to be among the largest of its kind in the nation), 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 Skills 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.

UCD has long been known for teaching and research in agricultural sciences. The reputation of the Davis campus in many other fields has advanced as Davis has moved into the ranks of the top 20 general research universities in the United States.

The Setting

The Davis campus lies adjacent to the city of Davis (population 43,200), 15 miles west of Sacramento and 72 miles northeast of San Francisco. Sacramento, with all its resources as the state capital, is only 20 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 3,600 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 usually above freezing. It rarely 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. Approximately 46 miles of bike paths and 40,000 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 Yolo Bus (CBL) linking Davis with the nearby cities of Woodland and Sacramento is supplemented by Un-
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It's the 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.

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 21,000 students, its style remains friendly, informal, and personal. As the campus moves toward the nineties, a special effort is being made to reflect the diversity of the general population by attracting more ethnic minorities, handicapped students, Vietnam-era veterans, and other underrepresented groups.

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 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, Davis Comic Opera Company, Davis Musical Theatre Company, 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 theater performances, exhibits, meetings, and special events.

Since its early days, Davis has recognized the importance of open space. It now operates 18 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 20,000 people only 20 years ago, the population of Davis stands today at over 43,000.

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 20 percent, while natural gas consumption has been reduced more than 40 percent. 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 Davis Campus Today

Looking around the campus you can see modern concrete and glass buildings—the newest is four-story Meyer Hall completed in 1987—contrasting with the older, original wooden structures from the University Farm days. The first building on campus, University House, is still in use as the Gifts and Endowments Office.

The spirit of the campus’ 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—entirely—reflects UCD’s aim to bring together learning and life, scholarship and teaching, theory and practice, and general and professional education.
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 1866, 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 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. Some 150 laboratories, Extension centers, and research and field stations on campuses and in other parts of the state strengthen research and teaching while providing public service to California and the nation.

The nine campuses of the University have a current enrollment of more than 161,000 students, 90 percent of whom residents of California. More than one-quarter 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 18 Nobel Laureates 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 1989, 20 scholars from within 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 composing the board, 20 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.

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 Pierpont Gardner is president and head of the Universitywide administration. Authority for the administration of each campus has been delegated to a chancellor.
The General Library at the University of California, Davis, is comprised of the Peter J. Shields Library, the Physical Sciences Library, the Agricultural Economics Library, the Loren D. Carlson Health Sciences Library and the Library at the UCD Medical Center in Sacramento. There are also a number of specialized departmental libraries located on the campus, as well as a Law Library located at the King Hall Law School.

The libraries contain over 2.2 million volumes and receive about 50,000 periodical and journal titles annually. Resources in the natural sciences and the agricultural sciences are outstanding, and there are strong collections in the humanities, fine arts, social sciences, and engineering as well. The UC Davis libraries rank twenty-third among the ninety-nine academic libraries in the United States and Canada which make up the Association of Research Libraries. In addition to the book collections, there are over 2.5 million items on microcopy, 200,000 maps, 586,000 pamphlets, and 13,000 sound recordings.

Shields Library serves as the main library for the campus and houses, in open stacks, the collections in the humanities, arts, social sciences, biological sciences, and agricultural sciences. A major expansion of this facility is under construction with occupancy projected for sometime in 1990. Service units in Shields Library include the Departments of Humanities/Social Sciences, Biological/Agricultural Sciences, Government Documents, Special Collections, Access Services, the Periodicals Room, the Interlibrary Loan Service, and the Reserve Book Room. Shields Library also houses the General Library's administrative offices and the technical processing departments.

Shields Library is an official depository for Federal and State publications, and the Government Documents Department provides services which make it easier to use these materials. Current issues of journals and newspapers, some 7,000 titles, are housed in the Periodicals Room and are available for library use only. The Reserve Book Service lends, on a short-term basis, items which are assigned for class readings. The Department of Special Collections houses rare books, manuscripts, photographs, and pamphlets supporting research in the arts and humanities. Special subject strengths include nineteenth-century British literature, American avant-garde poetry, the performing arts, and the history of agriculture, technology, and rural life. Special Collections also administers University Archives, which includes UC Davis theses and dissertations, and the Michael and Margaret B. Harrison Western Research Center, a 17,000 volume collection that documents the history and development of the trans-Mississippi West from the mid-nineteenth century to the present, with particular emphasis on the American Indian. Other facilities in Shields Library include a browsing collection for recreational reading, audio-visual equipment, a graphic arts loan collection, and copying machines at various locations.

The collections of the Physical Sciences Library, consisting of over 232,000 volumes, support teaching and research in engineering, computer sciences, physical sciences, and mathematics. The library maintains a collection of 966,000 research reports of the U.S. Department of Energy, the National Aeronautics and Space Administration, the Nuclear Regulatory Commission, and other governmental agencies. The Carlson Health Sciences Library serves the Schools of Medicine and Veterinary Medicine with a collection of approximately 202,000 volumes. The Agricultural Economics Library holds more than 7,000 bound volumes and 241,000 unbound pamphlets in this field. The Library at the UCD Medical Center provides a clinical collection of 23,000 volumes.

The use of most library materials has been made easier by an automated circulation system. The MELVYL online catalog contains complete holdings for the Physical Sciences, Carlson Health Sciences, and the Law Libraries, and records for most of the Shields Library collection, including all books added since 1977. It also provides access to over 4 million titles located on the eight other campuses of the University.

Interlibrary loan services allow borrowers to obtain materials from libraries throughout the University and from all over the world.

The libraries provide orientation and assistance in using the various collections. Audiotape walking tours and lectures on the resources of the libraries are part of the Educational Services Program. Three courses for credit are offered: "Introduction to Library Research and Bibliography" (English 28), "Library Research Resources and Methods in the Biological and Agricultural Sciences" (Entomology 298), and "Biomedical Information Resources and Retrieval" (Epidemiology and Preventive Medicine 401).
A valuable research tool is the Automated Information Retrieval Service (AIRS), which is available in Shields Library's Humanities/Social Sciences, Biological/Agricultural Sciences, and Government Documents Departments, and in the Physical Sciences, Carlson Health Sciences and Medical Center Libraries. This service connects local terminals to computerized databases which provide information and bibliographies of periodical literature and other publications of the last 20 years, often including abstracts, in almost all subject areas. Numeric information and literary or other texts are available in some fields. Most databases also provide selective dissemination of information (SDI) to help researchers regularly update their knowledge. There is a charge for AIRS services.

Specialized equipment to facilitate library use by disabled patrons is available in most libraries on campus. Telephones designed to communicate with hearing-impaired persons are available in Shields, the Physical Sciences, and Carlson Health Sciences Libraries. A Kurzweil Reading Machine, which converts printed text to spoken form, is located in the Reserve Book Room in Shields Library, while additional equipment for vision-impaired users is available in the other libraries. The libraries cooperate with the Disability Resource Center in providing this equipment. Users requiring other accommodations because of disability are encouraged to inquire at any reference desk; the libraries are committed to a policy of service to borrowers with special needs.

Some books from the Shields and Physical Sciences Libraries are now located in the Library Annex (in Surge II) and may be used there or delivered to another campus library on request. Some less-used library materials are located in the Northern Regional Library Facility, operated by the four UC campuses in northern California. All volumes are accessible within 48 hours by leaving a request at the Loan Desk in the Shields, Physical Sciences, or Carlson Health Sciences Libraries.

Daily intercampus bus transportation between the Davis and Berkeley campuses is available to facilitate library research and other scholarly activities. Information about reservations and cost for these buses is available in departmental offices or from the Central Garage.

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.

The University Arboretum

Arboretum Headquarters
Temporary Building 32
752-2496

The University Arboretum occupies an area of about 200 acres and provides a living collection of plants along Putah Creek's abandoned north fork for teaching and research. The plants are attractive dry-land trees and shrubs. The acreage includes demonstration gardens, paths, campus art, and picnic tables for recreation.

Outstanding plant collections are represented by the oaks in the Shields Grove, the California native trees and shrubs (in the Mary Wattis Brown Garden), and the T. Elliot 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). Two gardens of herbaceous perennials are next to Shields Grove: the Carolee Shields white flower garden and the Ruth Risdon Storer Garden of hardy plants.

The Arboretum program of seed exchange is international in reputation and has provided the University with numerous exotic plant specimens and also serves to distribute California native plants throughout the world. Also, the Arboretum administers the Putah Creek Campus Reserve, about 150 acres of riverine woodland and wildlife along some three miles of the constantly flowing south fork of Putah Creek. This area is used for research and education.

Work-learn internships and work study for Davis students are available through the Arboretum in botany, horticulture, landscape architecture, and environmental education.
Agricultural History Center
378 Voorhes Hall
752-1827

The Center coordinates and administers several research and publication programs designed to further the study of agricultural history. Primary research activities include studies of comparative farm policy, the history of farm land values, the causes and consequences of agricultural mechanization and other sources of productivity improvements in the nineteenth and twentieth centuries, and the impact of scientific research.

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

Bodega Marine Laboratory
P.O. Box 247
Bodega Bay, CA 94923
(707) 875-2211

The Bodega Marine Laboratory is an organized research unit dedicated to research and teaching in marine biology and related fields. Research areas include biochemistry, physiology, genetics, microbiology, ecology, aquaculture, and fisheries. A variety of undergraduate courses are taught during the academic year and summer session. Student housing is available. The Laboratory is located in Bodega Bay, Sonoma County, 100 miles west of Davis. The Laboratory is surrounded by 362 acres of varied habitats which comprise the Bodega Marine Reserve.

California Primate Research Center
Primate Center
752-0447

The research staff of the California Primate Research Center (CPRC) investigates selected human health problems for which the nonhuman primate is the animal model of choice. Research programs include behavioral biology, developmental and reproductive biology, respiratory diseases, comparative retrovirology, virology and immunology, and a variety of biomedical collaborative research projects. A major theme of the CPRC is the study of environmental influences on vertebrate organisms and the recognition and development of new spontaneous and experimentally-induced disorders. Primate medicine and primate pathology teams are responsible for the health of the colony and for research on spontaneous diseases.

The Center, established in 1962, is supported by a grant from the National Institutes of Health. Many of the projects occurring at the center are funded by grants and contracts from a wide variety of extramural sources.

The facilities and training programs of the Center are currently being used by 34 core and collaborative faculty members, over 50 affiliate scientists, more than 50 undergraduate and graduate students, visiting scientists, and approximately 120 technical and supporting staff members.

The Campus Writing Center
Temporary Building 116
752-8824

The Campus Writing Center is a campuswide program designed to provide writing instruction across the curriculum and to assist faculty and teaching assistants with the writing component of General Education courses. Its primary means of accomplishing this goal are through

- Adjunct writing courses, and
- Writing workshops.

Adjunct writing course sections (English 102) are paired with specified courses in other disciplines. Because the reading and writing assignments in the adjunct courses are determined by the subject matter of the paired course, the adjunct courses offer students an opportunity to improve their writing skills while mastering the content of a specific discipline. In addition, English 102 courses, which carry three units of credit, will now fulfill the upper division composition requirement in the College of Letters and Science or partially fulfill the written and oral expression requirement in the College of Agricultural and Environmental Sciences.

The writing workshops are available upon request by faculty members or teaching assistants. The workshops focus on specific aspects of academic writing and are adapted to meet the needs of any field. In particular, workshops are designed to offer training and help to professors or teaching assistants in General Education courses who have responsibility for assigning, correcting and evaluating student papers. Workshops are also conducted (upon the request of faculty members) for undergraduate students writing essay examinations or term papers.

The Campus Writing Center is affiliated with both the Office of the Vice Chancellor, Academic Affairs, and with the English Department.

Computing Services
Surge II
752-0233

Computing Services, with main offices at Surge II, serves the campus for batch, interactive timesharing, and re-
mote job entry mainframe computing. Additionally, numerous microcomputers and scientific workstations are provided for student use. The department's primary concern is service to students and, therefore, instructional usage on the academic computer systems has priority over research and administrative users. Davis has developed an innovative Easy Access system of computing for student use. Any student on campus, upon presentation of a valid registration ID card at the Dispatch Counter in the basement of Hutchison Hall, 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. Regularly scheduled computer-related and individual study courses are funded separately. Microcomputer labs are also provided at no direct charge to students.

Computers operated by Computing Services include: a Unisys A10FX, the primary administrative computer; a Unisys A6KX for administrative development work and A10FX backup; and five DEC VAX 11/785s and five VAX 11/750s for academic use. These systems support over 100 terminals located in four student terminal rooms, plus over 3,000 additional terminals and microcomputers located throughout the campus. One of the terminal classrooms is designed primarily for teaching interactive graphics and is equipped with twenty-four color graphics terminals and six ink-jet color graphics copiers. During open hours these classrooms can be used by students any time that class instruction is not scheduled. Consultants are available to answer questions. Additionally, there are seven microcomputer labs with a combination of over 140 IBM PC compatible, IBM PS/2, and Macintosh microcomputers. There is also a 28 station SUN 3/50 scientific workstation laboratory.

The computer systems are accessed through the Dev-lenet, a switching computer which allows the user to identify from an individual terminal the computer system required for the work which is to be accomplished. Computing Services also manages a Data Entry Group for key-to-disk entry of data into the computer systems.

**Center for Consumer Research**

148 Everson Hall
752-2647

The Center is a small 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 Center also houses a library containing books and periodicals on consumer-related topics.

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

**Early Childhood Laboratory**

Temporary Building 117
752-2888

The Early Childhood Laboratory (ECL) is sponsored by the Human Development and Family Studies unit in the Department of Applied Behavioral Sciences to provide a facility where students enrolled in Human Development courses, can develop observational techniques and participate with peers, children, parents, and professionals in an early childhood program. The faculty help students link theory and practice, develop a recognition and respect for individual differences, and consider their interaction and communication styles. Selected graduate students and faculty also conduct research at the Laboratory.

Four Laboratory programs accommodate children from ages six months to five years for three hours a day, following the academic calendar. Tuition is lower for UCD student families than for UCD staff, faculty, and community based families. A county program for child-
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dren with special needs is housed at the ECL facility, and children and staff from both programs mix as frequently as possible. Information about the ECL and enrollment procedures can be obtained by telephoning 752-2888 in the mornings or writing to ECL, Department of Applied Behavioral Sciences.

Veterinary Medicine Teaching and Research Center (VMTRC)
18830 Road 112, Tulare, California 93274
(259) 888-1731

The facilities of the VMTRC at Tulare were occupied in January, 1983. Located in a region of the state that has concentrated, diversified livestock production enterprises, the Center has developed programs with livestock production units to serve as a principal clinical center of UCD's School of Veterinary Medicine for teaching, research, and service programs on food-animal herd health, preventive medicine, and production management.

Water Resources Center
University Extension Building
752-1544

The Water Resources Center is a Universitywide organized research unit charged with coordinating water resources research on the UC campuses. Through University research funds and funds from the 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
752-0204

The Facility for Advanced Instrumentation supports research and instructional programs in electron microscopy, mass spectrometry, and morphometrics. The electron microscope laboratory houses scanning and transmission electron microscopes adjacent to a specimen preparation laboratory. Instruction in the theory and operation of the electron microscopes is provided by a unique autotutorial system and hands-on sessions with the microscopes. Morphometric analysis is supported by a computerized digitizing tablet and a digitizing video image analysis computer. The mass spectrometer laboratory consists of a quadrupole mass spectrometer and a high resolution double-focusing instrument. Both mass spectrometers have soft ionization and high mass capabilities and are interfaced to gas chromatographs and data acquisition systems. Instruction in the theory and operation of the mass spectrometers is offered throughout the year. Faculty staff are available to teach students to use facility instruments, consult with users regarding experimental design, prepare samples and specimens for analysis, and operate the facility's instruments.

The Facility also promotes and coordinates the shared use of major scientific equipment located in various campus departments, including electron microscopes, an electron microprobe, an x-ray fluorescence spectrometer, an x-ray diffractometer, a paleomagnetometer,
a scintillation counter, a cesium irradiator, and a whole body counter.

Institute of Ecology
2132 Wickson Hall
752-3026

The Institute of Ecology was 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, or requiring advice on these subjects.

The Ecology Institute has a publication series and sponsors national and international activities, including organizing symposia and conferences. The Institute has management responsibility for the Jepson Prairie, Putah Creek, and Stebbins Cold Canyon reserves that are part of the UC Natural Land and Water Reserves System. 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

Established in 1962, The Institute of Governmental Affairs fosters research on a broad range of social science areas. There are currently nine research programs within IGA: applied macroeconomics and macro policy; applied public policy; East Asian business and development; Pacific Rim studies; international conflict and arms control; rural human resources; government and politics; productivity and quality control; and economy, justice, and society. The Institute also supports a wide array of public affairs programs, conferences, and seminars; provides specialized library services; oversees the Social Science Data Service; prepares and administers extramural grants; and offers research opportunities to graduate and undergraduate students.

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 sea foods. Current studies include those dealing with comparative biochemistry of proteolytic enzymes, the use of modified atmospheres for storage of seafood products, crustacea nutrition, carotenoprotein extraction as part of a project dealing with shellfish waste, and extracellular enzyme processing and production by a hydrocarbon-utilizing yeast.

Intercampus Institute for Research at Particle Accelerators
Professor Richard L. Lander, Associate Director
325 Physics/Geology Building
752-1780

This University-wide institute, established in 1977, conducts research that uses the unique facilities at national and international accelerator laboratories, particularly the Stanford Linear Accelerator Center, the Enrico Fermi National Accelerator Laboratory, the Japanese accelerator laboratory (KEK), and the German laboratory (DESY) in Hamburg. High-energy particle physics is the dominant area of research. The Institute also promotes seminars and lectures by visiting researchers at individual campuses.

Croceter Nuclear Laboratory
Croceter 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, biology, neutron damage studies, the effect of background radiation on computers, and historical studies. Isotopes produced by the variable-energy 76-inch cyclotron are used in clinical and research applications, including pioneering work in brain imaging. Teaching activities at the undergraduate, graduate, and post-doctoral levels are in biology, medicine, radiochemistry, and physics.

Institute for Environmental Health Research (IEHR)
Institute for Environmental Health Research
752-1340

The Institute for Environmental Health Research (formerly the Laboratory for Energy-Related Health Research) coordinates interdisciplinary research concerned with biomedical and toxicological problems related to exposure to chemical, physical, and biological toxic agents or to ionizing radiation. The overall aim of the research at the Institute is to determine basic mechanisms of toxic effects and to predict human health hazards from continual exposure to realistic levels of toxic substances in the environment or at the workplace. Studies on toxic, radioactive, mutagenic, carcinogenic, and teratogenic compounds are carried out in special animal holding facilities. Central laboratories exist for analytical chemistry, radiochemistry, ionizing radiation detection and quantification, cell biology research, inhalation toxicology, and human epidemiology. The Institute houses major University-wide programs in Toxic Substances and Occupational Health.

Serology Laboratory
Horse Bloodtyping Laboratory
Armstrong Tract
752-2211
Cattle Bloodtyping Laboratory
Armstrong Tract
752-7383

The Serology Laboratory was established in 1955 to provide blood-typing services for the animal breeding industry. The Laboratory is a self-supporting unit of the
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School of Veterinary Medicine; its facilities are available to students working towards M.S. and Ph.D. degrees in genetics, immunology, and comparative pathology.

The Laboratory is recognized for its pioneering research on animal blood groups and biochemical polymorphisms. Current research activities of the Serology Laboratory include: investigation of red cell, serum, lymphocyte and DNA genetic markers which enhance the effectiveness of current techniques applied to parentage investigation and identification of cattle, horses, sheep, goats, llamas, and dogs; study of breed relationships through gene frequency analysis; application of blood typing tests to clinical veterinary medicine; investigation of the major histocompatibility complex (MHC) of cattle and horses and its role in resistance or susceptibility to a variety of diseases; study of the role of chromosome abnormalities in infertility; and investigation of the mode of inheritance of several suspected hereditary diseases.

The Laboratory works closely with the Equine Research Laboratory and the Livestock Diseases Research Laboratory, as well as with other departments, such as Animal Science.

Natural Reserve System

Information:
Natural Reserve System
300 Lakeside Drive, 6th Floor
Oakland, CA 94612-3560
(415) 987-0150

The University of California administers some 26 natural reserves throughout the state. These reserves comprise a representative cross-section of California’s diverse ecosystems and include deserts, off-shore 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 funds, has acquired these carefully selected sites which might otherwise have become unavailable for scientific study.

UC Davis administers three Natural Reserve System reserves and one affiliated field station.

Bodega Marine Reserve

Peter G. Connors, Ph.D.,
Reserve Manager
P.O. Box 247
Bodega Bay, CA 94923
(707) 875-2020 or (707) 875-2211

Bodega Marine Reserve comprises 362 acres of coastal habitats near Bodega Bay in western Sonoma County, approximately 100 miles from the Davis campus. This site includes a remarkably diverse set of habitats, including an excellent rocky intertidal zone, sand beaches, saltmarsh, lagoon tidal flats, freshwater marsh, coastal prairie, and dunes. Adjacent subtidal sand and rock habitats in a Marine Life Refuge are administered as part of the Reserve.

The attractiveness of this site for research and teaching is enhanced by the excellent on-site facilities of the Bodega Marine Laboratory. This modern, well-equipped laboratory consists of several buildings, with over 60 research and support staff. On-site housing is available for students and visiting researchers. More than 30 field research projects are currently active at Bodega Marine Reserve, making this one of the most productive reserves in the Natural Reserve System.

Jepson Prairie Reserve

Institute of Ecology
2126 Wickson Hall
UC Davis
752-6580

The Jepson Prairie Reserve is located fifteen miles south of the campus and comprises 1,566 acres of perennial bunchgrass grassland and vernal pools. The Jepson Prairie area is typical of habitats which once covered most of California’s Central Valley and is recognized as the best remnant of native prairie land. Several rare or endangered species are endemic to the area. Long-term grazing and fire ecology research to aid in management of native grasslands began in fall 1986.

Stebbins Cold Canyon Reserve

Wesley W. Watham, Ph.D.
Department of Avian Sciences
3202 Meyer Hall
UC Davis
752-1300

In 1979, the University purchased 277 acres of wildland in Cold Canyon as part of its Natural Reserve System. It is located twenty-four miles west of campus near Lake Berryessa. In 1984, 299 acres were added to the Reserve, which is named in honor of G. Ledyard Stebbins, professor emeritus of genetics. The Davis campus has administrative and management responsibility for the reserve, which will be maintained in its present natural state. The reserve is available for teaching and field research by scientists and students from all campuses of the University and researchers from other institutions of higher learning.

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. The diversity of plant and animal species on the reserve, and its close proximity to the campus, contribute to the popularity of the reserve as an open-air classroom and research site.

Putah Creek Campus Reserve

Kerry Dawson
Environmental Design
UC Davis
752-2498

The University Arboretum administers a campus nature reserve known as the Putah Creek Campus Reserve. Putah Creek and its south fork flow along the southern boundary of the campus with the reserve consisting of a 150-acre corridor along the north bank approximately 6 kilometers long and averaging 100 meters wide. Vegetation and wildlife include native and introduced species. The goals of the reserve are habitat conservation, education, research, and environmentally-directed recreation.
Sustainable Agriculture Program: Student Experimental Farm

Introduction
College of Agricultural and Environmental Sciences
752-7645

The Student Experimental Farm is an innovative teaching and research facility located on twenty-five acres of University land, and is the main focus of the Sustainable Agriculture Program. Since its inception in 1977, the Student Experimental Farm has provided students with unique opportunities to explore alternative agricultural technologies and philosophies through classes, special projects, internships, work study jobs, and original research.

The farm offers students numerous opportunities to gain practical experience in areas such as organic crop production, aquaculture, small animal husbandry, farm operations, and seed saving. In addition, classes such as “Alternatives in Agriculture” and “Introduction to Sustainable Agricultural Systems” provide students with a chance to examine various agricultural issues in the classroom.

Because the farm includes several acres of land that have been managed organically for over a decade, it provides researchers with a facility for conducting field research into sustainable agriculture. Whether interest is in organic or other farming systems, the farm can provide several services to facilitate student research projects.

Carnegie Institution of Washington, Department of Embryology, Davis Division
752-0210

The world-renowned Carnegie 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. The collection includes insectivore, prosimian, platyrhine, and catarrhine embryos.

The resources of this department are available to qualified investigators on a very limited basis, on application to the director.

ADDITIONAL ACADEMIC RESOURCES

UNIVERSITY EXTENSION
Information and catalogs:
1333 Research Park Drive
752-0880

The free quarterly University Extension catalog contains the current list of continuing education programs offered in Sacramento and Davis. 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 University Extension courses include administration, agriculture, business and management, computer studies, education, engineering, environmental studies, graphic design, health and human services, labor relations, liberal arts, personal financial planning, hazardous materials management, wilderness recreation, international travel study, and winemaking.

Adult Fitness Program

Department of Physical Education
752-2540

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 and fitness. The program is sponsored by the Department of Physical Education with considerable support from the Division 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 blood chemistry analysis, nutrition analysis and counseling, resting ECG, exercise stress test with ECG, pulmonary function tests, body composition analysis, strength and flexibility tests, and 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 fatness determined, with personal counseling on how to achieve a desired body weight through proper nutrition and exercise. A “Shape-Up” program for students and staff is open at the beginning of each quarter and includes submaximal exercise testing, body composition analysis, and supervised exercise sessions.
Introduction

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

Enrollment fees enable University Extension to function as a financially self-supporting nonprofit organization.

COMMITTEE FOR ARTS AND LECTURES

Information:
104 Freeborn Hall
752-2523

The UC Davis Committee for Arts and Lectures presents a wide variety of performing arts events for the student and campus community and audiences throughout the greater Sacramento region. During the academic year the committee sponsors concerts and recitals by classical, jazz, and folk music artists; drama; classical, modern and ethnic dance; and lectures by eminent public figures. Annually, the season features an average of more than one event a week.

Supported in part by student fees, the committee provides UCD students with ticket prices of up to 50 percent off for all performances. Student volunteers usher at many performances and help with promotional activities; student employees work as drivers, office assistants and stagehands. Students also serve on the Committee for Arts and Lectures, the Chancellor's Advisory Committee composed of UCD staff, faculty and students which helps to select performing arts programs. Many Arts and Lectures events at UCD include free lecture-demonstrations, noon concerts and master classes for students. Arts and Lectures also works with the Department of Music cosponsoring various performances throughout the year.

Annual and quarterly brochures and promotional materials for upcoming events are available through the Arts and Lectures office at the above location. Tickets for Arts and Lectures events may be purchased at the UCD Campus Box Office in Freeborn Hall.

CAMPUS EVENTS AND INFORMATION OFFICE (CEIO)

Information:
4th Floor, Memorial Union
752-2813

The Campus Events and Information Office provides a range of services to clientele seeking facility reservations, conference services, and special event presentations. CEIO is responsible for interpreting and applying campus policies related to the use of campus facilities. The staff of CEIO assists organizations in facility reservations and coordinating various services related to events. For further information contact this office at the above location.

The Information Services unit of CEIO provides general information regarding special events, campus tours, location of facilities, parking, etc. Information stations are located at 129 Mrak Hall (752-0639) and the Memorial Union lobby (752-2222). Questions pertaining to campus tours and tour programs should be directed to 129 Mrak Hall.

PUBLIC SERVICE RESEARCH AND DISSEMINATION PROGRAM

Information:
436 Mrak Hall
752-3224

The Public Service Research and Dissemination Program sponsors collaborative research efforts between faculty and government or private agencies on public policy issues. Research and dissemination projects are solicited, reviewed and funded in the area of environment, agroecology, and global climate change. Collaborators are encouraged to assist in the research process and are involved in dissemination of findings.

Seminars, conferences and publications are used to link faculty and decision makers and to establish change in research directions.

SUMMER SESSIONS

Information:
378 Mrak Hall
752-1647

Summertime affords students the opportunity to accelerate progress toward a degree, to tackle problem courses and meet prerequisites, to take special study courses, or to do research. Although it is possible to complete up to 24 units by attending both summer sessions, 7 units per session is an average load.

Summer sessions at Davis offers a wide variety of lower division and upper division courses that provide full University credit. Special programs are also available in Great Britain, France, Italy, Ireland and China. Admission is open to all university students, high school graduates, and other qualified applicants. However, admission to a summer session does not constitute admission to the University's regular sessions.

In 1990 there will be two six-week sessions at UC Davis: June 25 through August 3, and August 6 through September 14. For the Summer Sessions Bulletin and application materials (available about mid-March), write to the address above.

WORK-LEARN INTERNSHIPS

Information:
The Internship and Career Center
2nd floor, South Hall
752-2855

Where are you going with your life? That question is 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 make these and other important decisions is to participate in a work-learn internship. An internship expands your learning beyond the classroom and enables you to make better decisions for the future by helping you to assess your skills, explore career opportunities, and secure on-the-job experience.

You can take advantage of one of the hundreds of organized internships through the Internship and Career
Most EAP experiences are for undergraduates for an academic year. Exceptions are the one-semester programs in Leningrad (USSR), Nanjing (China), Hungary, the spring- or fall-quarter study and field experience program in Mexico, and the summer programs in Togo and Mexico.

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 three regular session quarters completed in residence at UC by the time of participation
- At least 84 quarter units completed by the time of participation
- At least a 3.0 grade-point average for coursework completed at UC at the time of application and departure
- In most cases, 2 years (6 quarters) of University-level foreign language or the equivalent, with a 3.0 grade-point average (not applicable where courses are in English), but consult EAP Office for specific requirements
- 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 of the 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 all-inclusive minimum costs for the nine- to twelve-month program range from $6,500 to $9,500 (varies depending upon the country).

For study abroad during the 1990-91 academic year, the application deadlines are as follows: mid-November for the United Kingdom and Ireland, Japan, and the spring quarter programs in Mexico and Costa Rica; mid-May for Australia; and mid-to-late January for all other study centers. If you intend to participate in a study program during your senior year, careful advance planning is necessary to make sure that all degree requirements will be met. Consult with your major adviser, the Dean’s Office of your college, and the campus EAP coordinator. For information on EAP centers and study programs, refer to EAP in the Programs and Courses section of this catalog.

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

Residence Halls

Information:
Student Housing Office
(916) 752-2033

You can expand your UC Davis experience and add a measure of convenience to your life by living on campus; some 4,500 undergraduates and 180 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. Over 86 percent of the freshman students live in residence halls. Twenty-five percent of the transfer students elect to live in a residence hall environment. All undergraduates who apply on or before April 1, 1989, are guaranteed residence hall housing as long as they complete all of the instructions which accompany their contracts.

The total room-and-board rate for 1989-90 is $4,310 for a double-occupancy room and $4,730 for a single room (of which there are very few available to new residents). Nineteen meals per week are provided. Rooms are furnished to provide each resident with a bed, desk and chair, bookcase, chest of drawers, study lamp, and bulletin board.

If the Davis campus is your choice when filing out your University Admissions Application, the necessary information and applications are mailed to you by the UCD Undergraduate Admissions Office. If you have a physical disability which requires special housing accommodation, please attach a detailed letter of explanation to your application.

Student Family Housing

Information:
Student Family Housing Office
Orchard Park
(916) 752-4000

There are 476 furnished and unfurnished on-campus apartments for UCD student families. The monthly rates for the academic year 1988-89 were as follows:

- Orchard Park, two-bedroom unfurnished apartment, $352.
- Orchard Park, two-bedroom furnished apartment, $374.
- Solano Park, one-bedroom unfurnished apartment, $264.
- Solano Park, two-bedroom unfurnished apartment, $300.

Vacancies in Student Family Housing are filled from a chronological list based on the date of application. You should anticipate a wait of at least five months for a fall assignment (may be less at other times during the year). An application may be submitted before you are admitted to the University and before you are married, but you must show documentation of your student and marital or parental status before occupancy can be granted. If a member of your family has a physical disability which requires special housing accommodation, please attach a detailed letter of explanation to your application.

Community Housing

Information:
Student Housing Office
(916) 752-2483

Approximately 75 percent of UCD students live off-campus. If you choose to live off-campus, the Community Housing Office can be a valuable resource. This office maintains vacancy listings to assist you in roommate selection and in locating rental housing off-campus. Housing available in the community includes apartments, duplexes, condominiums, mobile homes, and rooms in private homes. Listings change daily, so they are not furnished by mail nor given over the telephone.

Other services of the Community Housing Office include: counseling and mediation of landlord/tenant and roommate grievances; educational programs; publications; liaison with fraternities, sororities, city government offices, and housing-related agencies in the community; and child care information and referral. This office also provides information on accessible housing to persons with disabilities.

THE ARTS AT DAVIS

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

The Department of Music (752-0665) sponsors the University Symphony, Chorus, Chamber Singers, 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 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 U.C. Davis Contemporary Music Players and the UCD Faculty Woodwind Quintet are in residence on campus. The Department of Music sponsors nearly one hundred public concerts each year.

The Department of Dramatic Art has one of the best theatre facilities in California. The excellent faculty and the Granada Artists-in-Residence program (which brings a major British director to the department each quarter), the presence of graduate students working on Master of Fine Arts (MFA) degrees in acting, directing, playwriting, and design, and an unusually good stock of scenery, props, costumes, and lighting equipment all contribute to the professional quality of Davis productions. Each year's drama schedule includes University Theatre Season (five major productions of established plays); one major special event; 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...
Art Gallery (752-2885) features a series of changing contemporary and historical art exhibits during the school year. The Gallery utilizes student employees and interns in operating the facility. Works by professional artists as well as students are on display for periods of six weeks. The Design Gallery (752-6223) on the first floor of Walker Hall is known for its unique exhibitions of design-related material. Changing exhibitions are designed with special themes and media that reflect the interests of the Design program. Presentations and installations of architecture, interiors, graphics, costumes, textiles, folk art and the annual Picnic Day Student Exhibition are some of the areas from which shows are designed. The Design Gallery is an innovative gallery where the installations are as interesting as the material presented.

The Richard L. Nelson Gallery (752-8500), 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 Fine Arts Collection (752-8500) is located adjacent to the Nelson Gallery. Representing various historical periods and cultures, it is the Davis campus’s major collection of art. Selected works are available for viewing weekday afternoons. The student-run Basement Gallery (752-0105 to leave a message) in the Art Building features art work by undergraduate UCD art majors. The work changes weekly and is hung by the artist with direction from the department peer adviser.

The C. N. Gorman Museum (752-6567), located in Temporary Building 111 (across from 194 Chemistry Building), was established in 1973 in honor of Carl N. Gorman, artist, advocate and former faculty member of Native American Studies on campus. The museum features changing exhibitions of works by contemporary Native American and other ethnic artists. Selections from the permanent collection of artifacts are also exhibited on a rotating basis throughout the year.

The Committee for Arts and Lectures (CAL) (752-2523), located in Freeborn Hall, brings a wide variety of touring performing artists to UC Davis to serve both the campus and surrounding communities. During the academic year, CAL presents concerts and recitals by classical, jazz, and folk music artists; drama; classical, modern, and ethnic dance; and lectures by eminent public figures. 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 News Service Office (752-1930) and Special Events, a monthly flyer distributed by the Campus Events and Information Office (752-1920) list upcoming activities. Bulletin boards, kiosks, the student radio station KDVS, and the California Aggie also advertise programs and local events.

RECREATIONAL FACILITIES AND PROGRAMS

No matter what your recreational bent—horseback riding, an outdoor adventure, music listening, arts and crafts, bowling, swimming, or sports—Davis campus has a place where you can enjoy it.

Facilities and programs such as the Equestrian Center, Craft Center, Outdoor Adventures, Recreation Hall, Intramural Sports, MU Art Gallery, Recreation Swimming Pool, or the MU Games Area will help you balance the academic demands at UCD with your leisure interests.

Memorial Union and Campus Recreation

Information:
Memorial Union Programs and Campus Recreation
463 Memorial Union
752-1730

The Memorial Union (MU) complex, at the north end of the Quad, serves as the community center for the campus by providing campus services and a variety of extracurricular activities. Bring yourself up-to-date on local events by stopping at the Information Desk in Griffin Lounge on the main floor. A valuable resource for current students as well as new students and visitors, the Information Desk can be reached by telephone, 752-2222. Other first-level facilities include the UCD Bookstore, Corral gift shop, Coffee House, Union Square eateries, and the Lifestyle Information Network.
King Lounge on the second floor features music listening and periodicals in a comfortable and relaxed atmosphere popular for studying. The MU Art Gallery and a complex of meeting rooms, the MU II Conference Center, complete the second floor. In addition to the administrative offices of Memorial Union and Campus Recreation, the offices of ASUCD, Campus Events and Information, the Graduate Student Association (GSA), and Student Activities and Judicial Affairs can be found on the third and fourth floors of the MU tower. Freeborn Hall is a recently renovated 1,650-seat assembly hall used for dances, dramatic and musical events, banquets, lectures, and conferences. The Committee for Arts and Lectures Office and the Campus Box Office, where you can purchase tickets for campus events and cash checks, are in Freeborn.

Outdoor patios furnished with wooden benches and umbrella tables offer open-air seating and the enjoyment of a wisteria arbor and giant eucalyptus to the north of the MU and a five-story Aleppo pine to the south.

In addition to the overall operation of Memorial Union facilities, professional and student staff of the Memorial Union and Campus Recreation office coordinate the following facilities and programs:

The Craft Center, just south of the Silo Student Center and adjacent to parking lot 43, is an ideal place to channel your creative energy. Facilities are available on a drop-in basis, or passes may be purchased for more frequent use of the equipment and work space. Workshops and classes are offered each quarter in such varied crafts as woodworking, weaving, jewelry-making, art and graphics, auto mechanics, ceramics, photography, silkscreen printing, welding, leather-working, and stained glass. More information can be obtained by calling 752-1476/1730.

The Equestrian Center, southwest of the Veterinary Medical Teaching Hospital off Garrod Drive, is active all year round providing trail rides, practice sessions, and instruction in both English and western riding. Group and private lessons are available for beginning through advanced levels, and an extensive volunteer program has been designed to provide an educational experience for those interested in horse care and stable management. The Equestrian Center sponsors clinics, horse shows, and a summer equestrian camp plus special events, and also coordinates the Drill Team, Polo, and Equestrian Clubs for student participation. Telephone 752-2372/1730 for further details.

The MU Art Gallery and Music and Periodicals Center, adjacent to King Lounge on the second level of the Memorial Union, feature a changing series of contemporary and historical art exhibits throughout the school year. Print sales, special programs, and lectures are sponsored by the Gallery, as well as internships for those interested in career work in an art gallery or museum. The Music and Periodicals Center provides current periodicals for leisure reading and has a library of albums for your listening pleasure. Further information regarding these services may be obtained by calling 752-2885/1730.

The Games Area, located below the UCD Bookstore, is a recreational facility consisting of a bowling center with pro shop, billiards room, video arcade, lounge, snack bar, and storage lockers. The Games Area con-
The Memorial Union has several facilities that can be rented for group gatherings. The **Recreation Pool Lodge**, adjacent to the pool on La Rue Road, is equipped with a kitchen, a meeting room, and a lounge with a fireplace. The **Silo Student Center**, southwest from the corner of California Avenue and Hutchinson Drive, features a snack bar, a large multipurpose room, and large-screen TV. The Silo is open daily for students who want to just relax or study and is reserved most evenings by one of the many student organizations holding meetings, dances, or other group functions. In 1989-90, the Silo is scheduled to be closed for expansion and remodeling to better meet the needs of our growing campus community.

**Putah Creek Lodge**, equipped with outdoor barbecue pits and tables as well as an indoor fireplace, kitchen, and multipurpose room, is situated on the south side of campus on Putah Creek. It is surrounded by a large grassy area suitable for group recreation and outdoor activities. The bicycle and walking trail, which runs parallel to Putah Creek and directly in front of the lodge, offers much enjoyment as you pass along the Arboretum and view trees, shrubs, and other plant life used in research and teaching. To reserve these facilities call 752-2813. For more information, call 752-1900.

A special program of the Memorial Union, the **LINK** (the Lifestyle Information Network)—promotes balanced, healthy living by "linking" people and their leisure interests with appropriate resources. Through referrals, information, and educational programs, the LINK demonstrates how leisure can improve one's health and satisfy personal needs. The LINK is open weekdays in the MU lobby from 10 a.m. to 2 p.m. For more information about the LINK, call 752-LINK/1730.

**Recreation Hall**

Information:

Entrance 1/8
752-6073

Recreation Hall is a multi-use arena available for intramural and informal recreation play, intercollegiate athletics, physical education classes, sports clubs, and special events. The tri-level facility has locker rooms; a flat running track; an equipment room; handball, racquetball, wallyball, and squash courts; a weight room with free weights, universals and a self-guided circuit training concept that utilizes hydraulic machines; main court areas for basketball, volleyball, and badminton; and areas for martial arts, table tennis, gymnastics, aerobics, and dance.

Students can use Rec Hall facilities by showing their current, valid photo ID card. Nonstudents may purchase a privilege card at the Rec Hall to use lockers, equipment, and facilities. Patrons may also purchase a daily pass at the 18 entrance. Rec Hall is open Monday through Friday from 6:00 a.m. to midnight throughout the academic year.

Numerous special events sponsored each year by the ASUCD, Entertainment Council, and the campus are held in the 8,600-seat Recreation Hall.

Recreation Hall maintains an outdoor fitness cluster on Orchard Field, the tennis courts on La Rue Road, just north of the Rec 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. The courts cannot be reserved and are available on a first-come, first-served basis.

**Intercollegiate Athletics, Intramurals and Club Sports**

Information:

264 Hickey Gymnasium
752-1111 (Intercollegiate Athletics)
752-3600 (Intramurals and Club Sports)

Intercollegiate athletics, intramurals, and club sports programs collectively provide organized sports competition and physical recreational activities across the broad spectrum of student physical abilities. The underlying objective is to offer a coordinated program of sports participation that meets student needs at every level of competence and depth of interest.

Although intercollegiate athletics at Davis is intended to benefit the campus by providing esprit de corps, its prime role is to provide personal development opportunities for as many non-scholarship student-athlete participants as facilities and resources permit. Currently, the program consists of varsity teams in eleven men's sports and nine women's sports. Membership affiliation is with the Northern California Athletic Conference and Division II of the National Collegiate Athletic Association. Approximately 1,000 students compete on varsity or junior varsity teams each year. The club sports program includes both recreational and competitive offerings involving thirty-seven sports with 2,100 participants per year, while the intramurals program provides competition in thirty-six sports and serves approximately 14,000 participants.
ASSOCIATED STUDENTS (ASUCD)

Information:
Executive Council Office
370 Memorial Union
752-3832

ASUCD Office
364 Memorial Union
752-1990

The Associated Students of the University of California, Davis (or ASUCD), authorized by The Regents and the Chancellor, represents all undergraduate students. From the fees paid to the University each quarter, The Regents allocate $15 per student to ASUCD to support the organization and its many activities. Graduate and professional students may have access to all ASUCD activities and services by paying the fee although certain services are available to these students by their participation in the Graduate Student or Law Student Associations. Funds allocated to ASUCD by the University provide activities and services that will make life as a student a little easier, less expensive, or just more fun.

The student government budgets the allocated funds each year through its Executive Council. Based on the city council form of government, the Executive Council consists of seven elected council members and the Council President and Vice President. The Council is the policy-making body for ASUCD and supervises all aspects 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 is the liaison for the undergraduate student body and represents the students with other universities, the Universitywide administration, The Regents, and the Davis city government.

Five commissions are subordinate bodies of the Executive Council, and assist the governing board with its decisions by researching legislation and making recommendations. Commission chairpersons are ex-officio members to the Council. Each commission also involves itself with various projects that relate to their specific area.

- Academic Affairs acts as an advocate to 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 makes recommendations to the Executive Council on all financial matters.
- Ethnic and Cultural Affairs makes recommendations on policies and programs concerning UCD's ethnic community, for establishing liaison and achieving rapport with on-campus and off-campus bodies affecting ethnic students and their quality of life while at the University.
- The judicial branch is comprised of two boards whose members are appointed by the President of ASUCD.
- The Student Judicial Board is responsible for determining eligibility of candidates for elective office in ASUCD and interpreting and enforcing the ASUCD Constitution.
- The Student Appeals Board rules on appeals to Student Judicial Board decisions.

ASUCD operates more than fifty activities and services for UCD students. Information about these services can be found in the Student Directory, which combines details about ASUCD services and organizations and the student directory, or by visiting the ASUCD offices in the Memorial Union.

Some of the services operated by the ASUCD for University students include the Unitrans bus system, California Aggie newspaper, Student Viewpoint evaluation of professors and classes, Just Your Type wordprocessing service, the Bike Barn repair services, travel service, free legal advice, 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, Classical Notes and The Paperworks, Homecoming, Student Forums, Entertainment Council, Whole Earth Festival, 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 ACTIVITIES

Information:
Student Activities
4th Floor, Memorial Union
752-2507

There are about 250 registered student organizations at UCD which represent a wide variety of student interests, including cultural, social, religious, political, ethnic, academic, international, recreational, performing, residence hall, and service groups. The Student Activities Office registers these diverse groups and provides advising on activities, resources, and campus policies. In addition to the subunits described below, Student Activities administers a number of campus programs: Club Finance Council, Activities Faire, Cultural Days, Leadership Training Programs, and national collegiate leadership awards competitions. Student Activities staff assist individual students who want to be-
come involved in activities or start new organizations. All students are encouraged to drop by the office to review the resources available to them.

The Cal Aggie Marching Band entertains spectators at athletic, campus, and community events. As one of the last remaining "student-run" bands in the nation, the band has a style and personality all its own. The UCD Spirit Squad is a group of talented and enthusiastic dancers, stunt team members, and gymnasts who travel and perform with the band.

The Danzantes del Alma is a performing dance troupe that seeks to perpetuate Chicano culture through the traditional music, dance, and costumes of Mexican folklore. All interested students are invited to participate in the troupe.

JUDICIAL AFFAIRS
Information:
Student Judicial Affairs
4th Floor, Memorial Union
752-1128

Student Judicial Affairs supports the standards of the campus by responding to alleged violations of University policies or campus regulations. In addition, the office is a contact point and referral agent for student grievances based on impermissible discrimination or harassment (sexual, racial, religious, handicap, etc.), or on violations of student rights to obtain access to or prevent disclosures from their campus records. The office also serves as a resource for conflict resolution and it can provide interpretations of University policies and regulations.

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. Standards for student conduct are included in the UCD Code of Academic Conduct, in the Student Activities Handbook, in the Guide to Residence Hall Life, and 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 Student Judicial Affairs, 463 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, sexual or other physical assault, threats of violence, forgery, theft, vandalism, hazing, 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 should be referred to the Coordinator of Student Judicial Affairs. If complaints cannot be resolved informally between the Coordinator, the accused student, and the referring party, the case may be referred to the Student Conduct Committee, Campus Judicial Board, or another appropriate panel or hearing officer. The President of the University, through the Chancellor, has ultimate authority for the administration of student discipline.

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 policies, rules, and regulations of the University and this campus.

You will not be able to register, receive transcripts of record, or diplomas until you have met all University obligations.

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:
1st Floor, South Hall
752-3000

Advising Services coordinates the student service groups listed below. Professional staff and more than 70 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 over forty 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 108 South Hall, 752-3000.
The First Resort is a place to go if you are feeling bogged down by University red tape, registration procedures, course selection, choosing a major or other general advising 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 maintains a tutor listing and referral service, a 1-3 unit course listing, and other valuable resources. Pregraduate school information is available, and graduate school bulletins and other supplemental materials on hand are useful in selecting a graduate program. If you have a problem, remember—start with The First Resort which is open from 9 a.m. to 4 p.m. throughout the academic year. (Temporary Building 96, across from the Chemistry building, 752-2807 for information or 752-3323, the advising hotline.)

The Orientation and Summer Advising Office provides coordination for the Summer Advising and Registration Program, Fall Quarter 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 108 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, management, and public administration. 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-Graduate School Information and Referral Service is a program available through Advising Services to assist students interested in M.A. or Ph.D. programs. Specific services include help in locating graduate school programs in specific fields, completing application forms and statements of purpose, and planning financial options. Advisers are available through the main Advising Services office, 108 South Hall, 752-3000.

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 108 South Hall, 752-3009.

The Health Sciences Advising Office, 106 South Hall, 752-2672, will be an important place for you if you are preparing for a profession in the health science area. The professional staff and student advisers can provide information on requirements, application procedures, professional school curricula, and related options. The office maintains an extensive library of school catalogs, statistics, and books and journals related to health education.

Associate Dean of Students
Information:
1st Floor, South Hall
752-2019

The Associate Dean of Students provides advising, referral and program development to meet the needs of undergraduate and graduate students, particularly women students. The Associate Dean intercedes with faculty, academic, and Student Affairs administrators on behalf of students in academic or personal difficulty; interprets policies and procedures for students and parents; and works with schools, academic administrators and individual faculty to assist students in meeting UCD academic requirements. This office also provides leadership and influences policy and program development in the administration of activities related to the special needs of women and graduate students.

Counseling Center
Information:
219 North Hall
752-0871

The Counseling Center offers confidential psychological, psychiatric and peer counseling services to students having problems which affect their academic progress and sense of well-being. Assistance is provided through a network of programs at three campus locations: North Hall, Cowell Student Health Center, and The House. All services are funded through student registration fees. Counselors help students manage their personal concerns and appropriately face difficult and challenging situations. Students are encouraged to develop the personal insight, interpersonal skills, and strength of character expected of an educated person.

A variety of counseling services is available to meet the needs of a large, diverse student population. A multi-disciplinary staff from the fields of psychology,
Student Life

psychiatry, and social work provide short-term individual and group counseling, crisis intervention, consultation, and referral. In addition, career interest inventory, personality testing, and information about graduate school admissions tests and the Planned Educational Leave Program are offered. Two peer counseling programs, The House and EOP/SAA Information Office, provide professionally supervised peer counseling and referral services.

To make an initial appointment, students can telephone or come to the Counseling Center. Students, faculty or staff who have a concern about a student or desire assistance in making a referral, are encouraged to call the Center.

The House
Temporary Building 16
24-Hour Hotline: 752-2790
Business Line: 752-5665

Located in a green, two-story house next to the Housing Office, The House is a peer counseling program of the Counseling Center. The setting provides an informal environment where students can receive confidential support, information, and referrals regarding personal or interpersonal problems. The facility is staffed by well-trained student volunteers and is professionally managed. Peer counselor training is offered on a quarterly basis. Applications are available at The House.

Students can receive assistance through individual peer counseling and a wide variety of workshops and support groups. Students are always welcome to come in and enjoy the quiet atmosphere, free tea and coffee, and tours of The House. No appointment is necessary and services are offered on a drop-in or telephone basis. The House is open seven days a week and is wheelchair accessible.

Educational Opportunity Program/Student Affirmative Action (EOP/SAA)

Information:
313 North Hall
752-3472

The Educational Opportunity Program/Student Affirmative Action Information Office serves EOP/SAA students by assisting them with their academic, social, and personal adjustments to the University environment; coordinating EOP/SAA new student orientation programs; as well as serving as liaison to staff, faculty and administrators. The Office's multicultural peer staff is particularly sensitive to differing social, cultural, and ethnic concerns and serves as a valuable resource to students. In addition, those students interested in pursuing the "helping" professions can receive training and experience through the Peer Adviser Counselor training program.

EOP/SAA Information Office services are also accessible at various outreach locations throughout the campus such as the Colleges of Agricultural and Environmental Sciences, Letters and Science, and Engineering; Learning Skills Center; The House; and all ethnic studies departments. All students are invited to telephone or stop by the EOP/SAA Information Office on the third floor of North Hall or any one of the outreach locations to find out more about the peer counseling services.

EOP/SAA Tutoring (Learning Skills Center, The Basement, South Hall, 752-2013) is a free service for EOP and affirmative action students. If you are having difficulty with your course work, the Learning Skills Center offers tutoring in most 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 students carefully selected for both their knowledge of course content and their sensitivity to the needs of students being tutored.

Special Transitional Enrichment Program (STEP)
(Learning Skills Center, The Basement, South Hall, 752-2013). New EOP/SAA students (freshmen and transfers) admitted by special action are expected to participate in the Special Transitional Enrichment Program (STEP). Selected regularly admitted EOP/SAA students are encouraged to do so. The program begins in summer and continues through the first academic year, providing preparatory course work and developing academic skills. It 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:
The Basement, South Hall
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
- English as a second language
- Time-management
- Test-taking
- Test anxiety reduction
and many more...
In addition to the above areas of assistance, the Center provides individual tutoring sessions to various segments of the student population: Educational Opportunity Program students, members of the underrepresented ethnic groups, handicapped students, veterans, and students on academic probation or subject to dismissal. Group and drop-in tutoring is available to the general student body.

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 Program’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 made. Students reentering at the graduate level can also receive special assistance in the Office of the Graduate Division. The Veterans Affairs and Community Housing offices can be of help in the reentry process.

Once admitted, the campus provides additional assistance with an orientation to campus life through Advising Services and through study skills workshops at the Learning Skills Center. The Financial Aid and the Internship and Career Center offer special reentry student advising. The Counseling and Women’s Resources and Research Centers are places where reentry students can share common interests and concerns through support groups.

**STUDENT SERVICES**

**Student Health**

Information:
Cowell Student Health Center
752-2300 (voice, and telephone device for the speech and hearing impaired)

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 submit a medical history form, and evidence of rubella and rubella immunity to the Health Center as part of registration.

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, in part, by your registration fees. As an enrolled student paying full registration fees, you are eligible to use the Health Center 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 care
- Regularly scheduled clinics
- X-ray, laboratory, and pharmacy services
- Physical therapy
- Women’s Clinic

The Health Center currently does not provide services for dental problems, or routine eye care.

The services of the Health Center are available to student’s dependents on a fee-for-service basis. Also a Health Insurance Plan for your spouse and children may be purchased at the Health Center.

**Health Insurance.** Starting fall 1989, UC Davis will no longer provide a blanket health insurance plan for all students. Graduate, professional, and international students will have a mandatory insurance plan that will be purchased as part of registration. Undergraduate students will also have an opportunity to purchase a voluntary plan during registration. Please refer to the insurance information in your registration packet for the details of these plans. For more information, you may also call (916) 752-2612 or visit the Insurance Office at Cowell Student Health Center, 8:00 a.m. to 5:00 p.m., Monday through Friday.

**Health Education.** Because maintaining good health is vital for the successful pursuit of your educational goals, Student Health’s Health Education Program provides information and services in the areas of nutrition, exercise, sexuality, sexually transmitted diseases, stress management, and drug and alcohol use. The program is located in the Student Health Center. Telephone 752-9652 for information.

**International Student Services (SISS)**

Information:
Services for International Students and Scholars
300 South Hall
752-0864

UC Davis currently has a community of over 1,400 international students and scholars, from approximately 90 countries, who are studying, teaching, and doing research in a variety of fields. Assistance to this varied group is provided by the staff of Services for International Students and Scholars.

The functions of the SISS Office are to assist incoming international students and scholars in making preparations to come to the U.S., to provide orientation to the campus and community upon their arrival in Davis, to assist them in maintaining their legal status while at UCD, and to facilitate the international transfer of funds in order to maintain their academic endeavors. In addition, immigration, personal, cultural, and financial advisement are provided.

Student Life
Prior to Fall Quarter registration, a special orientation program is held for new international students. The program provides assistance with registration, class enrollment, housing, cultural orientation and immigration regulations as well as an introduction to campus services and community resources. All new and transfer international students are required to attend this program.

Careful budgeting is essential for international students. A minimum allowance of $17,000 per year for a single student is recommended to cover nonresident tuition and fees, and living expenses. A married student must budget an additional $2,500 per year for a spouse and $1,000 for each child accompanying the family.

The University of California, Davis expects the international student to be responsible for the above costs. Prior to admission, the student must complete the Certification of Finances form certifying availability of funds for twelve months. It is important to note that tuition and fees may be increased without advance notice.

The international student should be cautioned that there will be numerous initial expenses during the first few months including cleaning and rent deposits for housing, telephone installation costs, bedding and cooking utensils, etc.

No financial aid is awarded by the University to international students during their first year of study. After the first year of attendance, very little financial aid is available to international students, and it is probable that in the near future, no aid will be available to them. Therefore, international students must be prepared to pay their expenses for the entire length of their stay at UC Davis.

Students must report to Services for International Students and Scholars as soon after their arrival as possible. This office can help with immediate needs, make introductions to the Davis international community, and assist students and scholars in locating other individuals from their home countries.

Disability Resource Center

Information:
Disability Resource Center (DRC)
101 Silo
752-3184 (voice/TDD)

If you have a disability, either permanent or temporary, you may find the advice, assistance, and specialized resources available from the Disability Resource Center very useful. Disabled people established this resource program to help students manage their disability to achieve maximum participation in campus life. You can establish a partnership with experienced DRC staff to accommodate your academic needs.

Academic and mobility resources for registered students with verified disability needs include the following:

- Specialized advising on adapted educational methods
- Funding and assistance to hire aides for instructional reading, writing, research, and other access needs
- Sign language interpreting and notetakers
- Advice on compensatory strategies and alternative test formats for learning disabled students
- Specialized educational equipment—a reading machine; brailleers, tape recorders, and television aids for visually impaired; amplification equipment for hearing impaired; and computer adaptations
- Priority registration and enrollment in classes
- Mobility advising and supplemental orientation for the campus environment
- Campus transportation services
- Repair services for wheelchairs and other specialized disability equipment
- Equipment loans for emergency needs, including tape recorders, electric carts, and wheelchairs
- Information and referrals for tutoring, sources of devices, transportation, etc.

Counselors can help you with disability management issues and career choices. You can also find assistance in obtaining financial aid to meet special needs. Advising is available to assist with such problems as living options, attendant recruitment and management, and adaptations for maximum independent living.

Campus accessibility is excellent: practically all instructional, recreational and student facilities are wheelchair accessible. Accessible on-campus housing is available, as well as a campus map showing physical accessibility features. Most of the campus is flat and has a good curb ramp system. Ease of mobility, plus special class scheduling methods, can ensure that you’ll make it from one class to another on time. Accessible buses link the campus with the community of Davis.

Preadmission counseling is available to individuals with disabilities. You are encouraged to contact DRC if the circumstances of a 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

The Veterans Affairs Office assists veterans, dependents of deceased or disabled veterans, and reservists through a variety of federal, state, and campus programs. The office certifies course attendance to the Veterans Administration, coordinates a tutorial assistance program, provides advice and support, and helps with employment, work study, and financial aid concerns.

To initiate a benefit claim, write or drop by at 200 Silo with your letter of admission. The office can give you the forms, information, and advice to get your claim processed.

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 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:
10 Lower Freeborn
752-3372

The Women’s Resources and Research Center brings attention to and challenges the barriers that inhibit the inclusion, equal power, and advancement of women. The Center promotes an understanding of the evolving roles of women and men, and helps women develop their full potential. To this end, the WRRC can provide the UCD community with information and programs on the educational, career, and personal needs and interests of women. The WRRC’s services are wide-ranging and include:

- Workshops, lectures, forums, conferences, and events on issues of particular interest to women
- Classes in communicating with confidence
- Peer- and professionally-facilitated support groups
- Resource files and referrals for mental health, health care, employment, housing, campus and community events, marital problems, legal rights, legislation, child care, sexuality, and other issues
- Original research on gender roles and women’s concerns
- Competitive grants for student research on women or gender, awarded biannually

- Research consultation (assistance with designing and conducting research on women and gender roles)
- Assistance in obtaining academic credit; help in finding faculty members to sponsor 198, 199, and 299 courses

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

The Women's Studies major and minor programs are administered at the WRRC. For information and program advising, see the Women's Studies Program in the Programs and Courses section of this catalog or telephone 752-3307.

The Center is staffed by professionals and student interns. You are encouraged to drop by and talk with the staff. Student internships are available in legislative work, publicity, program planning, and research.

Student Employment
Information:
Student Employment Center
114 South Hall
(916) 752-0520

Need a part-time job to get through school? Do you sometimes need a few extra dollars for a special weekend event? Are you looking for work experience related to your major? If so, the Student Employment Center can help you.

The Center helps students who are enrolled in a full-time or part-time degree program, students on PELP, students’ spouses, and students with a letter of acceptance for the following quarter who have not yet registered. The Center also coordinates the College Work-Study Program for financial aid recipients.
A variety of employment opportunities are offered on campus, in the City of Davis, and in adjacent communities. Full-time, part-time, and temporary jobs are available during the school year and vacation periods. New listings are posted daily. Listings of employment opportunities for the summer with government agencies, camps, and resorts throughout California are located at the Center. Students are encouraged to begin looking in January for summer jobs.

Offers of employment are conditional, subject to proof of identity and U.S. citizenship or your right to work in the U.S., as required by federal law (Immigration Reform and Control Act 1986).

The Center is open from 8:30 to 11:45 a.m. and from 1:00 to 4:00 p.m.

**Career Planning and Placement**

Information:
The Internship and Career Center
2nd floor, South Hall
752-2855

Worried about your career plans? Do you know what kind of 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 Internship and Career Center (ICC) can help you.

If you are an undergraduate, graduate, or alumnus, ICC can assist you in (1) identifying your abilities and interests, and relating them to jobs; (2) gaining access to practical experience to increase your competitiveness in the job market; and (3) finding out how and where to look for the jobs you want. 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 here include:

- The quarterly Working Times publication which lists all programs and services offered students through ICC
- Individual career advising and group seminars
- Workshops on resume writing, interviewing, and job-seeking skills
- Seminars to explore career fields and employment trends
- A Career Resources Library
- System of Interactive Guidance and Information (SIGI), self-help computerized guidance system which aids in values clarification and career decision making
- A manual for job-seekers
- Listings of current job vacancies
- Internship opportunities (applied work experiences) in all career areas

The Howe Career Resources Library contains 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 ICC, 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 office solicits and maintains job 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 Internship and Career Center early—you'll be way ahead later. Advisers are available on a drop-in basis or by appointment.

**Education and Graduate Placement Services**

Any student enrolled in the teaching credential program or pursuing a master's or doctoral degree in order to teach, should register with the Education and Graduate Placement Office. Services include:

- Teaching job vacancy listings
- Placement files (professional dossiers)
- Special workshops on writing teaching resumes and curriculum vitae, and on preparing for interviews
- Individual advising

Advisers maintain contact with school district personnel and work with undergraduate students to explore teaching through internships. In addition, the office sponsors the Graduate Career Options Program for advanced degree candidates originally planning a teaching career and now considering other career options.

**TRANSPORTATION**

A valid permit is required to park on the UCD campus. Information on automobile and motorcycle parking can be obtained through Parking Services located in the Transportation and Parking Office on Extension Center Drive directly south of Lot 30 and Recreation Pool (752-TAPS). Parking for on-campus residents is limited. The TAPS Intracampus shuttle is available throughout the year to provide free transportation in the central campus area.

Unitrans, seven bus lines operated by the Associated Students, serves the campus year round. Full service is provided each UCD school day (Monday through Friday) and Monday through Thursday during the regular school year—fall, winter, and spring quarters. Reduced schedule bus service operates during the summer, finals week, and all academic break periods. Finals and break schedules are available during the last week of classes each academic quarter. Schedules are available at the MU Information desk, bus terminals, City Hall, Chamber of Commerce, Post Office, and Unitrans office.

Ridesharing is encouraged. Information on transportation alternatives to the Davis campus including carpooling, vanpooling, public transit, and shuttle systems is available from the TAPS Transportation Coordinator (752-MILE).
CHILD CARE PROGRAMS

Seeking assistance with child care? The following programs are available on campus and in the community to assist students in meeting their child care needs.

- The Community Housing Office distributes child care publications, coordinates child care information and referral services among a network of satellite campus units, and serves as the University's liaison with Kids On Kampus, Russell Park Child Development Center, and the City of Davis Child Care Services Program. For further information, contact Community Housing, 101 Student Housing Office or telephone (916) 752-2483.

- The City of Davis Child Care Services Program provides free child care resources and referral information, and administers a child care subsidy program. The office is funded jointly by the University of California, Davis; the City of Davis; and the State Department of Education. Up-to-date information is maintained regarding preschools, licensed family day care homes, in-home providers, child care centers, child care co-ops, playgroups, and other family-related services. It is located at 23 Russell Boulevard, telephone (916) 756-3747.

- Kids On Kampus offers a comprehensive child care program for infants through school-age children. This privately owned and managed facility is located on campus. For further information, telephone (916) 753-8716.

- The Russell Park Child Development Center is a privately owned and managed facility located on campus that offers a comprehensive program for infants through school-age children. Priority is given to residents of Russell Park, Orchard Park, and Solano Park student family housing. Telephone (916) 753-2487 for further information.

- The Financial Aid Office can assist students who are parents and who qualify for financial aid with allowances for dependent children (food, clothing, housing, basic medical costs), direct care costs (in-home provider or child care center charges), and unanticipated medical expenses. This office is in 113 North Hall, (916) 752-2390.

- The Early Childhood Laboratory is a teaching and research facility associated with the Human Development Program. Four different programs accommodate children from the ages of six months to six years for three hours a day, following the UC Davis academic calendar. Student families pay lower tuition than do UCD staff, faculty, and community-based families. The laboratory is located on campus, and the office is in Temporary Building 117, telephone (916) 752-2888.

- For those living in on-campus Student Family Housing, parent associations in Orchard and Solano Parks sponsor low-cost cooperative playgroups. Morning sessions are held in each area for children ages two to five. Participation is limited to Student Family Housing residents. For further information or referral, telephone (916) 752-4000, Orchard Park/Solano Park, Student Family Housing Office.

- The Perfect Tender infant care cooperative serves six infants under twelve months of age for no fee. Participation is limited to School of Law student parents while they are attending classes throughout the academic year.

ALUMNI ASSOCIATION

Information:
The Alumni Center
Gulifter House
112 "A" Street
(916) 752-0286
Toll free in California 1-800-242-GRAD

In choosing the University of California, Davis as your university, you are making a lifelong commitment...you will be identified with the Davis campus for the rest of your life. After graduation you will continue your association with UCD through membership and participation in the Cal Aggie Alumni Association (CAAA).

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, Homecoming, Picnic Day, legislative relations programs, student recruitment, career networking, and the student loan fund. In addition, the Association maintains a professional staff dedicated to meeting the needs of UCD's more than 84,000 alumni.

Another exciting program includes area alumni chapters from Taiwan to Washington, D.C. The area chapters are lead by local alumni boards who plan many activities for area alumni including social, educational, family, and recruitment programs. So no matter how far away from Davis your life takes you, you can still be part of the UCD pride and spirit.

Each graduate of UCD is important. Sustaining membership in UCD's CAAA is only $30 per year. Members are afforded the many special programs and benefits of the Association. Call the Alumni Center for more information or drop by before you graduate. You will be glad you did.
Fees, Expenses and Financial Aid
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 $1,933 per quarter. (See the Appendix 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>$218.00</td>
</tr>
<tr>
<td>Memorial Union</td>
<td>28.50</td>
</tr>
<tr>
<td>Associated Students' fee</td>
<td>15.00</td>
</tr>
<tr>
<td>Graduate Student Association fee†</td>
<td>4.50</td>
</tr>
<tr>
<td>Graduate Student Health Insurance fee</td>
<td>80.00</td>
</tr>
<tr>
<td>Optional Undergraduate Health Insurance Fee**</td>
<td>(93.00)</td>
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<tr>
<td>Education fee‡</td>
<td>308.00</td>
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<tr>
<td><strong>Total for California residents</strong></td>
<td>$869.50</td>
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<tr>
<td>Tuition for nonresidents‡</td>
<td>1,933.00</td>
</tr>
<tr>
<td><strong>Total for nonresidents</strong></td>
<td>$2,502.50</td>
</tr>
</tbody>
</table>

These fees are for the 1989-90 academic year and are subject to change without notice.

*Students in the School of Law should refer to the School announcement for explanation of fees.
†Students in the Schools of Law, Medicine, and Veterinary Medicine are not included (see the explanation of fees following).
‡Students approved for enrollment on a part-time basis are required to pay only one-half of the Education Fee and one-half of the Nonresident Tuition Fee.

**A voluntary health insurance plan will be available to all undergraduates except for foreign undergraduate students who must pay the Graduate Student Health Insurance fee.

Additional Fees and Expenses

Students may be subject to the following fees for optional services (rates subject to change):

- Parking (per year: $108 to $180 for cars, depending on the type of permit; $36 for motorcycles; $48 for nighttime only permit, i.e., $17 per quarter)
- Bicycles, fee for the California State License (initial license, $6, and renewals, $3). Required for all bicycles on campus.
- Late payment registration fee ($50)
- Changes in class schedule after announced deadline ($3, each petition)
- Transcripts ($3 a copy)
- Diplomas can be mailed to an address left with Office of the Registrar (fee varies with current mail costs)
- Applications for readmission, Planned Educational Leave, or intercampus transfer ($35)

For details concerning fees and deposits, consult the publication 1989-90 Student Fees and Deposits, available from the Office of the Registrar. Current fees are also published in the Class Schedule and Room Directory.

(Fees are subject to change without notice.)

Explanation of Fees and Expenses

University Registration Fee: $218.00 for fall and winter quarter and $217.00 for spring quarter; $326.50 per semester for law students. Revenue from this fee is used to support a portion of the cost of student services programs including cultural and 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.

Education Fee: $308 per quarter for undergraduate and graduate students; $462 per semester for law students. Revenue from this fee is used for financial aid and related student programs.

Nonresident Tuition: $1,933 per quarter; $2,899.50 per semester for law students (see the nonresident tuition fee statement in the Appendix).

Memorial Union: $28.50 per quarter; $42.75 per semester for law students. Paid by all students. This fee includes the student facility fee. Revenue from this fee is used toward planning and future expansion of student facilities on campus.

Associated Students Fee: $15 per quarter. All undergraduate students, both full-time and part-time, are represented by the Associated Students of the University of California, Davis (ASUCD). Graduate and professional students may receive access to all services and activities by paying the fee (see also Graduate Student Association Fee following).

Graduate Student Association Fee: $4.50 per quarter. Paid by all academic graduate students, including students in the Graduate School of Management, but not mandatory for professional students in the Schools of Law, Medicine, and Veterinary Medicine. Professional students may have access to the same services and activities by paying the fee.

Graduate Student Health Insurance Fee: $80.00 per quarter; $120.00 per semester for law students. Paid by all graduate students, including students in the Graduate School of Management and the Schools of Law, Medicine, and Veterinary Medicine, unless comparable coverage can be demonstrated. (Also paid by all undergraduate foreign students.)

Undergraduate Health Insurance Fee: $93.00 per quarter. Undergraduate students may purchase a voluntary health insurance plan during enrollment.

Law Student Association Fee: $5 per semester.

Costs for a Year at UCD

The Financial Aid Office estimates that in 1989-90 the average expenses of a single UCD undergraduate living off campus will total $8,654, including $1,708 for fees, $636 for books and supplies, $2,930 for housing, $1,269 for food, $1,598 for personal expenses, and $513 for...
Fees, Expenses and Financial Aid

transportation. Estimated expenses for other single students living off campus are: graduate students, $8,969; Graduate School of Management, $9,372; Law, $9,283 to $10,539, depending upon the year in school (first, second, etc.); Veterinary Medicine, $9,367 to $10,389, depending upon the year in school (first, second, etc.); Medicine, $11,059 to $13,161 depending upon the year in school. The awards for married students are based on the same basic budget plus the addition of a standard child care allowance, unless documentation is provided about a spouse who is unable to work, in which case a dependent living allowance will also be awarded. Single parents' awards are based on the single student's budget and a child care allowance. If single parents' resources (earnings and benefits) are not sufficient to meet the basic living expenses of their dependents, a standard dependent living allowance may be awarded upon receipt of documentation.

The 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.

Refund Procedures

New Undergraduate Students:

Prior to Day 1, Registration Fees paid are refunded in full except for the $100 Acceptance of Admission Fee.

Day 1 and after, the $100 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 Readmitted Students and New Graduate Students:

There is a service charge of $10 for cancellation of registration 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, Education 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, Education 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>
</tr>
<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
113 North Hall
(916) 752-2390 (TDD 752-3244)

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

To ensure priority consideration, file your application for the 1990-1991 academic year as soon as possible after January 1, 1990. The priority filing deadline is March 2, 1990. Students who miss the priority filing date may not receive funds to meet their full need. However, you should still apply for financial aid even after the priority deadline because application processing will continue until funds are depleted. Application instructions for prospective undergraduate students are in the UC Undergraduate Admissions and Financial Aid Packet. The Student Aid Application for California (SAAC) is available at local high schools, community colleges, and the Financial Aid Office. Continuing UCD students and prospective graduate students should obtain the SAAC and "Financial Aid—How to Apply, 1990-91" from the Financial Aid Office in December.

Undergraduates with outstanding academic records are encouraged to apply for scholarships. See "Scholarships and Awards" at the end of this section for information about scholarship applications or contact the UCD Scholarship Office, 207 North Hall, (916) 752-2393.
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. Eligibility for state graduate fellowships is based on grade-point average, test scores, and financial need. Awards are applied directly toward fees. A State Graduate Fellowship Supplement as well as a SAAC must be submitted to a processor by March 2, 1990.

Eligibility for most assistance is based upon demonstrated financial need. (Most scholarships are need-based.) Eligibility is determined by the following formula: 1) the student is assigned a standard budget reflecting the average costs for a student attending UCD; 2) the student’s resources are analyzed according to federal and state regulations; 3) the resources are subtracted from the budget, and the remainder is the amount of eligibility. The Financial Aid Office attempts to fill this amount with a combination of grants, work-study, and loans.

For more information, contact the Financial Aid Office. Regulations and deadlines are subject to change.

Types of Financial Aid

Grants

A grant is a gift that does not have to be repaid as long as the student remains eligible. Whenever criteria and funding levels permit, a student’s financial aid award includes grants.

Pell Grants are federally-funded awards. All undergraduate financial aid applicants are required to apply for a Pell Grant each year by following the instructions in the financial aid application packet. Recipients must be enrolled at least half-time and must maintain good academic standing and make satisfactory academic progress. Eligibility for a Pell Grant is determined by the federal government according to a formula developed by the Department of Education and approved annually by Congress. All applicants are notified via a “Student Aid Report” (SAR). All parts of the SAR must then be submitted to the UC Davis Financial Aid Office. The amount received depends on financial need.

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 in 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 for 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.

- Cal Grant A pays a portion of the registration fees.
- Cal Grant B pays a monthly stipend for living expenses for first-year students and a portion of the registration fees plus a monthly stipend for living expenses for students in their second through fourth year.

University Grants are available to both graduate and undergraduate students. The maximum varies each year depending on funds available.

Educational Opportunity Program (EOP) Grants are restricted to undergraduates.

Supplemental Educational Opportunity Grants are awarded on the same basis as University Grants and are available to U.S. citizens or permanent U.S. residents who are at least half-time students and demonstrate exceptional financial need while pursuing their first undergraduate degree.

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 and who show financial need. Applicants must submit a regular financial aid application and provide supporting documents. Applicants should also write to the agency which administers their tribal affairs and request a BIA Higher Education Assistance application. The BIA Financial Aid counselor on campus can assist you with completing the application.

- Amount of BIA grant depends on need and availability of funds at each BIA agency.

Loans

A loan is an award which does not have to be repaid until completion of studies. A Financial Aid Offer almost always includes a long-term, low-interest loan. Repayment of these loans begins after you graduate or withdraw from school.

University Student Loans up to $18,000 per student are available for graduate studies, payment may be deferred until completion or termination of studies. Co-signer is required for annual amounts above $1,000.

- $4,500 undergraduate maximum for first 2 years
- $9,000 undergraduate maximum during 4 years
- $18,000 maximum for graduate students, including loans for undergraduate studies
- 5 percent interest (subject to change)
- Repayment begins 6 months after graduation or withdrawal

Perkins Loans (formerly National Direct Student Loans) are for U.S. citizens or permanent U.S. residents. Loans may be limited to a percentage of student’s need because of demand and limited funds. Repayment starts six to nine months after graduation or withdrawal from school and may be extended over ten years. Additional deferments are possible for temporary total disability.
or volunteer service in a private, non-profit organization, VISTA, or the Peace Corps. Some teachers of students from low-income families and full-time teachers of handicapped children may also qualify for partial loan cancellation.

- $4,500 undergraduate maximum for first 2 years
- $9,000 undergraduate maximum during 4 years
- $18,000 maximum for graduate students, including loans for undergraduate studies
- 5 percent interest (subject to change)

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

- $2,500 maximum for veterinary medicine and first-year medical students
- $3,333 maximum for medical students in the second-, third-, or fourth-year
- 5 percent interest
- Repayment begins 12 months after receipt of the degree or withdrawal

Stafford Student Loans (formerly GSL) are available through banks and other lending institutions. These loans are based on financial need. Interest accrued while the student is in school is paid by the federal government.

- $2,625 maximum per year for freshmen and sophomores, $4,000 maximum per year for juniors and seniors, to $17,250 maximum cumulative indebtedness for undergraduate students
- $7,500 maximum per year to $34,750 maximum cumulative indebtedness for graduate students
- 7-9 percent interest (may change on short notice)
- Repayment begins 6 months after graduation or withdrawal

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

- $20,000 maximum per academic year (or the financial need of the student, whichever is less)
- $80,000 total maximum
- The HEAL Program does not provide a subsidy for interest
- Interest is set at 3 percent points above 91-day T-Bill rates
- Repayment begins 9 months after completion of formal training, including accredited internship and residency programs or withdrawal

Parent Loans to Assist Undergraduates (PLUS) and Supplemental Loans to Assist Students (SLS) are government-insured loans that are made to parents of dependent students, to independent undergraduate students, and to graduate or professional students by participating banks and other lenders, regardless of income and assets.

- Parents of (1) dependent undergraduate students or (2) dependent graduate and professional students may borrow $4,000 per year to a maximum aggregate of $20,000 for each dependent student
- Independent undergraduate students or graduate and professional students may borrow up to $4,000 per year to a maximum aggregate of $20,000
- There is no interest subsidy for this loan
- Repayment begins 30 to 60 days after loan disbursement

Short-Term, Emergency, and Teaching Assistant Loans are designed to meet temporary or emergency financial needs of registered students. Loan funds are provided by UCD alumni, ASUCD, the Cal Aggie Foundation, The Regents of the University of California, and private donors.

- Short-term loan: $300 maximum; the full amount of in-state registration fees for one quarter may be borrowed in the form of a fee voucher. The maximum repayment period is 5 months.
- Emergency loan: $100 maximum; payment is due in 30 days. Available on a drop-in basis, Monday through Friday, 10:30 to 11:30 a.m. and 2:00 to 5:00 p.m.
- Teaching assistant loan: students who are in the teaching assistant, research assistant, associate-in, and postgraduate research classifications can apply for a maximum of one month's salary before and during Fall Quarter. The maximum repayment period is six months.
- The application for a Short-Term, Emergency, or Teaching Assistant Loan is available in the lobby of North Hall. For more information or to schedule an appointment, call (916) 752-6470, 10 a.m. to 12 noon and 2 to 4 p.m.

Work-Study

The College Work-Study Program enables students to earn part of their financial aid through part-time employment. To participate, you must first receive Work-Study as a part of your financial aid package. Your Work-Study award offers you both money for your education and work experience. The Student Employment Center coordinates College Work-Study (see below).

Federal Work-Study is funded by the federal government. Employment may be on or off campus with profit or nonprofit organizations. To be eligible, you must be a citizen or permanent resident of the U.S., must carry at least a half-time academic course load, and must maintain minimum academic progress.

California State Work-Study is funded by the state, and employment may be with profit or nonprofit organizations. The employment must be educationally beneficial or related to a particular career interest or the exploration of a career option. To be eligible, students must meet the requirements for federal student aid eligibility and be California residents.

University Work-Study is funded by the University of California, and employment is limited to jobs on-campus.
This program is primarily used for international students with financial need who would be ineligible for Federal Work-Study.

The Student Employment Center helps students, including those on the Planned Educational Leave Program, and their spouses find both part-time and temporary full-time employment on and off campus during the school year and vacation periods. Job opportunities are available in many fields of interest and require skills ranging from entry level to highly technical. For further information, see "Student Employment" in the Student Life section of this catalog.

Students applying to the University for the Fall Quarter are considered for scholarships using the same forms completed for admission purposes. Continuing students and applicants for Winter or Spring quarter should obtain scholarship applications in October. These applications are due in mid-December. Announcement of winners is usually made beginning in mid-April.

Graduate students are also eligible for various scholarships and fellowships.

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 $500 per year award) or may be accompanied by a stipend generally covering the difference between family resources and yearly educational costs. The Regents Scholarship Administrative Committee conducts personal interviews during the final selection process. These scholarships are renewable as long as you maintain a 3.25 grade-point average.

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

Alumni Scholarships, provided by the 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
- 1-, 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 $100 to $1,500

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
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. The second step is to determine the admission category to which you belong. (See Explanation of Application Categories further on in this section.) 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 Application Packet and return it during the appropriate filing period. The final step is to arrange to have all supporting documents—official test scores and transcripts—forwarded as early as possible.

A summary of the steps in the application procedure appears on the next page. Use the checklist to follow your application through the admission process.

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 Student Housing Offices since admission to the University does not guarantee the awarding of financial aid or housing.

The Disability Resource Center encourages applicants with a physical impairment to contact that office for further information concerning admission or assistance if needed.

Office of Relations with Schools/EOP Outreach Services

Information:
11 Mrak Hall
(916) 752-1099

The Office of Relations with Schools/EOP Outreach Services is the University’s link with secondary schools and community colleges within the state. Services and programs provided by the office include:

- Visiting schools to provide information about UCD to prospective students, counselors, school administrators, teachers, and parents
- Presenting conferences to acquaint the public with University programs
- Developing and distributing publications describing UCD’s programs and academic majors
- Coordinating information about course equivalencies and credit between the community colleges and UCD

- Administering a recruitment program designed to attract underrepresented and low income students to the University

The Educational Opportunity Program/Student Affirmative Action (EOP/SAA) is a major effort of the Office. These special programs in the junior high schools, high schools, and community colleges are aimed at encouraging students from underrepresented groups to become eligible for regular admission to the University.

Programs include the Early Academic Outreach Program in the junior high schools and high schools, and the Immediate Outreach Program in the high schools and community colleges; the Academic Enrichment Program, which provides encouragement for students to take science and mathematics courses in high school; and Upward Bound, a pre-college motivational program in the high schools. The office also sponsors summer residential programs on the Davis campus to give students the opportunity to experience the diversity of University life through residence hall living, special classes, trips, and lectures.

ADMISSION 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 including the essay and list the college and major you prefer. Attach a check or money order to cover the Application fee with your application materials, and return them in the preaddressed envelope during the priority filing period for the quarter in which you are interested.

☐ 3. Retain for your records the notices received from both the Application Processing and the Undergraduate Admissions Offices which acknowledge receipt of your application.

☐ 4. If you are applying from high school, do not send a preliminary transcript unless requested to do so by Undergraduate Admissions. If you are applying as an advanced standing student, arrange to have all transcripts sent. If test scores are required, please arrange to have these forwarded by the testing agency.

☐ 5. High school applicants to the fall term should make arrangements to take the SAT or ACT and three Achievement tests by no later than December. We strongly encourage that these tests be completed by the November test date.

☐ 6. 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, filing fee, essay, transcript (if required), work in progress, and test scores (if required), therefore it is important to make arrangements for these
requests if you want to avoid delay in the processing of your application.

☐ 7. Retain for your records the notification of admission received with your "Statement of Intent to Register" form.

☐ 8. Return your "Statement of Intent to Register," with the nonrefundable advance deposit of $100 (if required), as soon as possible and no later than the date stated on the SIR so your registration materials can be ordered before you register.

VISITING THE CAMPUS

Information:
Information Services Office
129 Mrak Hall
(916) 752-0539

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 or visit the Undergraduate Admissions Office. No appointment is necessary. For scheduled or individual tours of the campus, contact the Information Services Office at least four or five days in advance, either in person or by telephone.

PREPARING FOR UNIVERSITY WORK

A carefully planned program of high school courses provides you with the best preparation for University work. As a prospective University student, you should give priority to completing the high school courses required for admission—the "A-F" requirements.

You should take college preparatory courses that will challenge you to work hard and will prepare you beyond minimum levels of competence in reading, writing, and mathematics. A student who is well-prepared for University work will have taken four years of English in high school, four years of mathematics, two to three years of foreign language, two to three years of laboratory science, one year of history, and one or more years of art or humanities.

Reading: You should become proficient in reading and understanding technical materials and scholarly works. You should learn to read analytically and critically, actively questioning yourself about the author's intentions, viewpoint, arguments, and conclusions. You should also become familiar, and comfortable, with the conventions of standard written English, and with various writing strategies and techniques. Your reading experience should include original works in their entirety, not just textbooks and anthologies, and should encompass a wide variety of forms and topics.

Writing: Effective critical thinking and proficiency with the written language are closely related, and both are skills which every University student must master. By University standards, a student who is proficient in English composition is able to: a) understand the assigned topic; b) select and develop a theme by analysis and argument; c) choose words which aptly and precisely convey the intended meaning; d) construct effective sentences, i.e., sentences that economically and successfully convey the writer's ideas and display a variety of structures; and e) demonstrate an awareness of the conventions of standard written English.

If you plan to attend the University, you must take English courses in high school that require the development and practice of these skills. You must take at least four years of English composition and literature that stress expository writing; the development of persuasive critical thinking on the written page.

Mathematics: Many undergraduate majors require preparation in mathematics beyond the three years required for admission to the University. All majors in the natural and life sciences, engineering, and mathematics require calculus, and many majors in the social sciences require statistics or calculus, or both. Calculus is also required for undergraduates preparing for careers in the environmental sciences, dentistry, medicine, optometry, pharmacy, and biostatistics. If you select a major which requires either calculus or statistics, you should expect to take that course during your first year at the University.

You should prepare yourself for University courses in mathematics while you are still in high school. Good preparation includes a year of mathematics beyond second-year algebra (such as precalculus, mathematical analysis, analytic geometry) and, definitely, a course in mathematics during your senior year.

The ability to use algebra to solve problems is necessary for success in University mathematics courses. Students who do not take a mathematics course during their last year in high school often find they need to take a preparatory course at the University in order to renew their algebra skills. The need to take such a course at the University could delay undergraduate studies for which mathematics is a prerequisite.

Finally, you should take advantage of any guidance your high school may offer in study skills. Managing your time well and studying effectively are critical to excellence at the University. Together with solid academic preparation, these skills should enable you to realize your educational goals and, ultimately, fulfill your career aspirations.
APPLICATION PROCEDURES

The UC Application System

Students seeking admission to the University of California are able to have their applications considered simultaneously at more than one campus. Under this system, you submit one application to the University indicating the campus or campuses you wish to attend. The application is then forwarded to the campuses you list. For information regarding the filing fee, consult the application packet.

Undergraduate application packets may be obtained from any California high school, community college, or University of California Admissions Office. Complete the application materials following the instructions included in the packet. Communications concerning admission to the UC Davis campus should be sent to the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis 95616.

A nonrefundable application fee 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.

Initial filing dates are the same for all UC campuses and are listed below. All applications will be considered if filed during the priority filing period. The Davis campus may continue to accept applications beyond the initial filing period; however, after the priority filing period, some departments or colleges may close to new applicants as enrollment quotas are filled. Once a department or college has closed, any additional applications which are received will be notified of alternatives on other UC campuses by the Central Processing Office.

The initial filing periods for new applicants are as follows:

<table>
<thead>
<tr>
<th>Quarter to be Admitted (All UC Campuses, Except Berkeley)</th>
<th>Semester to be Admitted (Berkeley Campus Only)</th>
</tr>
</thead>
</table>

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 and other supporting documents to be sent to the Undergraduate Admissions Office as soon as they are available. High school students should not forward transcripts unless requested by the Undergraduate Admissions Office. Because advanced standing eligibility depends upon the final outcome of quarter or semester course work in progress, this office must receive a final official transcript of all work completed before you may register.

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 or UC campus. Please note that it is your responsibility to arrange for official transcripts to be forwarded and to ensure that they arrive promptly. It is also useful to have unofficial transcripts sent to you to retain for counseling purposes.

You must submit an official final transcript including a statement of graduation, a Certificate of Proficiency or a General Education Development (GED) certificate. Freshman applicants (see "Explanation of Application Categories") are also required to submit results of their SAT or ACT tests and three Achievement Tests. (Fall quarter freshman applicants must complete all tests by the December test date in order to be given priority in the admissions process.)

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

Addition of Campus Choice

If, after submitting your application, you wish to add a campus or campuses to those listed on your application, you may do so for a fee, if the campus(es) you wish to add is (are) still open to new applications. Contact the
Acceptance of Admission

When you receive your notification of admission you will also receive an important form called the "Statement of Intent to Register" (SIR). You must complete the form and return it to this office, along with the required non-refundable $100 deposit, in order to complete the admissions process. This advance deposit is applied to your University Registration Fee as long as you register in the quarter to which you are admitted. Intercampus transfer, EOP, and readmission applicants (see Explanation of Application Categories below) are not required to submit the $100 advance deposit; however, they will pay full Registration fees at the time of registration.

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 is a student who has graduated from high school or who has earned a Certificate of Proficiency or a General Education Development Certificate, 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 is a student who has been registered in a regular or extension session of a college or university since high school graduation.

An intercampus transfer applicant 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 (non-UC) collegiate institution.

An intercampus transfer reentrant applicant is an undergraduate who was formerly registered at UC Davis, then registered at another UC campus, and is now transferring back to UC Davis from a UC campus. This student follows the filing deadlines established for readmission applicants and applies as a readmit through the Davis campus Office of the Registrar.

An Educational Opportunity Program/Student Affirmative Action applicant is a low-income, disadvantaged, or underrepresented student who may or may not meet the standard admission requirements for freshman or advanced standing status.

A readmission applicant 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.

A reentry applicant is an undergraduate student age 25 or over or a graduate student age 30 or over who has had a significant break in education.

A limited status applicant 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.
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 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 seven areas of concentration: animal science; plant sciences and pest and disease management; food, nutrition, textile, and consumer sciences; applied economic and behavioral sciences; resource sciences and engineering; environmental studies; and biological sciences. The **College of Engineering** focuses on curricula on the engineering sciences. 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.

Major programs are listed in each college section.

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.

A special status applicant 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 part-time status student is a person who wishes to complete a degree at UC Davis on a part-time enrollment basis.

Employee-student status is for a UC career employee who wishes to work toward a degree through the Employee Reduced Fee Program.

A second baccalaureate applicant is a college graduate who seeks an additional bachelor's degree. Approval is granted only to students who have completely changed their educational objectives and are applying for a major that has no enrollment restrictions.

An international applicant is a student who is not a U.S. citizen, immigrant, or refugee.

A concurrent enrollment applicant is someone 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. Such work may be used for admission consideration and for later meeting degree requirements. A concurrent student is enrolled but not admitted to UC Davis. This program is offered through University Extension and does not require the applicant to meet regular admission requirements.

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 Graduate Division section in this catalog.

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 (Law, Management, Medicine, Veterinary Medicine). Please see the appropriate sections in this catalog for specific information.
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.**

**Subject Requirement**

You must complete at least 15 high school units in the subject areas listed below. At least 7 of the required 15 units will have to be taken in the last two years of high school. 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, however, the grades 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, in some cases, complete a more advanced course) with a grade of C or better.  

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

A. **History**—1 unit  
   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**—4 units  
   Four years of English—composition and literature (university preparatory in nature, including frequent and regular practice in writing expository prose compositions of some length). Not more than one year will be accepted from the ninth grade. (See English Proficiency below.)

C. **Mathematics**—3 units  
   Three years of mathematics—elementary algebra, geometry, and intermediate algebra. (Courses taken in grades seven and eight may partially satisfy the requirement if they are accepted by the high school as equivalent to its own courses.)

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

E. **Foreign Language**—2 units  
   Two years of one foreign language. Any foreign language with a written literature and emphasis on the development of aural and oral skills may be used. (Courses taken in grades seven and eight may satisfy this requirement if they are accepted by the high school as equivalent to its own courses.)

F. **College Preparatory Electives**—4 units  
   Four units in addition to those required in "A" through "E" above, to be chosen from at least two of the following subject areas. Elective courses should involve considerable reading and aim to develop analytical and reasoning ability and skill with written and oral exposition.
- History and English courses that fit the general description for elective courses above.
- Advanced mathematics: Trigonometry, linear algebra, precalculus (mathematical analysis), calculus, statistics, computer science, and similar courses. (Courses containing significant amounts of material for arithmetic or from shop, consumer, or business mathematics are not acceptable.)
- Laboratory science: courses in the biological and physical sciences. A general science course taken in grade nine as preparation for a laboratory science may be used.
- Foreign language: courses may be in either the same language used to satisfy the “E” requirement or a second foreign language. If a second language is chosen, however, at least two years of work in that language must be completed.
- Social science: courses that fit the general description for elective courses above, and that serve as preparation for lower division work in social science at the University. (Courses of an applied, service, or vocational nature are not acceptable.)
- Visual and performing arts: courses should enable students to understand and appreciate artistic expression, and to talk and write with discrimination about artistic materials studied. Courses that develop creative artistic ability or artistic performance may be used. (Courses that are recreational or are offered under physical education are not acceptable.)

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 completing one of the following:
- College Board Achievement Test in English Composition (a score of 600 or above);
- Advanced Placement Examination in English Composition and Literature or English Language and Composition (a score of 5, 4, 3); or
- California State University and Colleges English Equivalency Test (a “pass for credit” only).

The requirement may also be satisfied with a 3-semester or 4-quarter unit transferable college-level English course with a grade of C or higher in literature, composition, or speech.

Scholarship Requirement

An applicant must have earned a grade of C or better in all high school courses to satisfy the “A” through “E” requirements above. The grades earned in these courses that are taken in grades ten through twelve will be used to compute the grade-point average for admission, except that the grades earned in the third year of mathematics required under the “C” requirement (intermediate algebra) will be used only if they improve the applicant’s grade-point average.

Two of the four units in elective courses used to satisfy the “E” requirement must be completed with a grade of C or better, and all four units must be accepted by the high school for graduation. The best grades earned in any two of these units taken in grades ten through twelve will be used in computing the applicant’s grade-point average for admission.

If you attain a grade-point average of 3.30 (where the letter grade A = 4, B = 3, and C = 2, and in honors or advanced placement courses taken during the eleventh and twelfth years—limit of four year-long courses—where the letter grade A = 5, B = 4, and C = 3) in the required “A to F” subjects taken after the ninth grade, you will be eligible to enter the University regardless of your scores on standardized tests. If your grade-point average falls below 3.30 but higher than 2.77, you will be eligible for the University by achieving the specified scores on the standardized tests (see the Eligibility Index on the following page). If you are a nonresident applicant, your grade-point average in the required subjects must be 3.40 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 courses in which you received a grade
Examination Requirement

All freshman applicants must submit scores from the College Board 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 December of your senior year (earlier testing is recommended). The following tests are required:

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

or

- American College Test

and

- Three Achievement Tests (College Board), which must include (a) English Composition (with or without the essay), (b) mathematics (level I or II), and (c) one test from the social studies or science or foreign language, or the test in English literature.

If you are a California resident and your grade-point average in the required high school subjects is over 3.30, the tests are required but your scores will not be used to determine your eligibility.

Eligibility Index

<table>
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<tr>
<th>Grade-Point Averages</th>
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<th>SAT† Total Scores</th>
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*The American College Test (ACT) is scored in intervals of 1 point from a minimum of 1 to a maximum of 36.
†The Scholastic Aptitude Test (SAT) is scored in intervals of 10 points from a minimum of 400 to a maximum of 1600.
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 of transferable college work since high school graduation, you can qualify for admission as a freshman by examination alone. (If you have completed transferable college courses, College Board tests cannot be taken in academic subjects covered in those courses.) You must take the same College Board tests discussed above and receive a total score of at least 1100 on the Scholastic Aptitude Test, or a score of 26 on the American College 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.

Examination Arrangements: Make arrangements to take the required Scholastic Aptitude Test (SAT) and the Achievement Tests by writing to The College Board, 1347 Center Street, Berkeley, CA 94704. For the American College Test (ACT) write to American College Testing Program, Registration Unit, P.O. Box 168, Iowa City, IA 52240. (Test fees should be paid to the Testing Service, not the University.) UC Davis's College Board 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 since high school graduation, excluding the summer immediately following high school graduation. An advanced standing student may not disregard his or her previous college records. Official transcripts from all previous colleges or universities must be submitted to Undergraduate Admissions. This Office determines an applicant's status by looking at courses that are transferable to the University. Courses accepted for admission may not be accepted by the Dean of your college for meeting breadth, major, General Education, or degree requirements.

Admission Requirements

The requirements for admission to advanced standing will vary according to your high school record. If you have fewer than 84 transferable quarter (56 semester) units, you may be required to submit a SAT examination score to establish your high school eligibility on the eligibility index. Transfers with more than 12 quarter or semester units are not required to submit achievement test results. In any case, 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 as described later in this section under Nonresident Applicants.

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 2.00 or better. If your grade-point average fell below 2.00 at any one college you attended or you are not in good standing, 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 were eligible for admission to the University when you graduated from high school—meaning you satisfied the Subject, Scholarship, and Examination Requirements—you are eligible to transfer if you have a C (2.0) average in your transferable college coursework.

- If you have completed fewer than 12 quarter or semester units of transferable college credit since high school graduation, you must also satisfy the examination requirement for freshmen. Beginning fall 1989, all transfer students, regardless of the date of high school graduation, must meet the high school requirements stated earlier in this catalog, or establish eligibility as junior-level transfers.

- If you have graduated from high school and meet the needed Eligibility Index score but you have not completed one or more of the "A to F" subjects while in high school, you may be admitted after you have:

  1. established an overall grade-point average of 2.00 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 lack; and
3. completed 12 or more transferable quarter (or semester) units, or have met the freshman examination requirement.

- If you did not meet the needed Eligibility Index score and lack the required subjects, you may be admitted after you have:
  1. established an overall grade-point average of 2.40 or better in another college or university;
  2. completed 84 transferable quarter (56 semester) units of credit in college courses; and
  3. completed one of the following:
     a. appropriate college courses, with a grade of C or better, in high school subjects that you lacked—up to two units (one unit = one year-long course) of credit may be waived except in English and mathematics; or
     b. a college course, or courses, in mathematics; one in English; and one in either U.S. history, a laboratory science, or a foreign language, all with grades of C or better. The mathematics component must at least be equal to algebra, geometry, and advanced algebra. A course for which advanced algebra is a prerequisite, including statistics taught in a Mathematics department, will satisfy the entire requirement. Courses other than mathematics must be transferable to the University.

Campus Selection Criteria

UC Davis makes every effort to provide a place for all California resident applicants who meet the minimum admission requirements and file an application during the appropriate priority filing period.

In recent years, the number of applicants for some majors has far exceeded the number of spaces available. When UC Davis cannot accept all eligible applicants, it uses standards which are more demanding than the minimum requirements to select students. These standards, which are called selection criteria, identify those students who have demonstrated the capacity for high academic achievement and who have a variety of other qualities that can contribute to the strength and diversity of the campus community.

The selection criteria for freshman and transfer applicants for fall 1989 are described in this section. In the box marked "Admission Guidelines" are standards used by UC Davis to develop the selection procedures.

The selection criteria described below are only for applicants for the fall 1989 term. The criteria may differ for the winter and spring terms because enrollment targets and applicant qualifications change. Applicants for winter or spring should contact the Admissions Office for more information.

Admission Guidelines

To be eligible for admission, applicants must meet the University's undergraduate admission requirements. The following guidelines provide the framework within which the campuses establish procedures for selecting applicants when the number of eligible applicants exceeds the places available.

Each campus, in consultation with the Office of the President, develops enrollment targets that specify the number of new freshman and advanced standing students expected to enroll. Campuses that receive more applications than the number required to meet their enrollment target admit students using the criteria described below.

FRESHMAN APPLICANTS

Davis ranks all freshman applicants using the following academic index: (1000 x Grade Point Average [capped at 4.00]) + (combined Scholastic Aptitude Test [or American College Test]) + (three required College Board Achievement Tests).

Academic Criteria (used to select 40% of admits)

Applicants in all majors are selected on the basis of academic index score.

Supplemental Criteria (used to select 60% of admits)

The academic index is used as the basis for selection, with consideration of additional factors, including intended major, strength and range of college preparatory courses, and personal accomplishments and qualities.

ADVANCED STANDING APPLICANTS

Academic Criteria

All UC eligible California community college junior level transfer applicants will be admitted in all majors. Other UC eligible transfer applicants will be admitted if space is available.

The only exceptions to the above are for the Engineering and Biological Sciences majors, which screen applicants for completion of 84 quarter units and the potential to complete lower division prerequisites before enrollment.

Supplemental Criteria

The same supplemental criteria described above for freshmen are used.

SPECIAL PROGRAMS AND ADMISSIONS CATEGORIES

Educational Opportunity Program/Student Affirmative Action (EOP/SAA)

The Educational Opportunity Program/Student Affirmative Action is designed to assist and provide opportunities in higher education for students from underrepresented ethnic groups (American Indian, Black,
Chicano, and Latino) and students from economically and/or educationally disadvantaged backgrounds. The program offers assistance with the admission application process in addition to providing academic, social, and cultural support. (See also under Advising and Counseling in the Student Life section.) An admissions application fee waiver and financial aid are available to those individuals with demonstrated financial need. You can contact the Undergraduate Admissions Office for information on obtaining the fee waiver.

An EOP/SAA applicant may be admitted in one of two ways: (1) as a freshman or advanced standing student who has met the standard admission requirements, or (2) as a special-action freshman or advanced standing student who has not met the admission requirements but who has demonstrated academic potential.

To apply for the program each applicant must complete the regular UC admission application form and complete the appropriate places related to EOP. In addition, the applicant is advised to discuss the reasons for requesting EOP assistance in the required essay.

**Academic Reentry Program**

The Academic Reentry Program gives assistance in applying to the University to students in nontraditional age categories who are 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 also under Advising and Counseling in the Student Life section.)

**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 but not be a candidate for an advanced 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. 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 approval by 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.

**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.

**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. Applications are available from any local high school, community college or UC campus. The nonrefundable application fee must be submitted with your transfer application. Filing dates are the same as those listed for regular applicants (see Calendar at the front of this catalog).

**International Student Status**

Applicants from other countries will be admitted in accordance with the general procedures governing nonresident admission. An application may be obtained by writing the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis, California, 95616. Applicants who are not United States citizens, immigrants, or refugees, must return this application with the nonrefundable application filing fee. It is very important that the application be filed during the appropriate filing period. Applications received after the first month of the priority filing period will be processed as space permits.

Prior to admission, the Financial Certification Form is required to demonstrate the availability of $15,700 for the first year’s study. Adequate funding is required for the remaining years in the United States until the academic program is completed. Prior to registration, the signed Statement of Responsibilities for Privately-Funded Students, or the Statement of Responsibilities for Sponsored Students is required.

For applicants whose native language is not English or whose schooling has not been in the English language, the results of the Test of English as a Foreign Language (TOEFL) are required and must be submitted. To arrange a testing date and location in one’s home country write to the Educational Testing Service, P.O. Box 899, Princeton, New Jersey, 08540. The minimum TOEFL score which will be accepted is 500.

Prior to registration, international students whose native language is not English are required to demonstrate sufficient command of the English language to profit from instruction at the University. A proficiency examination is given at UC Davis during the week before school begins. If students do not pass this examination, they must enroll in English classes for international students—English 21, 22, or 23—until they have acquired the necessary language skills. In addition, students must satisfy the University Subject A requirement.

As part of the application process, applicants are required to submit their 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. Credit will be granted for university studies outside the United States if the coursework has been 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.

For additional information, look under International Student Services in the Student Life section of this catalog.
Part-Time Status

If, for reasons of occupation, family responsibility, or health, you are unable to attend the university on a full-time basis, you may qualify for enrollment in part-time status. Students may change status between full-time and part-time as their circumstances change. To be considered eligible, undergraduate students must be enrolled for ten units or fewer per quarter. Minimum progress requirements are waived for part-time students. A petition, available at the Office of the Registrar, must be approved by the dean of your college (certain verifications are required), and then filed with the Office of the Registrar no later than the tenth day of instruction in the quarter of enrollment. Part-time students have use of the same facilities and are eligible for the same services, including Student Health Services, as full-time students. For information on fee reductions applicable to part-time students, see the Fees and Expenses section of this catalog.

Employee-Student Status

Reduced fees are available to UC career employees and certain UC retirees who are qualified for admission to the University. Once admission has been granted, a petition for the reduction in fees must be filed prior to each quarter of enrollment. Employee students pay one-third of the regular fees and may enroll for up to nine units or three courses per quarter whichever is greater. Employee students on the semester system may enroll for up to six units or two courses, whichever is greater. Detailed information is in the UC Staff Personnel Policy Manual (Section 260.23 for employees, 775.7 for retirees, and 141.11 for the Administrative and Professional Staff program) available in department offices, at the Library Reference Center, or the Staff Development and Professional Services Office. Petitions can be obtained through the employee’s unit.

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, 414 Surge-IV, University of California, Davis 95616.

For admission to the Graduate Division, Schools of Law, Graduate School of Management, Medicine, or Veterinary Medicine, see the appropriate sections in this catalog.

ADDITIONAL INFORMATION

Options for Nontraditional Students

While UCD graduate and undergraduate degree programs are designed primarily for students who can enroll full time on campus, the following programs make it possible for qualified nontraditional students to accumulate credit without enrolling full time:

- For students admitted to UCD:
  Part-time status
  Employee-student status
  Credit by examination

- For admitted and non-admitted UCD students:
  University Extension courses
  Summer Sessions courses

- For students who have not been admitted to UCD:
  Concurrent courses

Pre-Admission advising is available to nontraditional students through the Academic Reentry Program.

High School Proficiency Examination

The University of California will accept the Certificate of Proficiency or the General Education Development (GED) certificate awarded by the State Department of Education, 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 College Board test 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 composition. This requirement is known as "Subject A." See the Academic Information section in this catalog for a full description of the means by which this requirement may be satisfied.

Advanced Placement Examinations

The Advanced Placement Examinations of the College Board are taken in conjunction with courses taken in high school. Depending on the examination, you can receive 6 or 4 quarter units of University credit for each examination 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 examination advanced placement for course work equivalencies and limitations of credit.

Credit from Another Institution

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. (Students accepted into the College of Agricultural and Environmental Sciences should refer to that section in regard to petitioning for upper-division course evaluation.)

California community colleges offer a full program of courses approved for transfer credit. A maximum of 105 quarter units (70 semester units) may be earned 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 (80 semester) 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 the Engineering section.)
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 Program 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 this program 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 course placement exams and complete your registration (payment of fees) 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 happen include departmental open houses, tours of the campus, concerts and lectures, registration, enrollment, and meetings with deans and advisers. Orientation activities are also held for students entering in Winter and Spring Quarters.

REGISTRATION PROCEDURES

Information:
Office of the Registrar
124 Mrak Hall
(916) 752-2973

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

If you are a new or reentering student you must also:
- Have a photo ID picture taken.
- Submit a Statement of Legal Residence (see Appendix).
- Return the completed Medical History form, evidence of rubella immunity, 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 is complete when you have submitted your registration forms, had your photo taken (first term of enrollment only), paid your fees, and enrolled in classes. Late registration privileges extend through the tenth day of instruction, but you will be assessed a fee of $50 to defray the extra clerical costs of late registration.

Permission to register after the deadline will be allowed only under conditions where action or inaction on the part of the University delays registration. A recommendation from an appropriate administrative unit will be required.

If you have not satisfied the Subject A requirement, you must enroll in English A. 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.

Study List Unit Limitations

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

Undergraduate students who qualify for part-time status may enroll for ten units or fewer per quarter; and graduate students with part-time status may enroll for one-half course load. Employee-students may enroll for up to nine units or three courses, whichever is greater, any given quarter.

Normally, an undergraduate student enrolls for 15 units per quarter; however, you should familiarize yourself with the quarterly minimum-progress requirements. Undergraduate students should refer to College sections for quarterly maximum-unit allowances.

Variable-Unit Courses

Subject to approval by the department chairperson, an instructor may arrange to give a special study course (numbers 92, 97T, 97TC, 98, 99, 192, 194H, 197T, 197TC, 198, 199) to interested students. These courses are graded on a Passed/Not Passed basis only. Under special circumstances, an instructor may request from the Academic Senate 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.

Credit in Special Study Courses (numbered 92, 94H, 199) is limited to a total of 5 units per term.

Adding or Dropping Courses

You are officially enrolled in all courses listed on your individual study list and will be held responsible for completing each of the courses. You must file an Add-Drop petition in order to add or drop courses after this initial enrollment. Petitions are to be filed with the departments offering courses to be added or dropped.

See the Academic Calendar in the front of this catalog for final dates for filing petitions each quarter, and refer to the appropriate Class Schedule and Room Directory for filing procedures. After published deadlines permission to change your study list may only be granted by the dean of your college or school and only in special circumstances. Graduate students must have their adviser's approval in order to drop courses. A course which is on your study list and for which you did no gradable work is reflected on your official transcript. A
verification of your study list is available at the beginning of the fifth week of each quarter.

Changes of Major, College, or School
With the approval of the appropriate dean or deans, an undergraduate student in good standing can transfer from one area of study to another. Petitions for this purpose may be obtained from the Office of 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. Requirements for changing a major in a given college are listed under each college section in this catalog.

Change of Name
Petitions for this purpose may be obtained from the Office of the Registrar. (Students planning to graduate should file this petition no later than the fifth week of the quarter in which they intend to graduate.)

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 Academic Senate Office) and submit it to the Academic Senate Committee on Courses of Instruction.

The deadline for applications is the end of the second week of the term prior to the term in which the project is to be undertaken. (See the Academic Calendar at the front of the catalog for specific dates.)

You must report the completion or termination of the project to the Committee on Courses of Instruction.

For further information contact the chairperson of the Committee on Courses of Instruction, c/o Academic Senate Office, in person or by telephone.

INTERNSHIP 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 Internship and Career Center on campus and enrolls for the course by Add card through the department involved. (For Public Affairs Internship procedures, see under Political Science.) The deadline for each quarter is the last day for adding courses to the study list.

A maximum of 12 units of internship courses, whether taken at UCD or elsewhere, may be counted toward the 180 units minimum required for graduation.

WITHDRAWALS AND LEAVES OF ABSENCE
Withdrawals may be granted by the University for emergency reasons or for good cause. In order to withdraw, approval must first be obtained from the dean of the student's college or school. Unauthorized withdrawals will jeopardize registration privileges and result in failing grades. Petitions for Withdrawal Forms are available at the Office of the Registrar. Information on fee refunds can be found in the Fee Refund section of this catalog. Once withdrawal forms are approved, enrolled courses will be dropped automatically. (See below for a planned temporary leave.)

If you are 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 are receiving veterans benefits, you must also report your withdrawal to the Veterans Affairs Office.

READMISSION AFTER AN ABSENCE
If you are a former UCD undergraduate student planning to return to the University of California at Davis, you must file an Application for Readmission available in the Office of the Registrar, with a nontransferable, nonrefundable fee of $35. (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 to the Office of the Registrar.

Undergraduate students applying for readmission must file their applications on or before the following deadlines:

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Deadline Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 1989</td>
<td>August 25, 1989</td>
</tr>
<tr>
<td>Winter 1990</td>
<td>December 1, 1989</td>
</tr>
<tr>
<td>Spring 1990</td>
<td>February 23, 1990</td>
</tr>
<tr>
<td>Fall 1990</td>
<td>August 24, 1990</td>
</tr>
</tbody>
</table>
Graduate students applying for readmission should refer to the Graduate Division section in this catalog for filing information.

**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. PELP is not to be used for a medical leave. If you cannot attend school because of medical reasons, you should request a Petition for Withdrawal available in the Office of the Registrar. (Also see Readmission after an Absence.)

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.

Applicants for enrollment in PELP are required to file an application available at the Office of the Registrar, including a brief written explanation of the reason for leaving the campus, and must state when they intend to resume academic work. Applications for Planned Educational Leave must be filed with the Office of the Registrar (Admissions Office for new students) no later than the tenth day of instruction.

A fee of $35 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 leave 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 tenth day of instruction in a quarter. You should be entitled to a partial refund of fees paid. (See Fee Refunds.) Enrolled courses will be dropped automatically.

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

Readmission is guaranteed assuming you resume regular academic work at the agreed-upon date and satisfy any "holds" that may have been placed on your registration. Students who do not return at the agreed-upon date and who do not officially extend their leave will be automatically withdrawn from the University.

You will not be eligible to receive all 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 ensure the availability of financial aid upon your return.

**SCHOLASTIC REQUIREMENTS**

The academic year consists of three ten-week quarters, except for the School of Law which has an academic year consisting of two fifteen-week semesters. 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.

**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, and enable you to transfer from one campus or university to another without undue difficulty. (To convert quarter units to semester units, multiply by 2/3; from semester to quarter units, multiply by 3/2.)

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 ask the instructor what is required in terms 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.

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 Office of the Registrar. The petition is subject to the approval of the instructor giving 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 duplicate any credit you have already earned toward your degree. The final results will be reported to the Office of the Registrar which 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.

Learning in nonacademic settings can also be validated through credit by examination.

Enrollment at Another Institution

A student may not obtain transfer credit for courses taken at a non-University of California campus in a term during which the student is enrolled as a full-time student at UCD. A variance can be obtained only by petitioning the dean of your college well in advance of the desired enrollment. In those instances in which a variance is granted, units earned are counted toward minimum progress for the term in which the dual enrollment occurs. Summer session courses are exempt from this regulation.

It is 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 Admissions Office for evaluation. On your transcript UCD Summer Sessions courses are identified by the letter "S" preceding course numbers. (There is no provision for auditing in Summer Sessions.)

See the Summer Sessions bulletin for detailed information.

GRADING

Every instructor is required to assign a grade for each student enrolled 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)
P, passed (grade C- or better)
NP, not passed
S, satisfactory
U, unsatisfactory
I, incomplete (work is satisfactory but incomplete for a good cause)
IP, in progress
E-NWS, enrolled—no work submitted

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:

4.0 = A +  
2.7 = B −  
1.0 = D

4.0 = A  
2.3 = C +  
0.7 = D −

3.7 = A −  
2.0 = C  
0.0 = F

3.3 = B +  
1.7 = C −  
0.0 = I

3.0 = B  
1.3 = D +  
0.0 = P/NP

0.0 = S/U

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 "scholastically deficient" (see Scholarship Deficiencies).

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 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 not counted 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 num-
ber of units graded P that will be accepted for degree credit is ¼ of the units completed in residence on the Davis campus. Consequently, at least ¾ of the units completed in residence at Davis and presented in satisfaction of degree requirements must be in courses taken for a letter grade. 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. Students who plan to attend graduate or professional school should consult with Advising Services regarding Passed/Not Passed grading.

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 must be submitted before half of the time covered by the IP grading has elapsed. The P/NP grading will then be in effect for the entire course sequence.

A course in which a D or F is 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 earned 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 adviser. (See also Individual Study courses.) A course in which a C, 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. Such courses count toward the maximum number of units graded P allowable toward the degree. (See also 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. (See above for P/NP grading option.)

Incomplete Grades

The grade of I may be assigned when a student’s work is of passing quality and represents a significant portion of the requirements for a final grade, but is incomplete for a good cause as determined by the instructor. (Good cause may include illness, serious personal problems, an accident, a death in the immediate family, a large and necessary increase in working hours, or other situation of equal gravity.) 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 Office of the Registrar.
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, and the grade is not replaced by the end of the third term succeeding the term in which the I grade was assigned, the I grade will remain on the student's record.

You may not re-enroll for credit in a course for which an I grade has been assigned. An undergraduate student whose record shows more than 16 units of I grades will be subject to disqualification. 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, NP, or U, 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 by the instructor 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 any course in which grades of D, F, or NP have been received up to a maximum of 16 units. (Repeat units of English A will not be counted against this maximum.) However, departments may restrict the repetition of a course if it is prerequisite to a course that has already been completed with a grade of C- or better. 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.) 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.

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/U basis.

In computing the grade-point average of a graduate student who repeats courses in which grades of C, D, or F was received, only the most recently earned grade for each course and corresponding grade points will be used.

Mid-Term Grade Standing

Students wishing to know their grade at the mid-quarter should ask 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, bring in a stamped, self-addressed envelope with your registration card to the Office of the Registrar before the end of the term.

Transcripts
A record of each student's academic work at UCD is prepared and retained permanently by the Office of the Registrar. Copies of your official transcript may be obtained from that office for $3 a copy. Transcripts of all work done through University Extension or Concurrent Enrollment should be requested directly from the University Extension Office, 414 Surge-IV. 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 two weeks 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>0–40.0</td>
</tr>
<tr>
<td>Sophomore</td>
<td>40.1–83.9</td>
</tr>
<tr>
<td>Junior</td>
<td>84.0–134.9</td>
</tr>
<tr>
<td>Senior</td>
<td>135.0 –</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. Final examinations may be given in graduate 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 (in undergraduate courses) of a take-home and an in-class final examination together should not exceed three hours. In each 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-opted 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. An in-class final examination may not be rescheduled for a date earlier than the first day of finals week. The due date for a take-home final examination may not be earlier than the time and date published in the Class Schedule and Room Directory.

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 the Davis Division of the Academic Senate by the end of the next regular term for appropriate action.

Students with learning disabilities may be afforded additional time for examinations (or alternate examination formats). An adjustment request must be submitted in writing to the instructor of the course involved by the tenth day of the quarter, and must include proof of the existence of a learning disability. The instructor determines, in consultation with the student and the campus Learning Disability specialist, whether an adjustment is necessary and specifies the terms of the adjustment.

The University of California, Davis seeks to accommodate any student, who in observance of a religious creed, encounters an unavoidable conflict with a test or examination schedule. It is the responsibility of the student to provide, in writing and at the beginning of the quarter, notification of a potential conflict to the individual responsible for administering the test or examination and to request accommodation. Instructors will consider such requests on a case-by-case basis and determine whether such conflicts can be resolved without imposing on the instructor or the other students in the class an undue hardship which cannot be reasonably avoided. If so, the instructor will determine, in consultation with the student, a time during which the student can take the test or examination without incurring a penalty or violation to the requester's religious creed.

An instructor may release each student's original examination, or a copy, at any time. Otherwise the instructor will retain final examination materials, or copies thereof, until the end of the next regular term, during which period students may have access to their examinations.

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 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 different 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.
### College Board Advanced Placement (AP) Examination Credit

If you take one or more of the College Board Advanced Placement (AP) Examinations and score 3, 4, or 5, you will be awarded college credit. The credit will be based on the same courses. The credit listed in the following table is given for courses in which you have scored 3, 4, or 5.

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

<table>
<thead>
<tr>
<th>EXAMINATION</th>
<th>SCORE</th>
<th>UCD COURSE EQUIVALENCIES</th>
<th>CONTINUING COURSE</th>
<th>CREDIT TOWARD DEGREE</th>
<th>CREDIT ALLOWED TOWARD SPECIFIC DEGREE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENGLISH</strong></td>
<td>5, 4</td>
<td>English A, 1, 3</td>
<td></td>
<td>8 units</td>
<td>English/Humanities Credit: Satisfies Subject A requirement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>College of Agricultural and Environmental Sciences: 4 units.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>College of Engineering: 9 units.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Humanities and Fine Arts credit: Satisfies first course toward English Composition requirement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Humanities Credit/Unrestricted Electives: 4 units.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>For each foreign language examination passed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In the College of Agricultural and Environmental Sciences, satisfies credit toward Humanities/Unrestricted electives.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In the College of Letters and Science, examinations also satisfy the foreign language requirement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In the College of Engineering, satisfies units toward Unrestricted electives.</td>
</tr>
<tr>
<td><strong>FOREIGN LANGUAGES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>French</td>
<td>5</td>
<td>French 20</td>
<td>French 23, or consultation with advisor.</td>
<td>5 units</td>
<td>Humanities Credit/Unrestricted Electives: 4 units.</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>French 21</td>
<td>French 22</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>French 3</td>
<td>French 21</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>German</td>
<td>5, 4</td>
<td>German 4, 6A, or 6B</td>
<td>German 101, upper division literature courses.</td>
<td>8 units</td>
<td>Humanities Credit/Unrestricted Electives: 4 units.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>German 3</td>
<td>German 4, 100A, 100B, or 100C.</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>Latin (Vergil)</td>
<td>5, 4, 3</td>
<td>Latin 2</td>
<td>Determined by consultation with Classics advisor.</td>
<td>8 units</td>
<td>Humanities Credit/Unrestricted Electives: 4 units.</td>
</tr>
<tr>
<td></td>
<td>5, 4</td>
<td>Latin 2</td>
<td>Determined by consultation with Classics advisor.</td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>5, 4</td>
<td>Spanish 5, 4</td>
<td>Spanish 6 and 2B, or more advanced course.</td>
<td>8 units</td>
<td>Humanities Credit/Unrestricted Electives: 4 units.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Spanish 4</td>
<td>Spanish 5, or consultation with advisor.</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td><strong>HUMANITIES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Humanities Credit/Unrestricted Electives: 4 units.</td>
</tr>
<tr>
<td>Art Studio</td>
<td>5</td>
<td>Art 2, 5</td>
<td>Art 3, or 4.</td>
<td>8 units</td>
<td>Humanities Credit/Unrestricted Electives: 4 units.</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Art 2</td>
<td>Art 3, or 4.</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Art 1A, 1B, 1C</td>
<td>Art 10H</td>
<td>8 units</td>
<td>Humanities Credit/Unrestricted Electives: 4 units.</td>
</tr>
<tr>
<td>American History</td>
<td>5, 4, 3</td>
<td>History 17A, 17B</td>
<td>Art 3, or 4.</td>
<td>8 units</td>
<td>Humanities Credit/Unrestricted Electives: 4 units.</td>
</tr>
<tr>
<td>European History</td>
<td>5, 4, 3</td>
<td>History 4B, 4C</td>
<td>Art 3, or 4.</td>
<td>8 units</td>
<td>Humanities Credit/Unrestricted Electives: 4 units.</td>
</tr>
<tr>
<td>Music</td>
<td>5, 4, 3</td>
<td>Music 10</td>
<td></td>
<td>8 units</td>
<td>Humanities Credit/Unrestricted Electives: 4 units.</td>
</tr>
</tbody>
</table>

**NATURAL SCIENCES**

<table>
<thead>
<tr>
<th>EXAMINATION</th>
<th>SCORE</th>
<th>UCD COURSE EQUIVALENCIES</th>
<th>CONTINUING COURSE</th>
<th>CREDIT TOWARD DEGREE</th>
<th>CREDIT ALLOWED TOWARD SPECIFIC DEGREE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>5, 4, 3</td>
<td>Biological Sciences 10</td>
<td></td>
<td>5 units</td>
<td>Natural Sciences Credit/Preparatory Courses for Science Majors: 4 units.</td>
</tr>
<tr>
<td>Chemistry</td>
<td>5, 4, 3</td>
<td>Chemistry 1A, 1B</td>
<td></td>
<td>8 units</td>
<td>Biological Sciences 1 is the first course taken by most students contemplating majors in the Life Sciences.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Credit for Chemistry 1A and 1B equivalence may serve as prerequisite to 1C with consent of instructor. While 1A and/or 1B may be taken for full credit, the 1A-4B-4C sequence is preferred.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Credit for Computer Science Engineering 30 may serve as prerequisite for Computer Science Engineering 40 with consent of instructor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Computer Science Engineering 30</td>
<td>Computer Science Engineering 40</td>
<td>4 units</td>
<td>In the College of Engineering, satisfies units toward Unrestricted electives.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In the College of Engineering, satisfies units toward Unrestricted electives.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In the College of Engineering, satisfies units toward Unrestricted electives.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In the College of Engineering, satisfies units toward Unrestricted electives.</td>
</tr>
<tr>
<td>Mathematics AB</td>
<td>5, 4</td>
<td>Mathematics 11, 16A, or 21A</td>
<td>Mathematics 16B or 21B.</td>
<td>4 units</td>
<td>Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.</td>
</tr>
<tr>
<td>Mathematics BC</td>
<td>5</td>
<td>Mathematics 11, 16A-16B, 21A</td>
<td>Mathematics 16C or 21C</td>
<td>8 units</td>
<td>Mathematics 16A, 16B, 21A, or 21B may be taken for full credit. Mathematics 16A, 16B, 21A, or 21B equivalents may serve as a prerequisite for Mathematics 16B, 16C, 21B, or 21C.</td>
</tr>
<tr>
<td></td>
<td>4, 3</td>
<td>Mathematics 11, 16A, or 21A</td>
<td>Mathematics 16B or 21B</td>
<td>8 units</td>
<td>Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.</td>
</tr>
<tr>
<td>Physics 8</td>
<td>5</td>
<td>Physics 1A, 1B, 6A, 6B, 6C, 10</td>
<td>8 units</td>
<td>8 units</td>
<td>Course equivalents may be used as prerequisites for succeeding courses of same series with consent of instructor.</td>
</tr>
<tr>
<td></td>
<td>4, 3</td>
<td>Physics 10</td>
<td></td>
<td>8 units</td>
<td>In the College of Engineering, only a score of 5 on Physics (CI or CII) Examinations applies toward Physical Science requirement.</td>
</tr>
<tr>
<td>CI</td>
<td>5</td>
<td>Physics 1A, 1A, 6A, 6B, 6C, 10</td>
<td>8 units</td>
<td>8 units</td>
<td>In the College of Engineering, only a score of 5 on Physics (CI or CII) Examinations applies toward Physical Science requirement.</td>
</tr>
<tr>
<td>CII</td>
<td>5</td>
<td>Physics 1B, 1B, 6B, 6B, 6C, 10</td>
<td>8 units</td>
<td>8 units</td>
<td>In the College of Engineering, only a score of 5 on Physics (CI or CII) Examinations applies toward Physical Science requirement.</td>
</tr>
</tbody>
</table>

**SOCIAL SCIENCE**

<table>
<thead>
<tr>
<th>EXAMINATION</th>
<th>SCORE</th>
<th>UCD COURSE EQUIVALENCIES</th>
<th>CONTINUING COURSE</th>
<th>CREDIT TOWARD DEGREE</th>
<th>CREDIT ALLOWED TOWARD SPECIFIC DEGREE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Government and Politics</td>
<td>5, 4, 3</td>
<td>Political Science 1</td>
<td></td>
<td>4 units</td>
<td>Social Science Credit Unrestricted Electives: 4 units.</td>
</tr>
<tr>
<td>Comparative Government and Politics</td>
<td>5, 4, 3</td>
<td>Political Science 2</td>
<td></td>
<td>4 units</td>
<td>In College of Agricultural and Environmental Sciences, satisfies credit toward Social Science requirement or Unrestricted electives.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In the College of Engineering, satisfies credit toward Humanities-Social Sciences electives.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In the College of Letters and Science, satisfies credit toward Social Sciences area requirement.</td>
</tr>
</tbody>
</table>
SCHOLARSHIP DEFICIENCIES

The following provisions apply to all undergraduate students in the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science. Graduate and professional students with scholarship deficiencies are subject to action at the discretion 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 in 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 qualitative 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 terms on academic probation.

The official transcript will in the case of qualitative standards reflect in good standing or not in good standing.

The quantitative standards, referred to as minimum progress requirements, define scholarship in terms of the number of units that must be satisfactorily completed. Minimum progress is defined as an average of 12 units passed per quarter, calculated at the end of every quarter for the preceding three quarters. Minimum progress requirements do not apply to students who have part-time status or to students who have their dean's approval to carry less than the minimum progress load because of medical disability, employment, a serious personal problem, a death in the immediate family, or an accident.

The notation "warning—minimum progress" will be noted on the grade report for a quarter in which the student has passed fewer than 12 units. The notation "minimum progress—subject to academic disqualification," will be noted on the grade report the first time the total number of units passed at UCD averages fewer than 12, calculated at the end of every term for the preceding three terms of enrollment. Quantitative standards are not reflected on the official transcript.

Once a student is in good standing and has met quantitative standards for scholarship, the notation will be removed from the transcript.

It is assumed that a student will earn the 180-unit minimum degree requirement prior to completing fifteen terms of enrollment. Normal progress would achieve 180 units in 12 terms.

The following courses may be counted toward unit minimum progress:

- Required non-credit courses, e.g., Mathematics B, will be evaluated according to the "Carnegie unit" rule and counted as units passed.
- Repeated courses passed to improve D or F grades.
- Courses passed during Summer Sessions at UCD or at another accredited school and transferred to UCD will be counted as units passed (applied to term of enrollment just preceding the summer session).
- Courses passed by examination in accordance with policies established by the Divisional Committee on Courses (applied to term in which examination is taken).
- Courses that are IP (in progress) will be counted as units passed.
- Courses graded I will be counted as units passed when replaced by a passing grade (applied to the term in which the I grade is received).

The dean of the student's college may grant a student a minimum progress variance of one or more quarters for an acceptable reason. Advising assistance should be obtained either through the student's faculty adviser or in the college Dean's Office.

Dismissal

Dismissal for either qualitative or quantitative reasons (defined above) is based on the decision of the dean of the college in which a student is enrolled. Such dismissal is from the University of California system and not simply the college or the Davis campus. Should a former Davis student later wish to be readmitted on the Davis campus, the authority to do so rests with the dean of the college from which the student was dismissed.
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.

HONORS AND PRIZES

Deans’ Honors Lists

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 16 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 by the Office of the Registrar.

Scholarships

Students with outstanding academic records who show promise of continued scholarly achievement are encouraged to apply for scholarship recognition and awards. Awards are accompanied by a financial honorarium or stipend.

Graduation Honors

Honors at graduation may 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 percent of the graduating class of their college or school, as shown in the table below, and who have met additional college requirements:

<table>
<thead>
<tr>
<th>Total Quarter Units Completed at UC</th>
<th>Highest Honors</th>
<th>High Honors</th>
<th>Honors</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-89</td>
<td>2%</td>
<td>2%</td>
<td>4%</td>
<td>8%</td>
</tr>
<tr>
<td>90-134</td>
<td>3%</td>
<td>3%</td>
<td>6%</td>
<td>12%</td>
</tr>
<tr>
<td>135+</td>
<td>4%</td>
<td>4%</td>
<td>8%</td>
<td>16%</td>
</tr>
</tbody>
</table>

The grade-point averages which mark the cut-off points for each honors category for the June graduating class (namely, winter term grades for candidates for June of each year) will be used as minimum criteria for the award of the same category of honors to students who graduate in the terms immediately following. Grade-point averages for the cut-off points (in the table above) for Winter Quarter 1989 are shown below. These averages will be used through winter 1990.

Individual grade-points can be compared once the Winter Quarter 1989 grades become available. All students having the same grade-point average as the one that falls at each percent cut-off point will be awarded honors in that category.

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 Office of the Registrar.

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 Kappa Delta (Sociology)
- Alpha Omega Alpha (Medicine)
- Alpha Zeta (College of Agricultural and Environmental Sciences)
- Delta Phi Alpha (German)
- Dobro Slovo (Russian)
- Omicron Delta Epsilon (Economics)
- Omicron Nu (Applied Behavioral Sciences)
- Order of the Coif (Law)
- Phi Alpha Theta (History)
- Phi Beta Kappa (Liberal Arts and Science)
- Phi Kappa Phi (All colleges and schools)
- Phi Sigma (Biological Sciences)
- Phi Zeta (Veterinary Medicine)
- Pi Alpha Xi (Environmental Horticulture)
- Pi Delta Phi (French and Italian)
- Pi Mu Epsilon (Mathematics)
- Pi Sigma Alpha (Political Science)
- Pnytanean Honor Society (All colleges and schools—women only)
- Psi Chi (Psychology)
- Sigma Pi Sigma (Physics)
- Sigma Xi (Research)
- Tau Beta Pi (Engineering)
- The Golden Key (All colleges and schools)
Bachelor's Degree Requirements
Bachelor’s Degree Requirements

University Requirements
All students must fulfill the following University of California requirements:
  Subject A
  American History and Institutions
  Unit Requirement
  Residence Requirements
  Scholarship Requirement

General Education Requirement
Students are required to complete a certain number of courses in the two areas of General Education other than the one which contains their major field.

College Requirements
College of Agricultural and Environmental Sciences
  Unit
  Scholarship
  English Composition
  Breadth (in the major)

College of Engineering
  Unit
  Residence
  Scholarship
  English Composition
  Design

College of Letters and Science
  Unit
  Residence
  Scholarship
  English Composition
  Foreign Language (A.B. and B.A.S. degrees)
  Area (Breadth) Credit

Major Requirements
Every major has course requirements which are listed in the Programs and Courses section of this catalog.

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 Board Achievement Test in English Composition.
- By achieving a grade of 5, 4, or 3 in the College Board 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 CSUIC English Placement Test may not be used to satisfy the Subject A requirement.)
- By writing a passing essay on the Subject A Examination. This examination may be taken only once. It is offered in the spring at local sites throughout California; a student admitted for fall quarter who has not already satisfied the Subject A requirement must take this examination. An out-of-state student or any California freshman admitted after mid-April will take another form of the Subject A Examination, which will be offered on the UCD campus during the orientation period each quarter. For the time and location consult the “Schedule for Registration and Orientation,” published prior to the beginning of each quarter.

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. The English A course must be taken for a letter grade and passed with a grade of C or higher. Students receiving a grade of C – or lower must repeat the course. This 2-unit course counts as 4 units on your study load and toward minimum progress.

Students whose native and school language is not English, and some students whose schooling combines work in the United States and in another country, must demonstrate proficiency in English. The level of proficiency must meet the standards of both the non-native speakers of English program and the Subject A program. The results of the Subject A Examination and a special examination in English administered during the orientation period each quarter determine whether a student has met the Subject A requirement or must take specific course work before meeting that requirement.

American History and Institutions
The American History and Institutions requirement ensures 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
  - Economics courses may be taken only with the consent of the instructor.

- By presenting evidence that the requirement has been satisfied through courses in the area of American History and Institutions at another college institution whose credits are acceptable for transfer to the Davis campus.

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

International students, regardless of the type of visa they hold, must meet the University's American History and Institutions requirement for graduation.

**Unit Requirement**

A minimum of 180 quarter units is required for graduation. These must be distributed according to the minimum requirements set forth by the faculty of your college or school (see appropriate college or school).

A maximum of 12 units of Internship Courses (92, 192, or a combination) may be counted toward the 180-unit bachelor's degree requirement.

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.

Students should refer to the Advanced Placement Examination chart and their transcripts to eliminate the possibility of duplication of credit.
Residence Requirements

The minimum residence requirement for a bachelor's degree at the University of California is one academic year (three quarters). Each quarter 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 while in residence on the Davis campus. Not more than 18 of these 35 quarter units may be completed in summer session courses at UCD.

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 department in partial fulfillment of the residence requirement for the bachelor's degree. Enrollment is with the consent of the instructor only.

Extension courses are not accepted as part of the University residence requirement.

There are additional residence requirements for students enrolled in the Colleges of Letters and Science and Engineering. 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 awarding 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. Grades earned in University Extension courses are not used in calculating individual grade-point averages. For specific college and school requirements consult the appropriate sections of this catalog.

Filing for Degree Candidacy

Each candidate for an undergraduate degree must file an Announcement of Candidacy with the Office of the Registrar for the quarter in which the candidate plans to receive the degree. The dates for filing are published in the Academic Calendar at the front of this catalog.

GENERAL EDUCATION REQUIREMENT

The General Education Program on the Davis campus seeks to promote intellectual growth among all students in the undergraduate colleges. To achieve this goal, the program requires of all students an understanding of the methods as well as the content of important areas of knowledge.

The program's objectives are: (1) to offer undergraduates a coherent choice of courses in all major fields of learning; (2) to stimulate intellectual growth through the study of important methods as well as significant material in a particular discipline; (3) to involve students in the learning process by requiring considerable writing and serious participation in class activities; and (4) to encourage students to apply the concepts and methods of a discipline in appropriate advanced-level courses.

General Education (GE) courses are grouped into three broad areas of knowledge:

1. Civilization and Culture. Courses in this area are designed to foster knowledge of the dominant intellectual traditions, achievements, and socio-political institutions of humankind. These courses should stimulate awareness of cultural diversity within the Western tradition and in other civilizations, and provide comparative and interdisciplinary perspectives on cultural history.

2. Contemporary Societies. Courses in this area are designed to create an awareness of critical economic, political, and social problems of the contemporary world. Courses in this area will also help students learn to study contemporary societies and social problems using the disciplines of modern social and behavioral science, and to appreciate the variety of values and perspectives that are embodied in the experience of diverse human groups.

3. Nature and Environment. Courses in this area are aimed at providing students with knowledge of major scientific ideas and discoveries and some perception of the methods, scope, power, limitations, and appeal of science. Students should be able to gain awareness of both the kinship of, and the distinction between, science and technology. It is a major goal of the General Education Program that students not primarily interested in scientific disciplines be prepared to read and understand scientific literature addressed to the educated public.

Fulfilling the General Education Requirement

To fulfill the UCD General Education requirement, you must complete a required number of courses that have been specially approved for this purpose by a faculty committee on General Education. The only way that you can fulfill the GE requirement is by completing approved GE courses at UCD (see the important exceptions in the next paragraph). If you have transferred to UCD from a community college or other post-secondary institution, or enter with Advanced Placement (AP) units, you still have to complete some of Davis' GE courses, but the number of required courses is reduced for you depending upon the number of transfer or AP units which you have brought with you to UCD.

There are two exceptions to the UCD General Education Requirement. First, if you have come to UCD from a California community college and have completed the "Transfer Core Curriculum," you are exempt from the UCD General Education Requirement. Second, if you come to UCD from another campus of the University of California and have completed the lower division breadth or general education requirements of that campus you are also exempt from the UCD General Education Requirement. Your college dean's office can tell you whether you fall into either of these categories.
Determining Your General Education Requirement

Each academic major and degree program has been assigned to one of the above three areas of General Education. Each approved GE course has also been assigned to one of the three areas. The General Education Program requires you to complete a certain number of courses in those areas of General Education other than the one which contains your major field.

Because the General Education Program was phased in over a four-year period beginning in fall quarter, 1984, the number and level of GE courses to be completed depends upon two things: (1) the academic year in which you first registered (paid fees) and enrolled (signed up for at least one class) as a student at UCD; and (2) the number of approved transfer units, if any, which you may have possessed at the time of your first registration and enrollment at UCD in a regular academic term. The number of transfer units is determined by the Office of Undergraduate Admissions and is shown on the "Transfer Credit Evaluation Form" which you should have been provided by that office. If you have any questions concerning the number of units to be used in calculating your General Education requirement, contact your college dean's office.

The specific General Education requirements for students entering UCD from the 1984/85 to 1986/87 academic years are detailed in prior editions of the General Catalog for each academic year. For students entering UCD in the academic years from 1987/8 to 1989/90 and thereafter, the General Education requirements are detailed below:

- If you are a freshman or a transfer student with 40 or fewer transfer units, you are required to complete the full requirement of three GE courses in each of the two areas outside the area of your major. One of the three courses in each area must be an introductory GE course and the other two non-introductory.
- If you are a transfer student with more than 40, but fewer than 84, transfer units, you are required to complete one of two options, either: (1) two GE courses in each of the two areas outside your major; or (2) three GE courses in one of the required areas and one course in the other required area. If you choose the first option, only one course in each area may be introductory. If you choose the second option, one of the courses in the group of three courses must be introductory and the other two non-introductory. The single course taken in the other area may be introductory or non-introductory.
- If you are a transfer student with 84 or more transfer units, you are required to complete one of two options, either: (1) one GE course in each of the two areas outside the area of your major; or (2) three GE courses in one of the two areas. If you choose the first option, both courses must be non-introductory. If you choose the second option, one course must be introductory and the other two non-introductory.
Restrictions Applicable to GE Courses

Effective with the fall quarter, 1986, there are two restrictions that apply to GE courses.

1. **GE courses must be taken for a letter grade.** Any student who wishes to receive General Education credit for a course must take that course for a letter grade. No General Education credit will be awarded for a course that is taken on a passed/not passed basis. Should you take a course approved as a GE course on a passed/not passed basis, you will be unable to apply that course toward the General Education requirement.

2. **Subject A requirement must be completed before you begin your GE coursework.** Except for those approved course sequences of non-GE courses for which General Education credit may be earned (see note 2 in the table of “General Education Courses and Academic Year of Approval” following), no student may receive General Education credit for completing a GE course unless that student has first satisfied the University Subject A requirement. Should you complete a GE course prior to completing Subject A, you will be unable to apply that course toward the General Education requirement.

These two restrictions, while applicable to all students who must fulfill a General Education requirement, took effect with the beginning of fall quarter, 1986. If you completed a GE course before fall 1986 on a passed/not passed basis or before having completed Subject A, you will still receive General Education credit for that course.

**Selecting General Education Courses**

Since GE courses must be chosen from the two areas of General Education other than the one containing your major field, you must begin by identifying the area of General Education to which your major has been assigned. The following list provides this information.

**Civilization and Culture (CC)**

- American Studies
- Art History
- Art Studio
- Chicano (Mexican-American) Studies (Humanities emphasis)
- Classical Civilization
- Comparative Literature
- Design
- Dramatic Art
- East Asian Studies
- English
- French
- German
- Greek
- History
- Italian
- Landscape Architecture
- Latin
- Linguistics
- Medieval Studies
- Music
- Philosophy
- Religious Studies
- Rhetoric and Communication
- Russian
- Spanish

**Contemporary Societies (CS)**

- Afro-American Studies
- Agrarian Studies
- Agricultural and Managerial Economics
- Agricultural Education
- Anthropology (A.B. degree)
- Applied Behavioral Sciences
- Asian American Studies (non-degree program)
- Chicano (Mexican-American) Studies (Sociology emphasis)
- Economics
- Environmental Planning and Management
- Environmental Policy Analysis and Planning
- Geography (A.B. degree—emphasis I, II, III, V)
- Human Development
- International Agricultural Development
- International Relations
- Native American Studies
- Political Science
- Political Science—Public Service
- Sociology
- Sociology—Organizational Studies
- Textiles and Clothing
- Women's Studies
Nature and Environment (NE)

Agricultural Science and Management
Animal Science
Anthropology (B.S. degree)
Applied Physics
Atmospheric Science
Avian Sciences
Biochemistry
Biological Sciences
Botany
Chemistry
Community Nutrition
Computer Science
Consumer Food Science
Dietetics
Engineering (all majors)
Entomology
Environmental Toxicology
Fermentation Science
Food Biochemistry
Food Science
Genetics
Geography (B.S. degree; A.B. degree—emphasis in IV)
Geology
Mathematics
Microbiology
Nutrition Science
Physics
Physiology
Plant Science
Pretarestry (non-degree program)
Psychology
Range and Wildlands Science
Resource Sciences
Soil and Water Science
Statistics
Textile Science
Wildlife and Fisheries Biology
Zoology

If you have declared multiple majors where all of your majors are classified in the same Area of General Education, you complete the General Education requirement just as you would if you had a single major; you should select the required number of courses from the two General Education areas other than the one containing your majors. However, if your majors are classified in two or more different areas of General Education, you are required to complete only the appropriate number of courses in the one area of General Education, if any, in which you do not have a major.

If you have an approved individual major, it should have been assigned to one of the three General Education areas at the time it was approved by your college. If you have any questions concerning the General Education area to which your major is assigned, consult your college dean’s office.

Approved General Education Courses

Once you determine the General Education area to which your major has been assigned, you should select the required number of GE courses from the two areas not containing the major. Following is a table of the approved courses and course sequences which have been selected for offering under the General Education Program.

You should remember that you cannot claim credit toward the General Education requirement for a course that you completed before that course was approved for General Education credit. Because the approval of courses to satisfy the GE requirement is an ongoing activity of the faculty committee which is responsible for the General Education Program, the table also indicates the academic year in which each course was first approved for General Education. For example, American Studies 1A (85) was first approved as a GE course for the 1985/86 academic year which began in the fall quarter of 1985 and extended through the summer sessions of 1986.

Introductory and Non-Introductory General Education Courses

As you can see from the following table, GE courses may be either introductory or non-introductory. Introductory GE courses assume no prior knowledge or exposure to the field, whereas non-introductory courses require some background coursework or familiarity with the subject. Thus, in the case of non-introductory GE courses, please consult the course descriptions contained in the Programs and Courses section of this catalog for the courses recommended as preparation for non-introductory GE courses.

General Education Literature Preparation List

In the case of some non-introductory GE courses, the recommended General Education preparation listed in the course description includes “any course from the GE Literature Preparation List.” This list consists of the following courses: English 3, Comparative Literature 1, 2, 3, French 25, German 52, and Integrated Studies 2D.

Approved General Education Clusters

General Education “clusters” are groups of closely-related introductory GE courses designed to allow you to build upon your intellectual experience from one course to the next.

Even though you may have to complete some non-introductory GE courses as part of your General Education requirement, you may also earn credit for having satisfied the entire requirement in an area of General Education by completing an approved cluster of introductory courses in that area. In effect, completion of a cluster allows you to substitute introductory for any required non-introductory courses.

There are two approved clusters and they are found in the area of Civilization and Culture: History 4A, 4B, 4C; and Comparative Literature 1, 2, and 3.

College and Major Requirements

The chart at the beginning of this section outlines College requirements in addition to the University and General Education requirements. Detailed information on college and major requirements can be found in specific college sections which begin immediately after this section. Course requirements are listed under each major program in the Programs and Courses section of the catalog.
# Bachelor's Degree Requirements

## General Education Courses and Academic Year of Approval

Note: Courses listed here were approved beginning with the fall quarter of the academic year indicated (in parentheses following course numbers) and for all subsequent academic years unless otherwise noted. Consult footnotes to this table for additional information concerning these courses.

### Civilization and Culture

<table>
<thead>
<tr>
<th>Introductory:</th>
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<tbody>
<tr>
<td>American Studies 1B (88)</td>
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<tr>
<td>Art 1A-1AG^1 (87), 1B-1BG^1 (86), 1C-1CG^1 (86), 1D-1DG^1 (86), 25-25G^1 (86)</td>
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<td>Classics 4A (85), 17A (85), 17B (85), 17C (85), 20 (85)</td>
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<td>Comparative Literature 1 (84), 2 (84), 3 (84), 5 (86), 6 (85), 7 (85), 13 (85)</td>
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<td>English 3 (84), 4 (88)</td>
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<td>French 25 (84)</td>
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<td>German 48 (89), 51-52 (84 only), 52 (86)</td>
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<tr>
<td>History 3 (86), 4A (85), 4B (84), 4C (84), 9A (85), 17A (84), 17B (84)</td>
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<tr>
<td>Integrated Studies 1D (84 only), 2B (84), 2C (84 only), 2D (84), 3B^1 (85), 3C^1 (85), 8B (89)</td>
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<tr>
<td>Italian 50 (89)</td>
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<td>Linguistics 1^4 (89)</td>
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<tr>
<td>Music 3A-3B^2 (84), 10 (84)</td>
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<tr>
<td>Philosophy 1 (84), 10B (84), 10D^1 (87), 14 (86), 21 (86), 22 (86), 23 (86), 24 (89), 31 (88)</td>
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<tr>
<td>Political Science 4 (84)</td>
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<tr>
<td>Religious Studies 21 (84), 40 (84)</td>
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### Non-Introductory:

| Art 178C (87)                      |  |  |
| Classics 40 (85, 86 only), 41 (85, 86 only), 140^1 (87), 141 (86), 143^1 (87) |  |  |
| Comparative Literature 8 (86), 20 (86), 135 (87), 141 (85), 153 (86), 157 (87), 159C (88), 160A (85), 160B (88), 161A (85), 161B (85), 161C (85 only), 163 (85), 164A (87), 164B (86), 166A (87), 166B (85), 168A (88), 168B (89), 169 (89), 170 (89) |  |  |
| Dramatic Art 156 (86), 157 (86)    |  |  |
| Education 120 (85)                 |  |  |
| English 30A (87), 30B (87), 30C^1 (84, 85, 86 only), 45^1 (84), 46A (87), 46B (87), 46C^1 (84), 118 (88), 127 (88), 156 (88), 162 (89), 171A (87), 171B (87), 167 (87), 167 (87), 167 (87) |  |  |
| Environmental Studies 108 (85, 86 only) |  |  |
| French 112 (84), 113 (84), 114 (84) |  |  |
| Genetics 108 (85, 86 only)         |  |  |
| German 110 (87), 113 (84), 115A (84), 116 (86), 117A (86), 118A (89), 119B (89) |  |  |
| German 30 (87), 72A (84), 13B (86), 140 (87), 147A (85), 147B (85), 147C (85), 169A (86), 169B (88), 175A (86), 177A (87), 177B (87), 186A (89) |  |  |
| Italian 140 (89)                   |  |  |
| Landscape Architecture 140 (84)    |  |  |
| Medieval Studies 20A (86), 20B (86), 20C (86), 120E (88) |  |  |
| Music 110A^1 (84), 110B (85), 110C^1 (84), 110D^1 (84), 129 (86) |  |  |
| Native American Studies 130A (89), 130B (88), 181A (87), 181B (87), 181C (87) |  |  |
| Philosophy 18 (87), 101 (88), 102 (88), 105 (85), 107 (88), 108 (85), 151 (86) |  |  |
| Religious Studies 18 (87), 141A (86), 141B (86), 141C (86) |  |  |
| Rhetoric and Communication 110 (84) |  |  |
| Russian 131 (88)                   |  |  |
| Spanish 149 (86)                   |  |  |

### Contemporary Societies

| Introductory:                      |  |  |
| American Studies 1A (85)           |  |  |
| Anthropology 2 (84), 4 (86)        |  |  |
| Economics 1A-1B^1 (84)             |  |  |
| Environmental Studies 10 (89)      |  |  |
| Geography 2 (84, 85, 86 only), 2-2D^1 (winter 87 through summer 88), 2-2G^1 (88), 5 (84, 85, 86 only), 5-5D^1 (winter 87 through summer 88), 5-5G^1 (88) |  |  |
| History 10 (84)                    |  |  |
| Integrated Studies 2A (84 only), 3A^1 (85), 3D (89), 8C (89) |  |  |
| Linguistics 1^1 (86, 87, 88 only) |  |  |
| Native American Studies 10 (88)    |  |  |
| Political Science 1 (84), 2 (84)   |  |  |
| Psychology 15-16^1 (84)            |  |  |
| Religious Studies 1 (85), 2 (85)   |  |  |
| Sociology 2 (84), 3 (87)           |  |  |

### Non-Introductory:

| Afro-American Studies 100 (86), 133 (88) |  |  |
| Agricultural Economics 120 (88), 141 (85) |  |  |
| American Studies 45 (85), 120 (84), 130 (87), 140A (85) |  |  |
| Anthropology 25 (89), 101 (87), 119 (86 only), 124 (86), 129 (87), 130 (86), 133^1 (87), 141 (86 only), 175 (89) |  |  |
| Applied Behavioral Sciences 2 (85), 151 (87), 153 (87), 154 (85), 178 (86) |  |  |
| Chicano Studies 101 (89)             |  |  |
| Consumer Economics 141 (84 only)     |  |  |
| Consumer Science 100 (87)            |  |  |
| Economics 106 (87)                   |  |  |
| Education 110 (86), 122 (84), 132 (86) |  |  |
| Engineering: Civil 160 (84)          |  |  |
| Environmental Studies 1 (86, 87, 88 only), 101 (87), 133^1 (87), 141 (86 only), 161 (84), 165 (85), 166 (86) |  |  |
| Geography 124 (87), 155 (84), 170 (84), 171 (86) |  |  |
| History 22 (85), 165 (86), 188B (89) |  |  |
| Human Development 15 (87)            |  |  |
| International Agricultural: Development 10 (86) |  |  |
| Linguistics 113 (86)                 |  |  |
| Native American Studies 130C (88), 180 (89) |  |  |
| Philosophy 10D^1 (85, 86 only), 117 (86) |  |  |
| Psychology 147 (87)                 |  |  |
| Resource Sciences 10-10D^1 (86, 87 only), 10-10G^1 (88) |  |  |
| Rhetoric and Communication 115 (86, 87 only), 152 (88) |  |  |
| Sociology 25 (84), 119 (87), 157 (87) |  |  |
| Textiles and Clothing 7 (85, 86 only), 107^1 (87) |  |  |
| Women's Studies 50 (84)              |  |  |
Nature and Environment

Introductory:

Anthropology 1 (86), 23 (88)
Astronomy 10 (85)
Bacteriology 10 (84 only)
Biological Sciences 10 (85)
Botany 10 (84)
Chemistry 1A-1B (84), 10 (84)
Engineering 20 (84)
Entomology 17 (89)
Food Science and Technology 2 (86)
Genetics 10 (84)
Geology 1-1D (86, 87 only), 1-1G\^{1} (88), 3-3D (86, 87 only), 3-3G\^{1} (88)
Human Development 19 (89)
Integrated Studies 1A (84), 1B (85), 8A (89)
Nutrition 10-11 (85), 20 (88)
Philosophy 31 (88)
Physics 10 (85)
Plant Science 10 (88)
Water Science 10 (88 only)
Wildlife and Fisheries Biology 10 (85)

Non-Introductory:

Agrarian Studies 2 (85)
Animal Science 1 (87)
Anthropology 15 (86), 152 (86), 153 (88)
Atmospheric Science 10 (87)
Avian Sciences 13 (85)
Bacteriology 20 (85, 86, 87 only)
Botany 101 (86)
Engineering Applied Science 137 (85)
Engineering: Civil 30 (85)
Entomology 11 (85, 86, 87 only), 111 (88), 119 (89)
Environmental Studies 30 (85), 108 (85, 86 only), 116-116D (86, 87 only), 116-116G\^{1} (88)
Genetics 108 (85, 86 only)
Geology 43 (89), 113 (84), 116-116D (86, 87 only), 116-116G\^{1} (88), 135 (88)
Landscape Architecture 155 (89)
Microbiology 20 (88)
Philosophy 108 (85)
Physics 137 (85)
Resource Sciences 2 (86), 3-3G\^{1} (88), 131 (86)
Textiles and Clothing 110 (86)
Water Science 10 (89), 100 (89)
Zoology 138 (88)

\^{1}These GE courses must be taken concurrently for General Education credit and will satisfy the requirement for one GE course.
\^{2}This is a two-course sequence of non-GE courses which will satisfy the requirement for one GE course.
\^{3}Integrated Studies 3A, 3B, and 3C were first approved for General Education credit for 1984/85 as Integrated Studies 2A, 2B, and 2C, respectively; they were renumbered effective fall, 1985. A new course 2B was created and approved for GE effective fall, 1986
\^{4}Philosophy 10D was classified as a non-introductory GE course in the area of Contemporary Societies for 1985-86 and 1986-87; it was reclassified as an introductory course in Civilization and Culture effective fall, 1987.
\^{5}Classics 140 and 143 were first approved for General Education credit as Classics 40 and 41, respectively; they were renumbered effective fall, 1987.
\^{6}English 30C, 45, and 46C were approved as Introductory GE courses in 1984-85 and 1985-86; they were reclassified as non-introductory courses effective fall, 1986.
\^{7}Music 110A, 110C, and 110D were approved as introductory General Education courses for 1984-85; they were reclassified as nonintroductory courses effective fall, 1985.
\^{8}Geography 2 and 5 were first approved for General Education credit for 1984-85; they were approved to be taken concurrently with courses 2D and 5D, respectively, effective winter, 1987; these were renumbered 2G and 5G respectively, effective fall, 1988.
\^{9}These courses were first approved for General Education credit for 1985-86 and were renumbered effective fall, 1987: Anthropology 119 and Anthropology 141/Environmental Studies 141 were changed to Anthropology 129 and Anthropology 133/Environmental Studies 133, respectively.
\^{10}Textiles and Clothing 107 was first approved for General Education credit as course 7; it was renumbered effective spring, 1988.
\^{11}These courses were first approved for General Education credit for 1986-87 and were renumbered effective fall, 1988: Environmental Studies 116D, Geology 1D, 3D, and 116D, and Resource Sciences 10D changed to Environmental Studies 116G, Geology 1G, 3G, and 116G, and Resource Sciences 10G, respectively.
\^{12}Nutrition 10 and 11 must both be completed to satisfy the requirement for one General Education course. These courses may be taken concurrently, if offered, or sequentially (10 then 11).
\^{13}Civil Engineering 30 was approved as an introductory GE course for 1985-86; it was reclassified as a non-introductory course effective fall, 1987.
\^{14}Linguistics 1 was classified as an introductory GE course in the area of Contemporary Societies for 1986-87, 1967-88, and 1988-89; it was reclassified as an introductory course in Civilization and Culture effective fall, 1989.
College of Agricultural and Environmental Sciences
Challenges and opportunities arising from social and technological changes characterize these times. Today's challenges — protecting the environment from human'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 management of water for home, agriculture, wildlife, recreation, and industry are studied. These areas, reflected in the thirty-nine majors and three 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, food processing, 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 ensure 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 their needs to learn, and utilize their knowledge. Furthermore, the College's programs are focused 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, let us know in the Dean's Office, 228 Mix Hall.

Student representatives are elected from each major in the Spring Quarter to serve on the Dean's Student Advisory Committee (DSAC). The DSAC meets with the Dean monthly throughout the academic year to discuss issues of concern to students and the College. Subcommittees are established to study special topics and to develop student recommendations on major policy issues affecting the college and/or campus.

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 Dean's 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 in Program Planning.** 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 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 associate dean, faculty members, advising staff, 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 the campus 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 the college's programs can be flexible to serve a student's needs. 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. In designing a major program individual students should consult their adviser and the General Catalog to find the most suitable courses. Prerequisites to selected courses need to be planned in advance.

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 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 prerequisite courses. Courses may also be challenged by examination.

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.

**COLLEGE ADVISING SERVICES**

University life is a complicated, sometimes bewildering experience. The College offers a variety of ways that you can obtain advice or help in solving your problems. Some of these services are described in the sections following.

**Office of the Dean**

The Dean's Office is open to students for a variety of services. The professional staff can assist you with many of your academic advising and extra-curricular activities. Its primary functions are

- **Academic advising**: advice regarding probation/dismissal status, admission to College, readmission, and second bachelor's, limited, and regular status.
- **Action on petitions that require the Dean's approval** (e.g., change of major, change of I grade, change of status, waiver of minimal progress, late Add/Drop petitions, PELP petitions, Withdrawal petitions.)
- **Additional services include**: Study Plan clearance; College English requirement check; release of holds on registration packets; evaluation of each student's record for graduation purposes; and a unit devoted to special events in the College, which is responsible for the College commencement program.

**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 a faculty 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 a faculty adviser with the training and experience required to facilitate your program planning.

The function of faculty advisers is to sensitize students to the educational opportunities at Davis, to discuss the implications of options available, and generally, on the basis of experience, to help students achieve their educational goals. The great potential which a faculty adviser-student relationship can have has long been recognized within the College, and you are strongly urged to consult with your faculty 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 faculty 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 have advising centers staffed by advising associates who are 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. These peer advisers keep themselves up to date on the "how's," "where's," and "why's," of University operations and 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 and Student Affairs**

Associate Deans of Resident Instruction and Student Affairs

- Ericka L. Barrett
- Shu Geng
- 228 Mrak Hall
- 702-0107

The College has two associate deans of resident instruction and student affairs and an advising staff who welcome the opportunity to become acquainted and to talk informally with individual students. 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 course (see Programs and Courses section) to introduce students to the University, to aid them in formulating educational objectives, and to help them identify the many educational opportunities at UC Davis. 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**

You may find that, because of space limitations, the descriptions in the General 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, basis for grading, course format, 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.

Internship Courses
Students who wish to secure credit for an internship must arrange for enrollment in a 92 or 192 course through the appropriate department and the Internship and Career Center. (See the College Requirements for unit limitations.)

MAJOR 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

Subject Areas and Majors
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 advising centers or the Dean's Office. Complete outlines of these majors and programs are presented in the Programs 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 memorandums section on your transcript. Requests for certification of multiple majors should be made in the College Office. These additional majors should also be indicated on the Candidacy Card when filing for graduation.

Each major is assigned to one of the three General Education categories (see Davis Campus requirement in the Academic Information section): Contemporary Societies (CS), Nature and Environment (NE), and Civilization and Culture (CC). The appropriate category is indicated immediately following the major.

ANIMAL SCIENCE

Majors in Animal Science
Animal Science (NE)
Avian Sciences (NE)
Wildlife and Fisheries Biology (NE)

Advising Centers:
1149 Meyer Hall, 752-6118 (Animal Science only)
3202 Meyer Hall, 752-1300 (Avian Sciences only)

Interdisciplinary Major
Agricultural Science and Management (NE)

APPLIED ECONOMIC AND BEHAVIORAL SCIENCES

Majors in Applied Economics
Agricultural and Managerial Economics (CS)

Advising Center:
University House Annex, TB-8, 752-6185

College of Agricultural and Environmental Sciences

MAJORS AND PROGRAMS IN BEHAVIORAL SCIENCES

Agricultural Education (CS)
Applied Behavioral Sciences (CS)
Asian American Studies (non-degree program) (CS)
Design (CC)
Human Development (CS)
Landscape Architecture (CC)
Native American Studies (CS)

Advising Centers:
101 or 103 Academic Office Building-4, 752-2244
152 Walker Hall, 752-1165 (Design: Landscape Architecture only)

BIOLOGICAL SCIENCES (an Intercollegiate Division)

Majors in Biological Sciences
Biochemistry (NE)
Biological Sciences (NE)
Botany (NE)
Genetics (NE)
Microbiology (NE)
Physiology (NE)
Zoology (NE)

Advising Centers:
376 Munk Hall, 752-0410 (Biological Science only)
196 Briggs Hall, 752-0204 (Animal Physiology only)
143 Robbins Hall, 752-4749 (Botany only)
2320 Storer Hall, 752-7468 (Zoology only)

FOOD, NUTRITION, TEXTILE AND CONSUMER SCIENCES

Majors in Food Sciences
Consumer Food Science (NE)
Fermentation Science (NE)
Food Biochemistry (NE)
Food Science (NE)

Advising Centers:
128 Crues Hall, 752-1468 (Consumer Food Science, and Food Science only)
3469 Chemistry Annex, 752-2159 (Food Biochemistry only)
3001 Wickson Hall, 752-1909 (Fermentation Science only)

Majors in Nutrition
Community Nutrition (NE)
Dietetics (NE)
Nutrition Science (NE)

Advising Center:
1151 Meyer Hall, 752-2512

Majors in Consumer Sciences
Textiles and Clothing (CS)
Textile Science (NE)

Advising Center:
129 Everson Hall, 752-4417
PLANT SCIENCES AND PEST MANAGEMENT

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

Advising Centers:
- 132 Hunt Hall, 752-1715
- 273 Hoagland Hall (Preforestry only), 752-1511/1406

Major in Pest Management
- Entomology (NE)
  Advising:
  - 384A Briggs Hall, 752-0490

Interdisciplinary Major
- Agrarian Studies (CS)
  Advising:
  - 2039 Wickson Hall, 752-0926

RESOURCE SCIENCES AND ENGINEERING

Majors in Environmental Studies
- Environmental Planning and Management (CS)
- Environmental Policy Analysis and Planning (CS)
  Advising Center:
  - 213A Wickson Hall, 752-3088

Majors in Resource Sciences
- Atmospheric Science (NE)
- Environmental Toxicology (NE)
- Resource Sciences (NE)
- Soil and Water Science (NE)
  Advising Centers:
  - 122 Hoagland Hall, 752-1669
  - 4111 Meyer Hall, 752-1042
  (Environmental Toxicology only)

Major in Agricultural Engineering
(See College of Engineering)

Interdisciplinary Major
- International Agricultural Development (CS)
  Advising Center:
  - 101 Academic Office Building-A, 752-2244

SPECIAL PROGRAMS

Exploratory Program (non-degree program)
College Academic Advising Center:
122 Hoagland Hall, 752-0610

Are you unsure what major you really want to pursue? If so, you may wish to register in the Exploratory Program. With the assistance provided by the College’s Academic Advising Center and the major advisors in the respective departments and major program offices, you will be able to explore specialization options, develop your decision-making processes, and ultimately select the major best suited to your needs. A major must be declared before you complete 120 units (see Declaration of Major).

For registration purposes, indicate “Exploratory” on your admissions materials. Further information is available from the Academic Advising Center, 122 Hoagland Hall, 752-0610.

Individually Designed Major Programs
College Academic Advising Center
122 Hoagland Hall, 752-0610

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 should be submitted to a special committee for review at least four quarters before you plan to graduate.

Additional information may be obtained by contacting the College’s Academic Advising Center, 122 Hoagland Hall, 752-0610.

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 Professional School Preparation section in this catalog.)

Preprofessional training requirements for application to professional schools, such as schools of veterinary medicine, administration, 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; Pre-Business School Advising Office, 359 Kerr Hall and the Internship and Career Center; or the Pre-Law Advising Office, South Hall.

Teaching Credentials

Inquiries concerning preparation for teaching credentials in Agricultural Education and Agricultural and Home Economics Education should be addressed to the Department of Applied Behavioral Sciences, University of California, Davis 95616.

For general information on obtaining the teaching credential, see Teacher Credential Programs in the Graduate Division section.

Student Experimental Farm

A student farm is available to obtain hands-on experience in crop production and to participate in the sustainable agriculture program. For more information telephone 752-7645.

MINOR PROGRAMS

Departments in the College of Agricultural and Environmental Sciences may offer optional minor programs. Completion of a minor is not required for graduation. However, when your total educational objectives cannot be met through a major alone, you may wish to complete the requirements for one or more minor programs and have this certified on your records.

Following is a list of approved minor programs within the College. Requirements for each program can be found under the department or major offering the minor (in parentheses).

- Aging and Adult Development (Applied Behavioral Sciences)
- Agricultural Entomology (Entomology)
- Apiiculture (Entomology)
- Asian American Studies (Applied Behavioral Sciences)
- Biological Sciences (Biological Sciences)
- Community Development (Applied Behavioral Sciences)
- Community Nutrition (Nutrition)
- Energy Policy (Environmental Policy Analysis and Planning)
- Entomology (Entomology)
- Environmental Policy Analysis (Environmental Policy Analysis and Planning)
- Environmental Toxicology (Environmental Toxicology)
- Food Service Management (Nutrition)
- Human Development (Human Development)
- Insect Ecology (Entomology)
- Insect Systematics (Entomology)
- International Agricultural Development (International Agricultural Development)
- Medical-Veterinary Entomology (Entomology)
- Native American Studies (Applied Behavioral Sciences)
- Nematology (Entomology)
- Nutrition and Food (Nutrition)
- Nutrition Science (Nutrition)
- Recreation (Environmental Planning and Management)
- Textiles and Clothing (Textiles and Clothing)

A minor normally consists of a minimum of 18 units of upper division course work. Only one lower division course may be substituted to meet minimum requirements. Only one course can be used to satisfy a requirement of both your major and your minor. No course can be counted toward minimum requirements for more than one minor program. Transfer units cannot normally be used to satisfy minor requirements. Exceptions in use of transfer units require approval by your adviser for the minor program and the College Committee on Majors and Courses of Instruction. Even though a minor program is not required, you may choose to complete one or more minors in either this college under the guidelines above or the College of Letters and Science according to guidelines in effect for that college.

Satisfactory completion of a minor program must be certified by your major and minor adviser. If you wish to have a minor authorized and entered onto your records, obtain the appropriate form from the Dean's Office, have your minor adviser certify the minor and have your major adviser sign the form, and return the completed form to the Dean's Office. The filing period coincides with that for filing for degree certification (see Academic Calendar in the front of this catalog).

DEGREE REQUIREMENTS

It is your responsibility to see that all requirements for graduation are fulfilled. The University and General Education requirements can be found in the Bachelor's Degree Requirements section of the catalog. You must fulfill the Bachelor of Science requirements in a major as prescribed by, or individually designed and approved by, the faculty.

In brief, the College requirements are as follows, including any restrictions in addition to the aforementioned requirements.

Unit Requirements: Of the required 180 units counted toward a degree, 54 UNITS MUST BE UPPER DIVISION WORK. In addition, the following unit limitations apply to all majors:

- Not more than 6 units can be Physical Education
Not more than 20 units can be courses numbered 92, 99, 190C, 192, 197T, 197TC, or 199.

Not more than 12 units can be courses numbered 92 and/or 192 (credit will not be given for 192s taken prior to the completion of 84 units).

Not more than 9 units of professional courses (numbers 300-499) may be used toward the 54 upper division units.

Scholarship Requirement: As of Fall Quarter 1984, students in the College are required to attain a minimum grade-point average of 2.000 for all courses specified as depth subject matter in the major for the awarding of the Bachelor's Degree. Each candidate must complete a program of study either as prescribed in (a) a major approved by the Committee on Majors and Courses of Instruction and printed in this catalog, or (b) an individual major approved by the Individual Major Committee. The major program must include a specification of Depth Subject Matter in which the degree student will be required to attain an average grade point of at least 2.000.

English Composition Requirement: Before you have completed 120 units, you are required to take two courses: either two courses emphasizing written expression or one course emphasizing written expression and one course emphasizing oral expression. The following UCD courses have been approved for satisfaction of this College requirement:

1. One course must be selected from English 1, 3, 20 or 103 (courses with primary emphasis on writing skills).

2. One course from one of the courses not selected above or from English 102, 104, Comparative Literature 1, 2, 3; Philosophy 5, 10, or Rhetoric and Communication 1 (courses emphasizing either writing or speaking skills).

Breadth Requirements (in the major): Each major requires a certain number of units of breadth—Natural Sciences, Social Sciences, and Humanities. These units are specified by the major program. The broadening effect of any particular course is dependent on your major and general interests. (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.

General Education: A General Education course may simultaneously satisfy the campuswide General Education requirement, preparatory subject matter, a breadth requirement or an unrestricted elective required by your major. You should consult your faculty adviser in advance to determine exactly how your General Education courses will apply toward your major.

Degree Requirement Changes: On occasion, the faculty may make changes in the requirements that students must satisfy to obtain the baccalaureate degree. So that you will not be penalized by changes that may work to your disadvantage and so that you will benefit by changes that assist you in completing your degree requirements, it is College policy that you may choose to fulfill the University, College, and major requirements in effect at the time you were enrolled at UC Davis.

If you have transferred to UCD from another postsecondary institution of higher education (i.e., community college, college, or university), you may follow the requirements as stated in any UCD catalog in effect either during the three years immediately preceding your transfer to Davis or at the time you first enrolled at that institution, whichever is most recent. Once you have chosen the year of the General Catalog under which you wish to be governed, you must satisfy all of the University, College, and major requirements specified in that catalog.

Filing for Graduation: You must file a Candidacy Card with the Office of the Registrar during the specified filing periods (see Academic Calendar). You must also see your faculty adviser and complete your Major Certification (see appropriate college section). 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 Plan Approval

A Study Plan provides for 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 regulation (see the Academic Information section).

In conjunction with a faculty adviser, you must plan and prepare a program that specifies your goals and shows how the graduation requirements will be met. It is a regulation that a written "study plan" be filed with the student's individual adviser by the end of the second quarter of the junior year (having completed not more than 120 units either in residence and/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 Study Plan does not preclude a change of major or program modifications.

Major Degree Certification

A Major Certification is completed during the quarter a student plans to graduate. At that time, the adviser and student check to see that all major requirements have been completed. The Dean's Office completes the degree certification by verifying that all College and University requirements have been satisfied.

Declaration of Major/Change of Major

Students who have not declared a major must do so by the time 120 units have been acquired. Failure to declare a major at this point will result in a hold on your further registration. In order to declare a major, you must meet with your faculty adviser, fill out a Change of Major petition obtainable at the Office of the Registrar or Dean's Office, and file the petition with the Dean's Office. If you have completed 120 units you must prepare at the same time a study plan with your adviser. You are accepted into a major only after both your adviser...
and the Dean have approved the Change of Major petition.

Within the College. You may change from one major to another within the College by obtaining approval from a faculty adviser of the new major you have selected and the Dean. Admission into a major program may be denied or deferred if your grade-point average in courses that are required for the selected major or your overall grade-point average is below 2.00. Procedures for changing a major within the College are the same as those for declaring a major (see above), and the same conditions apply.

Accompanied by Change of College. Petitions for a change of major involving change of college should be filed within the first five weeks of the quarter. A change petition, available at the Dean’s Office, must be endorsed by a faculty adviser of the new major you are selecting and signed by the Dean of the college from which you wish to transfer. In addition, admission to the new college will require that Dean’s approval. Permission to transfer from one college to another may be denied or deferred if you are in academic difficulty or have less than 2.00 in courses that are required by the new major.

Multiple Majors

Because of similarity in course requirements for many of the major programs in the College, requests for multiple majors are not normally approved. If you are interested in two or more areas of study, you should consider the options of planning an individually designed major, or of adopting one or more of the minor programs offered by the College to complement your major. You may also request that your transcript note that you have completed all the requirements for study of a major in addition to your selected major.

The College does encourage multiple majors between colleges whenever your academic interests and abilities indicate this to be the best route. After endorsement of the Change of Major petition by the appropriate faculty in the colleges involved, each dean may approve the petition if there are sufficient differences between the requirements for the major programs you wish to study. At least 80 percent of the upper division units used to satisfy course and unit requirements in each major selected must be unique and not duplicate those of another major. In planning for multiple majors, you should determine the total requirements needed for each major as well as for graduation from each college involved.

Passed/Not Passed Option

This option should be used only for elective courses, not for courses taken to fulfill major requirements. An NP grade in a course required by the major could prevent graduation. When in doubt, check with your faculty adviser before electing to take a course Passed/Not Passed.

Credit in Extension Courses

Students in residence may apply a maximum of 9 units of credit earned in some University Extension courses toward the 180-unit requirement provided written approval has been obtained from the Dean prior to enrollment. Units of credit allowed by the Dean may be less than the number of units listed for a course. No
grade points are assigned for courses completed through University Extension.

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 Programs 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 Dean's Office or the Advising Center responsible for your intended major or plan a visit to the campus to discuss your program with a faculty adviser. Simultaneous enrollment at another institution requires prior approval by the Dean of the College.

Withdrawal

A student may be permitted to withdraw from the College for emergency reasons or for good cause. Consultation with the Dean is required prior to obtaining the Dean's permission to withdraw. Also refer to the University policy and procedures for withdrawal.

Registration Beyond 195 Units

A minimum of 180 units is required for a bachelor's degree. Normally, all degree requirements will be fulfilled by taking 180 to 195 units. The College encourages you to meet your educational objectives in the most efficient manner commensurate with your educational goals.

HONORS

Dean's Honors List

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 of letter-graded courses on the Davis campus during any quarter 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. Recipients will have this distinction noted on their records and diplomas. Honors at graduation will be awarded according to the conditions specified in the Academic Information section of this catalog.

College Medal

Each year the outstanding graduating senior in the College is awarded a silver medal, known as the "Agricultural and Environmental Sciences Medal." Scholastic 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 Scholarships.)
Engineering is the profession in which the physical, biological, and social sciences are applied in a practical way for the benefit of humankind. 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.

Sixteen undergraduate engineering curricula, including four 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, you may choose an area of specialization by selecting suitable technical elective courses. If your specific career objectives are not compatible with the established curriculum, you may propose an individual engineering 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 similar to most engineering curricula. The second part (the Upper Division Program) is made up of elective courses and a group of required technical courses pertinent to your major. Most of your senior year is elective, to be divided between technical and non-technical courses. Since practical experience during your undergraduate years is also useful, you are encouraged to participate in engineering internship programs.

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 your 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.

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, refer to Graduate Study in Engineering at the end of this section.

**A.B.E.T. Accreditation**

The following engineering curricula are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology: Aeronautical Science and Engineering, Agricultural Engineering, Chemical Engineering, Civil Engineering, Electrical 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. 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, your graduation could be delayed. You must select a major before admission, and you may be limited in your freedom to change majors within the College once you have been admitted.

**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 shown in the Academic Information section of this catalog. 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, the highest priority is given to applicants who have completed the entire lower division program. Once you have completed the lower division engineering curriculum at a California community college, your studies at Davis can be completed within two academic years. Questions about community college programs should be directed to your school 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 four Lower Division Programs listed under Engineering in the Programs and Courses section of this catalog. You are advanced to upper division standing after completing 84 units.

If you are admitted with 84 or more quarter units, you are classified as having upper division standing, but you are required to complete the minimum number of quarter units in the subject areas specified below 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>Minimum Quarter Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics (calculus, differential equations, vector analysis)</td>
</tr>
<tr>
<td>Physical and biological sciences (at least 10 units must be in general chemistry and at least 12 units in physics for engineering and science students)</td>
</tr>
<tr>
<td>Engineering (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>
</tr>
<tr>
<td>Written and oral expression (courses that are equivalent to English 1, and Rhetoric and Communication 1 or 3)</td>
</tr>
<tr>
<td>Humanities-social sciences (courses must be selected from a list of course groups approved by the Committee on Undergraduate Study)</td>
</tr>
<tr>
<td>Unspecified subjects (Chemical Engineering majors should take quantitative analysis and one course in organic chemistry with laboratory during their sophomore year; Agricultural Engineering—Forest Engineering option majors should take courses in biology, botany and statistics; Agricultural Engineering—Food Engineering option majors should take courses in Microbiology and Biology)</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Once you have completed the Lower Division Program and completed these specified subject area requirements, you need not take additional lower division courses, except those that are prerequisites to upper division courses in your curriculum.

The minimum number of required units in the Lower and Upper Division Programs varies, with the curriculum, from 180 to 215.

When there are more applicants than space available in the College, priority is given to transfers from California community colleges who have completed the lower division program for engineering with a high grade-

point average. You must select a major before admission, and once admitted, you may be limited in your freedom to change majors within the College.

Engineering is closed to Limited Status, Special Status, and Second Baccaulaureate applicants.

**TRANSFER FROM ANOTHER UCD COLLEGE**

You may only submit petitions for a transfer into the College of Engineering from another UCD college if you 1) are in good academic standing and are making minimum progress, 2) have completed at least 40 units as a registered student on the Davis campus, 3) have successfully completed Mathematics 21A, 21B, and 21C and Physics 8A (or their equivalents) on a letter grade basis, and 4) have the minimum UC GPA specified for the year in which you wish to transfer.

You must declare a specific major at the time you petition to transfer and must have the minimum GPA specified for transfer into that major in that year. Refer to the section on Academic Information for details on filing petitions, and consult the Engineering Undergraduate Office for details on minimum GPAs for specific majors.

**ACADEMIC ADVISING**

In establishing the College of Engineering’s undergraduate programs, we have made every effort 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.

As an undergraduate in the College of Engineering you are assigned to a faculty member for academic and career advising. Initial adviser assignments are made through the Engineering Undergraduate Office prior to your first term on campus. Engineering majors usually keep the same faculty adviser throughout the undergraduate years, but you may change to a new adviser of your choice whenever you wish. However, you must keep the Undergraduate Office informed of your adviser selections.

You are expected to meet individually with your faculty adviser at least once each quarter. New freshmen are required to meet with their advisers each quarter of the first year of enrollment, and new advanced standing transfer students are required to do so for the first quarter. To facilitate dialogue with your adviser on your program of study, we provide Advising Worksheets. (Extra copies are available in the Engineering Undergraduate Office). You should work out your lower division worksheet early in your freshman year, get it signed by your adviser, and then review it regularly with your adviser. Similarly, you should work out your upper division worksheet early in your junior year, get it signed by your adviser, and then review it regularly with your adviser.

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

Majors (curricula) in the College of Engineering are:
- Aeronautical Science and Engineering
- Agricultural Engineering
  - Aquacultural and Fisheries Engineering option,
  - Food Engineering option
  - Forest Engineering option
- Chemical Engineering
- Civil Engineering
- Computer Science and Engineering
- Electrical Engineering
- Materials Science and Engineering
  - Chemical Engineering/Materials Science and Engineering
  - Civil Engineering/Materials Science and Engineering
  - Electrical Engineering/Materials Science and Engineering
  - Mechanical Engineering/Materials Science and Engineering
- Mechanical Engineering
  - Individual Engineering Major

Although you are required to select a major before your admission, after your first year you are encouraged to make use of the many advising and counseling sources available to students if you are uncertain about persisting in your choice of a major. Because of over-enrollment, certain restrictions have been placed on changes of major within the College, but information and advice are available from faculty and student advisers and the academic deans. The Internship and Career Center, the Advising Services Office, the Counseling Center, and other sources listed in the index under Advising are also good places to seek assistance.

You may design an individual major with the help of your adviser after your initial enrollment in the College. Your plan is subject to approval by the Engineering Undergraduate Study Committee. Additional information is available through the Undergraduate Office in Bainer Hall.

MINORS

The College of Engineering does not offer minors in engineering fields; however, engineering students may choose to complete no more than one minor offered by either the College of Agricultural and Environmental Sciences or the College of Letters and Science. (See the minor program list in the specific college section.) A minor normally consists of at least 18 units of upper division coursework.

You must plan a minor program carefully with the appropriate adviser(s) within the college offering the minor of your choice. Minor declaration forms are available in the appropriate college dean's office. The filing period for declaring a minor coincides with that for filing for degree certification (see Calendar).

Minors are not required and may not be the basis for petitions to substitute classes for approved Humanities-Social Sciences (HSS) electives.

PLANNING YOUR PROGRAM

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 (Introduction to Agricultural Engineering)
- Chemical Engineering 1 (The Scope of Chemical Engineering)
- Civil Engineering 1 (The Civil Engineer in Society)
- Electrical and Computer Science Engineering 1 (Introduction to Electrical and Computer Engineering)
- Mechanical Engineering 1 (Mechanical Engineering)

You may wish to take one of these courses to assist you in your decisions about 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. The Advising Worksheet described under Academic Advising is especially helpful.

Specific degree requirements for the various engineering curricula are listed under: Engineering in the Programs and Courses section.

The minimum number of required units varies with the curriculum and ranges from 160 to 215. Programs normally require a minimum of 12 to 14 quarters of study averaging 15 units each. A regular full-time student must satisfy the University's requirements for minimum 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 some curricula (Aeronautical Science and Engineering, Civil Engineering, Materials Science and Engineering, and Mechanical Engineering) only mathematics, Physics 8A and 8B, and the lower division engineering courses are prerequisites to required upper division engineering courses. You should complete all prerequisite courses during your first two years. The remaining non-prerequisite natural science courses and Humanities-Social Sciences/General Education courses listed in the four sample Lower Division Programs are requirements for graduation, and can be scheduled to suit your individual study program.

In planning your four-year program, be sure 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

Course priorities for the first quarter of your freshman year are suggested below.

- Mathematics 11, Analytic Geometry (if not completed in high school)
- Mathematics 21A, Calculus (if not completed in high school)
- English A (if the Subject A requirement is not yet otherwise satisfied)
- Engineering 3 or 4; English 1 or 3, or Comparative Literature 1, 2, or 3; Chemistry 1A or 4A; Rhetoric and Communication 1 or 3; or Humanities-Social Sciences General Education electives

If you have not satisfied the Subject A requirement before entering the University, you must do so as early as possible during your first year of residence. If you have not done so after three quarters of enrollment, you will not be eligible to enroll for a fourth quarter.

You may not receive General Education credit for courses taken before you have met the Subject A requirement.

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

Expanded Course Outlines

In planning your program, you may consult the file of expanded course outlines for all courses offered by the various engineering departments at the Undergraduate Office of the College.

Special Courses

Variable-Unit Courses: Refer to the Academic Information section of this catalog for unit limitations on special study, internship, and other variable-unit courses.

Internship Courses: Internship courses numbered 92 and 192 are designed to provide practical and applied experience. Further information is available from your adviser, the respective Engineering department offices, or the Internship and Career 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 by the Associate Dean for Undergraduate Studies 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.

University requirements and the campus General Education requirement for the bachelor's degree are explained in the Bachelor's Degree Requirements section of this catalog.

For the General Education requirement, all majors in the College of Engineering are in the Nature and Environment area. Therefore, courses used to satisfy general education electives must be chosen from the remaining two areas, Civilization and Culture, and Contemporary Societies. The relationship of these courses to the Humanities-Social Sciences electives is discussed under Electives in this section.

Unit 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 in the Programs and Courses section of this catalog.

You may, for good cause, request a modification of particular degree requirements by submitting a student petition. These petitions, which are 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 six professors and six (non-voting) students. A negative decision by the Committee may be appealed to the College faculty for action at a regular meeting.

Residence Requirement

In addition to the University residence requirement, you must complete at least 35 of the final 45 units characteristic of your curriculum in engineering while registered in the College.
Scholarship Requirement

In addition to meeting the University scholarship requirement, you are required to maintain a 2.0 grade-point average in all upper division courses in your major department combined with all upper division courses in Engineering.

English Composition Requirement

After completing 64 quarter units of college work, you must satisfy the English Composition requirement. The requirement may be fulfilled in one of three ways:

1. by passing the English Composition Examination administered by the College of Letters and Science.
   (You should take it early in your junior year and must take it prior to your last quarter before graduation. Units of credit are not given for passing this examination.)
2. by completing English 103A with a grade of C-- or higher.
3. by successfully completing English 102 adjunct to Chemical Engineering 155A or 155B (for Chemical Engineering and Chemical Engineering/Materials Science and Engineering majors only).

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

During the 1989/90 academic year, the English Composition Examination will be offered on the following three Saturdays: October 28, February 3, and April 28. Sign-up rosters will be posted on the College of Letters and Science's bulletin board, Mira Hall foyer, Monday through Thursday just preceding each Saturday examination date. You must sign up, in person, by Thursday. You must obtain the English Composition Examination form, available at the UCD Bookstore, to take the exam.

Engineering Design Requirement

Engineering design is the process of devising a system, component, or process to meet certain needs. Design involves a decision-making process (often iterative), in which the basic sciences, mathematics, and engineering sciences are applied to convert resources optimally to meet a stated objective. Among the fundamental elements of the design process are the establishment of objectives and criteria, synthesis, analysis, construction, testing, and evaluation. You must take at least 24 quarter units of such design coursework through a combination of required and restricted elective courses. Specific comments about design are included in individual curricula descriptions. You should also review the design content of your individual program with your adviser in the course of completing the upper division advising worksheet.

Electives

There are three kinds of elective courses in the engineering curricula: Humanities-Social Sciences/General Education, technical, and unrestricted.

Humanities-Social Sciences/General Education electives: Because engineers are significant agents of social change, they must be sensitive to the human setting in which that change takes place. The Humanities-Social Sciences/General Education (HSS/GE) electives are emphasized within the engineering curricula to increase your awareness of the human and societal implications of engineering practice. The humanities include subject areas such as literature, philosophy, history, and the fine arts. The social sciences include areas such as anthropology, political science, sociology, psychology, and economics.

You must take at least 24 quarter units from subjects in the humanities and social sciences areas. Subjects that are vocationally oriented or skills oriented, such as management and accounting, or that contain a preponderance of scientific or mathematical content, are not suitable for HSS credit even though a course may be offered by a department ordinarily classified as a humanities or social science department. Foreign language courses must stress literature, not skills, and fine arts courses must emphasize the history and appreciation of forms of expression, not development of performance or other technical skills. You may petition to have a non-literature course in a foreign language which is not your native language count as a humanities course.

You should note that the requirement of 24 quarter units of Humanities and Social Science (HSS) coursework is a College of Engineering requirement and is in addition to the campus General Education (GE) requirement of a fixed number of courses (e.g., six courses for a student entering UCD as a freshman). You must satisfy the HSS and GE requirements simultaneously, provided that you take the courses that are listed on both the list of HSS courses that follows and the list of GE courses that are listed in the current catalog. In general, a good academic strategy is to satisfy the campus GE requirement first and then to satisfy any remaining HSS requirements by taking courses from the list below. In this way, you can benefit from the breadth and depth of course coverage inherent in the GE program structure. (For example, courses from one or more areas outside of your major field of study are required and you must take coursework at both the introductory and non-introductory levels.) In satisfying the GE requirement, note that (a) you must take GE courses for a letter grade and (b) you must fulfill the Subject A requirement before you begin your GE coursework.

In consultation with your academic adviser, you should attempt to design a comprehensive and coherent set of courses using the HSS/GE electives.

You may petition for HSS credit for 92, 98, 99, 102, 119, 119, 195, 198, and 199 courses in appropriate cases. If you repeat any of the courses which may be repeated for credit, not more than 4 units in any such courses can be counted toward your HSS requirement.

Afro-American Studies 10, 15, 80, 100, 101, 107, 110, 120, 121, 123, 133, 145A, 145B, 150A, 150B

Agricultural Economics 1, 100A, 100B, 112, 120, 175, 169

American Studies 1A, 1B, 1E, 1F, 2, 10, 45, 101A-H, 111, 120, 125, 130, 140A, 140B

Anthropology 2, 3, 4, 101, 110, 112, 114, 120 through 149, 170, 177, 179

Applied Behavioral Sciences 1, 2, 17, 18, 151 through 154, 157, 161 through 165, 170, 171, 172, 175 through 178, 190
Art 1A, 1B, 1C, 1D, 10H, 10S, 15, 20, 25, 150 through 188C, 190
Asian American Studies 1, 2, 100, 101, 110, 111, 112, 130, 150, 155
Chicano Studies 10, 20, 101, 102
Chinese 10, 11, 104 through 107, 109A-I, 111 through 130
Classics 4A, 10, 17A, 17B, 17C, 20, 140, 141, 142, 143, 174, 175
Comparative Literature 1 through 53B, 135 through 169
Consumer Science 100
Design 140, 142A, 142B, 143, 144
Dramatic Art 15 (but not 15L), 20, 115, 150 through 159
East Asian Studies 113
Economics 1A-1B, 100, 101, 105, 110A through 175
Education 110, 117, 118, 120, 122, 123, 130, 132, 142, 145, 151
English 3, 30A, 30B, 45, 46A, 46B, 46C, 107, 110A through 189
Environmental Studies 1, 101, 133, 160 through 167, 169
Food Science and Technology 20
French 25, 45, 101, 102, 103, 107, 112 through 123, 140 through 150, 162
Geography 2, 5, 2G, 5G when taken concurrently with 2 or 5), 6, 10, 50, 104, 121, 122A through 127, 141 through 161, 170 through 173, 175
German 48, 50, 52, 106, 110 through 133
History 1 through 90A, 101 through 191B, 193 through 196B
Human Development 15, 100A through 103, 110, 130, 131, 132, 151, 191
Integrated Studies 2B, 2C, 2D, 2E, 3A, 3B, 3C, 3E, 8B, 8C (Open only to students accepted to Integrated Studies Program)
International Agricultural Development 10
Italian 25, 107 through 139C
Landscape Architecture 140
Linguistics 1, 100, 102, 113, 115, 120, 138, 150
Medieval Studies 20A, 20B, 20C, 120A-F
Native American Studies 1, 10, 32, 33, 55, 70, 101 through 161, 180, 181A, 181B, 181C
Nutrition 20
Philosophy 1, 10A-G, 14, 18, 21, 22, 23, 100 through 105, 109, 114A through 123, 137, 143 through 176
Physical Education 36A, 36B
Political Science 1 through 7, 100 through 113, 115 through 190
Portuguese 103A-118
Psychology 1, 16, 112, 114, 115, 120, 130, 131, 132, 135, 136 through 150, 165, 168, 171, 177, 183
Religious Studies 1, 2, 4 through 75, 100 through 172
Rhetoric and Communication 10, 42, 103 through 143, 152
Russian 30, 41, 42, 120 through 154
Scandinavian 110, 111
Sociology 1, 2, 3, 25, 102, 110 through 165B, 170 through 185
Spanish 34, 35, 100, 103A through 109, 111 through 129, 134, 135, 136, 138, 149, 150, 151
Textiles and Clothing 107
Women's Studies 50

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, they offer an opportunity to broaden a background in the sciences and engineering.

You may receive technical elective credit up to a maximum of 6 units for any combination of engineering courses numbered 190C, 192, 197, 198, and 199. Academic credit for courses of 199 courses is limited to a maximum of 5 units for each substantially different project. Academic credit for engineering internship courses (192's) is limited to a maximum of 5 units per quarter.

With the exception of the following courses, all upper division courses in engineering, physics, chemistry, mathematics, and statistics may be taken as technical electives. The exceptions are:

- **Applied Science Engineering 137** (restricted to one unit of technical elective)
- **Physics 137** (restricted to one unit of technical elective), 194H, 195, 197, 198, 199
- **Chemistry 194H, 197, 198, 199**
- **Mathematics 192, 197, 198, 199**
- **Statistics 102**

In addition, the following courses may be taken as technical electives:

- **Agricultural Economics 113, 140, 147, 148, 157, 176**
- **Agricultural Engineering Technology 161A, 161B**
- **Animal Science 1, 105, 133, 160**
- **Art 121A**
- **Atmospheric Science 105, 121A, 121B, 124, 133, 149A**
- **Biochemistry and Biophysics 101A, 101B**
- **Biological Sciences 1**
- **Chemistry 1C, 4C, 5, 8A, 8B**
- **Computer Science Engineering 168**
- **Economics 11A, 11B**
- **English 104**
- **Environmental Planning and Management 110**
- **Environmental Toxicology 131**
- **Food Science and Technology 100A, 100B, 102, 104, 108, 111, 131, 150**
- **Genetics 100**
- **Geography 106, 110**
- **Geology 1, 1L, 17, 50, 50L, 60, 105, 116, 117A, 117B, 123, 124, 134, 150A, 175**
- **Microbiology 2, 102, 130A**
- **Physiology 2, 110, 120B, 120E, 149**
- **Resource Sciences 100, 131**
Soil Science 100, 102, 107, 120
Textiles and Clothing 100
Vegetable Crops 101
Water Science 41, 103, 104, 122, 141, 142, 150, 154, 160, 172, 180
Wildlife and Fisheries Biology 120, 121
Zoology 2, 2L

You are urged to discuss the selection of technical elective courses with your academic adviser.

Unrestricted electives: You may count any course for which University credit is awarded as an unrestricted elective in the engineering curricula.

Degree Requirement Statements

As engineering is a rapidly developing profession, curricular changes are made by the faculty from year to year. In order to ensure that you benefit from these changes, the College of Engineering has established a policy that you must fulfill the degree requirements stated in the catalog for the year in which you complete degree work or in the catalog for the year immediately preceding.

Degree Check

You should use the Degree Requirement Check sheets for each of the curricula for monitoring your progress toward a degree. The Undergraduate Office will prepare only one unofficial degree check for you (preferably at the end of your junior year). In order to have this degree check prepared, you must submit a signed Degree Check Request. You can obtain further information concerning this service and forms in the Engineering Undergraduate Office.

GRADING

Passed/Not Passed Option

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 courses taken to satisfy (a) the unrestricted electives requirements, or (b) the Humanities-Social Sciences electives (not GE) and the English and rhetoric requirements, or (c) the technical electives requirement may be taken on a Passed/Not Passed basis. All other courses must be taken for a letter grade. Humanities-Social Science courses that you plan to offer in fulfillment of the campus General Education requirement 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, in that quarter
- have a P/NP petition approved by the Associate Dean for Undergraduate Studies or a designated representative

HONORS

The Dean's Honors List

The Dean's Honors List is posted quarterly in the glass case 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 your transcript each time you qualify 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 in the Commencement Program in June, and this distinction is noted on their records and diplomas. Honors at graduation will be awarded to students who have completed at least 45 units of work at the University with a grade-point average that places them in the appropriate top percent of the graduating class in the College of Engineering. (See Honors and Prizes in the Academic Information section.)

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.

GRADUATE STUDY IN ENGINEERING

The following departments and divisions 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.

- Aeronautical Science and Engineering
- Agricultural Engineering
- Applied Science (Davis-Livermore)
- Chemical Engineering
- Civil Engineering
- Computer Science
- Electrical Engineering and Computer Science
- Materials Science and Engineering
- Mechanical Engineering

Professional programs emphasizing design and leading to the Master of Engineering and Doctor of Engineering degrees are offered by the following departments:
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 or 16 units of specified graduate coursework, or a combination of specified graduate and undergraduate coursework
- Admission to the Graduate Division

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 Foreign Language and Area Requirements, and the Major Requirements.

The English Composition Requirement is designed to ensure that you are well versed in the skills of written communication.

The Foreign Language and Area Requirements provide you with a broad background of knowledge, guide you in an exploration of 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.), Bachelor of Science (B.S.) and Bachelor of Arts and Science (B.A.S.) degrees are offered by the College. The B.A.S. degree is for those who have two majors, one normally leading to an A.B. degree and the other to a B.S. These degrees are conferred upon completion of the University's requirements, the General Education requirement, and the College's breadth and major requirements detailed in the Bachelor's Degree Requirements section of this catalog.

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 175 Mrak Hall.)

STUDENT SERVICES

The primary function of the Letters and Science Advising 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:

- Determines how your transfer credits from other institutions apply towards completion of breadth and unit requirements for the bachelor's degree (applicability of transfer credit toward the major is determined by your major faculty adviser)

Provides a Status Card outlining the way in which transfer credit satisfies College and University requirements
- Provides workshops and individual review to identify remaining College requirements (See Degree Check at the end of this section.)
- Acts on petitions requiring the Dean's approval, e.g., petitions for declaration or change of major; change of study list after established deadlines; waiver of minimum progress requirements; permission to take 200-, 300-, and 400-numbered courses for degree credit; withdrawal; reentry on probation or after completion of 120 units
- Reviews the records of students who are subject to disqualification and decides whether such students can continue on academic probation or must be dismissed

ADVISING

Faculty Advising

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. Your transcripts from other colleges (your own copy is necessary) should be made available to your adviser. 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 explore many areas—some in depth—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 evolving interests, your academic and experiential background and your goals. 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 Letters and Science Advising Office for consultation on any academic matter.

Advising Checkpoints. You are required to consult with your faculty adviser at two, possibly three, critical stages in your academic career:

- Before you complete 90 units of degree credit, including transfer work, you must develop in consultation with your faculty adviser a proposal for a quarter-by-quarter program of courses showing how you will meet your educational goals and the graduation requirements. You must also have declared a major by this time (see The Major section below).

Filing this plan with your adviser does not preclude subsequent modifications of the plan or a change of major.

- Before you complete 135 units of degree credit, including transfer work, you must obtain a Degree Check (see the end of this section) from the Letters and Science Advising Office and consult your adviser concerning course selection and satisfaction of requirements in the major.

- Before you complete 195 units of degree credit, including transfer work, you must develop in consultation with your faculty adviser a firm study plan, in the form of a quarter-by-quarter program that will satisfy all remaining degree requirements as expeditiously as possible. This plan will be filed with your adviser. If the plan indicates that you will have to register beyond the 225-unit limit (see the end of this section) in order to achieve your goals and to meet the degree requirements, you must contact the Letters and Science Advising Office immediately.

If you have not met with your faculty adviser before these established check points, a hold will be placed on your registration materials as a reminder.

New students are assigned to a faculty adviser when the University receives their Statement of Intent 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.

If you did not indicate an initial commitment to a particular major program on your application for admission, you will participate in the Academic Options Program which is designed to provide academic advising to lower division students. You will be advised by a team of advisers: several faculty members representing the four Letters and Science major areas, an academic counselor and a peer adviser. This advising team will be available in the Letters and Science Outreach Advising Offices located in each of the university residence hall complexes. Through one-on-one advising and group workshops and programs, this team will work with you to guide your academic planning to ensure progress toward your educational goals and satisfaction of your degree requirements. They will assist you in exploring your options before you select your major.

Students are assigned to the Academic Options Program advising team located in their university residence hall complex. Students living off campus are asked to contact the Letters and Science Advising Office, 150 Mrak Hall, early in the quarter to receive their adviser assignments.

New students are encouraged to see their faculty adviser at least once every quarter during their first year on campus to discuss their 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. During Orientation Week of the Fall Quarter, you should contact the regular faculty adviser you have been assigned.

Continuing students who have completed three quarters in residence in the College are no longer obligated to consult an adviser except at checkpoint stages (above); they are urged, however, to maintain regular contact with an adviser in their major to avoid program errors which may delay graduation.

Seniors should maintain close contact with their adviser in order to ensure that they are meeting the major requirements.

Peer Advising

Student-to-student advising is an important part of the University advising services. The College of Letters and Science student assistants to the Dean are available during regular office hours in 150 Mrak Hall to talk with students about their academic concerns. Refer to the index under "Advising" for information on the various peer advising programs throughout the campus.

Letters and Science Advising Office

Information:
150 Mrak Hall
752-0392

Deans and academic counselors are available by appointment and other advising personnel are ready to answer questions on a drop-in basis at the Letters and Science Advising Office. 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 counselors. Peer advisers in the Letters and Science Advising Office are prepared to answer most questions about College requirements. Student-to-student advising is an important part of the University advising services. Refer to the index under "Advising" for information on the other peer advising programs. Preprofessional advising is also available to Letters and Science students, even though the College does not offer special preprofessional programs. Students who plan to prepare for a professional school undertake a normal program leading to a bachelor's degree. Some courses required by a professional school are included in the requirements for the bachelor's degree, and additional courses you may 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, Pre-Law, and Pre-Business Advising Offices, or the Internship and Career Center.

TEACHING CREDENTIAL

The teacher education program is administered by the Graduate Division. See The Graduate Division section, Teacher Credential Programs, 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 departmental and interdepartmental major programs offered by the College of Letters and Science. All but five of the majors offer a Bachelor of Arts degree. Those which lead to a Bachelor of Science degree as well are indicated by a footnote symbol (see below). Each Letters and Science major comes under one of the three General Education categories: Culture and Civilization (CC), Contemporary Societies (CS), and Nature and the Environment (NE). The appropriate category is indicated immediately following the major.

Afro-American Studies (CS)
American Studies (CC)
Anthropology (A.B. degree—CC; B.S. degree—NE)
Applied Physics (NE)
Art History (CC)
Art Studio (CC)
Biochemistry (NE)
Biological Sciences (NE)
Botany (NE)
Chemistry (NE)
Chicano (Mexican-American) Studies (emphasis in Humanities—CC; emphasis Sociology—CS)
Classical Civilization (CC)
Comparative Literature (CC)
Computer Science (NE)
Dramatic Art (CC)
East Asian Studies (CC)
Economics (CS)
English (CC)
French (CC)
Genetics (NE)
Courses listed in this catalog under Astronomy, Chinese, Classics, Education, Integrated Studies, Japanese, Portuguese, Scandinavonian, and Swedish are taught by teaching departments or programs in the College of Letters and Science, but no undergraduate majors in these areas now exist.

Declaration of Major

After an initial period of academic exploration, students are expected to focus their interests and declare a major by the time they have completed 90 units. If you have not declared a major by this point, a hold will be placed on your registration materials. The hold 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 published in this catalog and the Class Schedule and Room Directory each quarter. As a part of the petitioning procedure, you must, in consultation with a faculty adviser, prepare a projected plan of study. You are accepted into the major when your adviser and the Dean have approved the petition. The department or curriculum committee supervising the major program will assign you to a faculty adviser.

To be accepted into a major, you must have a C average in all courses you have completed that are a requirement for that major, as well as a C average in the upper division courses you have taken toward the major. Additional requirements, such as completion of a particular set of required courses with a specified grade-point average (usually well above a C average) may be introduced as conditions for acceptance into any major at any time.

Individual Major

Students with academic interests not covered by an established major have the opportunity to develop an individual major. If you choose this option you will work closely with faculty advisers who have expertise in the requisite fields of interest to develop a coherent and rigorous academic program. This program of courses is then submitted to a faculty committee for review and approval. 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 under Individual Major in the Programs and Courses section of this catalog.

Multiple Majors

If you are interested in two or more areas of study, you may choose to satisfy the requirements of more than one major. Multiple majors offer the advantage of a systematic, in-depth approach to two or more disciplines. However, flexibility in planning your courses and exploring new areas of knowledge are restricted by the obligation to satisfy the requirements of more than one major. Students choosing to satisfy multiple major requirements notify the Dean's Office of their decision by submitting a petition endorsed by faculty advisers in the majors. The Dean's approval of the declaration of more than one major is subject to the following conditions:
1. At least 80 percent of the upper division units used to satisfy course and unit requirements in each major selected must be unique and may not be counted towards the upper division unit requirements of any other major undertaken. Courses with substantial overlap in content will not count as part of the 80 percent.

If the major programs differ in the number of upper division units required, the major program requiring the smaller number of units will be used to compute the minimal number of units that must be unique.

2. At the time of request, a substantial part of the preparatory subject matter must have been successfully completed and at least two upper division courses in each major.

It should be possible to complete all degree requirements within the 225-unit limit.

Combination proposals that cannot be approved are two or more majors

1. in the following group: Biochemistry, Biological Sciences, Botany, Genetics, Microbiology, Physiology, and Zoology;
2. offered by the same discipline, except Art History and Art Studio.

A student who completes all requirements for approved multiple majors in which one major normally leads to an A.B. degree and another normally leads to a B.S. degree, will receive a B.A.S. degree. A single degree is granted to students who graduate with multiple majors.

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. 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 Biochemistry, Biological Sciences, Botany, Genetics, Microbiology, Physiology, or Zoology.

Change of Major Within the College

You may change from one major to another within the College. Consent of the department or committee in charge of your proposed new major is required. Admission into a major program may be denied by the program or by the Dean if your grade-point average in courses required for the selected major is less than 2.000.

Procedures for change of major within the College are the same as for declaration of major and the same conditions apply. If you wish to change to a major that has admission restrictions, you must comply with the special procedures and requirements for that major.

Except under unusual circumstances, no change of major will be permitted after you attain senior standing (135 units). It is not possible to change or declare a major in the quarter of graduation.

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 any quarter. Petitions, which are available at the Office of the Registrar 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 2.000 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, but in no case during the quarter of graduation.

Grade-Point Averages in the Major

In addition to the general University requirement of a C average (2.000) for all University work, the College stipulates the following additional grade-point criteria for graduation:

You must have an average of at least 2.000 for all UCD courses required for the major; you must also have at least a 2.000 average for all upper division courses required for the major.

A department or curriculum committee may refuse to accept you into a major they administer if you do not have at least a 2.000 average in the courses required for the major.

If your performance is unsatisfactory 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

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. Many teaching departments and programs offer optional minor programs to students in the College of Letters and Science. Completion of a minor is not required for graduation, but you may elect to satisfy requirements and have completion of the minor(s) certified on your transcript. 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. Most teaching departments and programs that offer a minor program list course requirements in the Programs and Courses section of this catalog. Following is a list of those minors:

Afro-American Studies
American Studies
Anthropology
Art History
DEGREE REQUIREMENTS

Each student is responsible for fulfilling all requirements for graduation. The University and Davis Campus General Education requirements can be found in the Bachelor’s Degree Requirements section of this catalog. College requirements are listed below, including any restrictions in addition to the aforementioned requirements.

Unit Requirements

A minimum of 180 units is required for the bachelor’s degree (see Unit Credit Limitations below). Of these units, 64 must be upper division units which include 48 units from Letters and Science teaching departments and programs. For the A.B. degree, a minimum of 12 of 48 units of upper division Letters and Science courses must be from outside the major department or program. All upper division General Education courses will be accepted in satisfaction of this requirement. Nonstandard courses (see Area Requirement List in this section) do not count toward these 12 units.

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 numbers 399 and 499): 9 units maximum.
- Extension courses: 9 units maximum by petition.
- Graduate courses: 9 units maximum by petition.
- Internship courses (numbers 92, 192): 12 units maximum including internship units taken at other institutions. (See under Nonstandard courses below.)
- Nonstandard courses (92, 97T, 97TC, 99, 192, 194H, 197T, 197TC, 199 and similar courses): 30 units maximum or one-sixth of the units taken at UCD, whichever is the smaller. (Note separate unit limits on internship, special study, and tutoring courses; and major limitations.)
- Passed/Not Passed Courses: Maximum of one-fourth of UCD units graded P taken at student’s option. (See also the Academic Information section.)
- 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.)

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 on the Davis campus.

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.

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 the Bachelor’s Degree Requirements section in this catalog. (Work completed while enrolled in the Education Abroad Program does not satisfy campus or College Residence requirements.)

Scholarship Requirement
The minimum grade-point average is 2.000 for all courses counted toward the major and for all upper division courses used to satisfy major requirements. To obtain these minimal averages in the major, you may, with approval from your adviser, repeat courses that are graded D or F. If you have to repeat a course more than once, you need the Dean’s approval. Only grades earned in courses taken at UCD will be included in the grade-point computations.

English Composition Requirement
The English Composition requirement can be met in one of two ways:

1. by passing the English Composition Examination (see College Policies and Procedures) upon completion of 70 units of degree credit (the examination does not yield credit);

OR

2. by completing with a grade of C— (or P) or better

   a. one course in English composition from English 1, 3, 20, Comparative Literature 1, 2, or 3;

   AND

   b. English 102 or 103 (which must be taken after 84 units have been completed).

Foreign Language Requirement
A.B. and B.A.S. degrees—the 15-unit level or the equivalent in one language. (For detailed information, see Foreign Language Requirement in this section.)

B.S. degree—none.

Area (Breadth) Requirement
The College Breadth Requirement promotes the intellectual growth of students by asking them to acquire a broader background of knowledge than is provided by the usual major. The Breadth requirement also guides students in exploring the interdependence of knowledge and, in the case of the A.B. degree, provides students the opportunity to become acquainted with performance in the fine arts.

A.B. degree—satisfaction of the campus General Education requirements plus completion of one of the following options:

   a. a “Mini Minor” consisting of a minimum of three approved upper division courses in a single Letters and Science department or program other than the major;

   OR

   b. a minimum of three approved lower or upper division courses in Art, Music, or Dramatic Art from outside the student’s major;

   OR

   c. a certified minor from any UC Davis college or program

The Letters and Science faculty believes that the completion of a certified minor is often the best way for a
student to obtain structure and coherence in pursuit of intellectual breadth.

For the purposes of options a and b above, all courses are considered as approved except: courses bearing less than 3 units credit, internship courses, non-standard courses, directed group study courses, and courses used to satisfy the College English Composition Requirements.

Twelve units of upper division courses must be completed in Letters and Science teaching departments other than the major department or program. Courses numbered 92, 97T, 97TC, 98, 192, 197T, 197TC, 198, and from 200 through 499 cannot be counted toward satisfaction of the 12-unit requirement: not more than 10 units in special study courses (194H, 199) may be counted.

B.S. degree—a total of 90 units in natural sciences/mathematics; and satisfaction of the General Education requirement (see Bachelor's Degree Requirements section).

**Major Program Requirements**

Requirements for major programs are described in the Programs and Courses section of this catalog. These requirements are fulfilled by completing a major program offered by a teaching department or program committee in the College of Letters and Science (see the list of majors) or an individual major program approved by the College's Committee on Individual Majors.

No more than 6 units in internship courses (numbered 92, 192, or similar work-learn courses), may be accepted in satisfaction of the requirements of major programs. Courses numbered 97T, 97TC, 197T, and 197TC do not satisfy unit or course requirements in the major.

**Area Requirement List (B.S. degree)**

Courses numbered 92, 97T, 97TC, 98, 192, 197T, 197TC, 198, and from 200 through 499 cannot be counted toward satisfaction of the natural sciences/mathematics Area requirements. A maximum of 10 units in special study courses (99, 194H, 199) may be counted toward that portion of the Area requirements. Courses used to satisfy the English Composition and Foreign Language requirements may not be counted toward the area requirement. Subject to the restrictions just listed, courses acceptable for fulfilling the 90-unit natural sciences/mathematics area requirement are as follows:

**Natural Sciences and Mathematics**
- Anthropology 1, 5, 15, 151, 152, 153, 154A, 154B, 155, 156, 157, 158.
- Astronomy.
- Avian Sciences 13.
- Biochemistry and Biophysics.
- Biological Sciences. All courses except 19.
- Botany.
- Chemistry.
- Engineering 20.
- Engineering: Civil 30.
- Engineering: Computer Science 10, 30, 32, 40, 100, 110, 120, 122, 140, 170.
- Engineering: Electrical and Computer Science 171.
- Entomology 10, 100.
- Environmental Studies 30.
- Food Science and Technology 2.
- Genetics.
- Geology.
- Human Anatomy 101.
- Integrated Studies 1A, 1B, 8A.
- Mathematics.
- Microbiology.
- Nutrition 10.
- Physical Education 101, 102, 103, 110, 111, 112, 113, 115.
- Physics.
- Physiology.
- Psychology 15, 41, 103, 105, 108, 129, 130, 131, 134, 136, 150, 154, 180B.
- Resource Sciences 2, 131.
- Statistics.
- Textiles and Clothing 110.
- Wildlife and Fisheries Biology 10.
- Zoology.

**Foreign Language Requirement (A.B. and B.A.S. degrees)**

**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 at 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.

   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. If you are a transfer student, consult your Status Card, which is issued by the Dean's Office prior to admission to the College.

2. **College Board Achievement Test.** Earning a qualifying score of at least 500 on a College Board 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 notify the Letters and Science Dean's Office so that satisfaction of the College requirement can be noted on your record.

3. **College Board Advanced Placement Examination.** A score of 5, 4, or 3 on any foreign language College
Board Advanced Placement Examination, with the exception of Latin, taken in high school will satisfy the Foreign Language requirement.

4. Course Completion in College (or the equivalent). A.B. degree—15-unit level in one language (e.g., Spanish 3 or Japanese 3). B.S. degree—as required in the major program.

If you have successfully completed (C— or better) the second or third year of a language in the tenth 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.

Change in Requirements

On occasion, the faculty makes changes in the requirements that students must satisfy to obtain the baccalaureate degree. So that you will not be penalized by changes that may work to your disadvantage and so that you will benefit by changes that assist you in completing your degree requirements, it is College policy that you may choose to fulfill the University and College requirements (see General Education requirement for an exception) as stated in any UCD General Catalog in effect at any time you were enrolled in a postsecondary institution of higher education (i.e., community college, college, or university). Once you have chosen the year of the General Catalog under which you wish to be governed, you must satisfy all of the University and College requirements specified in that catalog.

With respect to the completion of your major requirements, most of the majors in the College of Letters and Science require completion of the major degree requirements in effect at the time you officially declared your major. However, because departments differ in how these matters are handled, check with the department or major program office if you have any questions about which requirements are applicable to you.

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.

CREDIT FOR COURSES

Advanced Placement Examinations. For credit allowed and course equivalencies on units earned through Advanced Placement Examinations, see the College Board chart in the Academic Information section.

Education Abroad Program. Full University credit may be awarded for courses taken through the Education Abroad Program. See the Introduction section in this catalog for eligibility requirements and application deadlines.

Extension Courses. Students may apply credit earned in University Extension courses toward the 180-unit requirement, only when 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.

Enrollment—Undergraduates may enroll in graduate and professional courses in the 200, 300, and 400 series under the following conditions:

- Graduate courses in the 200 series are ordinarily open only to students who have completed at least 18 units of upper division work basic to the subject matter of the course.

- Admission to graduate and professional courses must be approved by the instructor in charge of the course.

Graduate and professional courses which have been completed will be listed on the student's transcript in the usual manner. However, the units earned may be counted toward degree requirements only under the conditions listed below.

Degree Credit—Within the limitations A, B, and C given below, an undergraduate student in the College may count up to 9 units in graduate 200 series courses, and up to a combined total of 9 units in 300 and 400 series professional courses, toward degree requirements. These units, however, are not counted as upper division units unless this is granted by petition to the Dean.

A. The recommendations of the instructor in the course and the department chairperson—in addition to approval from the Dean—must be obtained in order to receive credit toward the degree for the following kinds of courses:

- all graduate courses 200-298 whether offered by a department or program outside of or within the College of Letters and Science

- all professional courses 300-398 for teachers offered outside of the College of Letters and Science

- all postgraduate professional courses 400-498 offered outside of the College of Letters and Science

- all variable unit courses 300-398 and 400-498 offered within the College of Letters and Science

B. The minimum eligibility conditions for an undergraduate student in the College to petition for degree credit for a 200, 300, or 400 series course are a UC grade-point average of 3.3 and completion of 18 upper division units basic to the subject matter of the course. These eligibility conditions may be waived, however, upon the recommendation of the course instructor and
concerence of the department chairperson if the student's preparation warrants exception.

C. Undergraduates in the College cannot receive degree credit for special study courses 299, 399, or 499.

**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. Internships offer students the opportunity to apply classroom learning, to experience various work situations, and to test their career objectives. The Internship and Career Center has information on internships available or can help you develop one.

**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) and you have already passed a subsequent course in the sequence (e.g., you want to repeat Mathematics 16A, but you have already passed Mathematics 16C), you should check with the Dean's Office and the department regarding whether you can receive grade-point and/or unit credit. (See also the section on Academic Information.) See also, the section on Repetition of Courses in the Academic Information section of this catalog, especially regarding computing the grade-point average for the first 16 units of repeated courses and thereafter.

**Transfer Courses in English Composition.** Transfer courses considered by the Dean to be equivalent or comparable to English 1, 3, 20, 103A-G, or Comparative Literature 1, 2, 3 will be accepted toward satisfaction of the English Composition 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 fulfill the requirement by examination (see below) or take English 102 or 103 at Davis.

**ENGLISH COMPOSITION EXAMINATION**

The English Composition requirement can be met with a passing score in the English Composition Examination. No fee is charged and no unit credit is given for the examination.

This academic year, the no-fee examination will be offered on the following Saturday mornings:

- October 28, 1989
- February 3, 1990
- April 28, 1990

If you take this examination, you must do so after having completed 70 units. There are no examinations administered during the summer.

Sign-up rosters will be posted on the College of Letters and Science's bulletin board, Mrak Hall foyer, Monday through Thursday (or until filled) just preceding each Saturday examination date.

The English Composition Examination form, available at the UCD Bookstore, is required.

**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 the Academic Information section in this catalog.

Graduating seniors, and other students planning to undertake graduate or professional studies, should consult an adviser before petitioning for Passed/Not Passed in courses required for the major program.

**REGISTRATION BEYOND THE 225-UNIT LIMIT**

A minimum of 180 units is required for the bachelor's degree, and you are normally expected to fulfill all degree requirements within the 180- to 225-unit range. Once 225 units have been completed, you may register only with the permission of the Dean. Permission may be granted for sound educational reasons and for a limited time. You will be expected to adhere to a 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 225 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 225 units before you finish your fourth year. You must petition for continuation, however, and file the quarter-by-quarter course program you have planned.
DEGREE CHECK

Before the beginning of your senior year, you should take some time to consider your goals and to plan the academic program for your final year as an undergraduate. To plan properly and ensure that you get the most out of your remaining education and complete all graduation requirements as well, you should know what requirements remain unsatisfied. To help you in these efforts, the College requires that you obtain (1) an informational packet from the Dean's Office providing detailed instructions on evaluating your progress on College and University requirements and (2) a check of major requirements from your faculty adviser before you accumulate a total of 135 units of degree credit.

If you have not completed these two aspects of the degree check before you complete 135 units of degree credit, a hold will be placed on your registration materials.

UNIT LIMITATIONS

Ordinarily, a full-time student takes 12 to 15 units a quarter. (Note the Minimum Progress requirements in the Academic Information section.) In order to graduate in four years you need to complete 15 units a quarter.

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.

HONORS

The Dean's Honors List

The Dean's Honors List recognizes the academic achievements of students who have

1. completed at least 12 units for a letter grade during that quarter;
2. earned a grade-point average, for that quarter, that places them in the upper 16 percent of the students registered in their class level.

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.

The Honors Program of the College of Letters and Science

The honors program in the College of Letters and Science is designed to permit students to pursue a program of study in their major at a level significantly beyond that defined by the normal curriculum. It represents an opportunity for the qualified student to experience aspects of the major that are representative of advanced study in the field.

Entrance into the honors program requires that a student have completed at least 135 units with a minimum grade-point average of 3.5 in courses counted toward the major. Other prerequisites for entrance into the program are defined by the major. The program consists of a project whose specific nature is determined by consultation with the student's major adviser. It may involve completion of a research project, a scholarly paper, a senior thesis, or some comparable assignment depending on the major. The project will have a minimum duration of two quarters and will be noted on the student's record by a variable unit course number. Successful completion of the honors program requires that a minimum of six units' credit be earned in coursework for the project.

Honors with the Bachelor's Degree

Three categories of honors are awarded at graduation, honors, high honors, and highest honors. Graduation with honors requires that a student meet the appropriate grade-point requirement for all courses as described in the Academic Information section in this catalog. Students who complete the Honors Program and who meet the grade-point requirement for graduation with honors may be recommended by their departments for graduation with high honors or highest honors on the basis of an evaluation of their academic achievements in the major and in the honors project in particular.

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.

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 Lawrence J. Andrews prize is awarded to a senior who not only has achieved academic excellence, but who also has interests outside of pure scholarship.

The college also nominates graduates with distinguished academic records 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 75 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.

Davis graduate programs are administered either by departments or graduate groups. Graduate groups are composed of individual faculty members with similar disciplinary or research interests. The group structure, used extensively at Davis, permits faculty to be affiliated with graduate programs in more than one discipline and offers students flexibility and breadth by crossing the administrative boundaries of the various departments, colleges, schools and sometimes campuses. Conforming well to UCD’s progressive spirit, the group structure also allows for expansion of established degree programs and facilitates development of new ones. Almost half of the graduate programs at Davis are sponsored by graduate groups.

ADVANCED DEGREE AND CERTIFICATE PROGRAMS AT DAVIS

The following advanced degrees are offered at UC Davis: Master of Administration, Master of Arts, Master of Science, Master of Fine Arts, Master of Arts in Teaching, Master of Engineering, Master of 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 candidate for Doctor of 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 Graduate Announcement. Specific requirements are available from the office or chairperson of the graduate program or group concerned.

**Majors and Degrees**

- Administration (M.Admin.)—refer to Graduate School of Management
- Agricultural and Environmental Chemistry (M.S., Ph.D.)
- Agricultural Economics (M.S., Ph.D.)
- Agricultural Education (credential)
- Agronomy (M.S.)
- Animal Behavior (Ph.D.)
- Animal Science (M.S.)
- Anthropology (M.A., Ph.D.)
- Applied Mathematics (M.S., 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.)
- Cell and Developmental Biology (Ph.D.)
- Chemistry (M.S., Ph.D.)
- Child Development (M.S.)
- Classics (M.A.)
- Community Development (M.S.)
- Comparative Literature (M.A., Ph.D.)
- Comparative Pathology (M.S., Ph.D.)
- Computer Science (M.S., Ph.D.)
- Dramatic Art (M.A., M.F.A., Ph.D.)
- Earth Sciences and Resources (M.S., Ph.D.)
- Ecology (M.S., Ph.D.)
- Economics (M.A., Ph.D.)
- Education (M.A., credential)
- Endocrinology (M.S., Ph.D.)
- Engineering (M. Engr., M.S., D.Engr., Ph.D.)
- English (M.A., Ph.D.)
- Entomology (M.S., Ph.D.)
- Exercise Science (M.S.)
- Food Science (M.S.)
- French (M.A., Ph.D.)
- Genetics (M.S., Ph.D.)
- Geography (M.A., Ph.D.)
- Geology (M.S., Ph.D.)
- German (M.A., Ph.D.)
- History (M.A., M.A.T., Ph.D.)
- History of Art (M.A.)
- Horticulture (M.S.)
- Human Development (Ph.D.)
- Immunology (M.S., Ph.D.)
- International Agricultural Development (M.S.)
- Law (J.D.)—refer to School of Law
- Linguistics (M.A.)
- Master of Education (M.Ed.)
- Mathematics (M.A., M.A.T., Ph.D.)
- Medicine (M.D.)—refer to School of Medicine
- 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.S., 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 and Wildlands Science (M.S.)
- Rhetoric and Communication (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

The Graduate Division
The Graduate Division

Water Science (M.S.)
Zoology (M.A., Ph.D.)

Graduate Group Programs

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 of study, write to the group chairperson for more information. These programs are also entered alphabetically in the Programs and Courses section of this catalog, along with mailing addresses.

Agricultural and Environmental Chemistry
Agricultural Education
Animal Behavior
Applied Mathematics
Atmospheric Science
Avian Sciences
Biochemistry
Biomedical Engineering
Biophysics
Botany
Cell and Developmental Biology
Child Development
Community Development
Comparative Literature
Comparative Pathology
Computer Science
Critical Theory
Earth Sciences and Resources
Ecology
Endocrinology
Engineering
Exercise Science
Food Science
Genetics
Horticulture
Human Development
Immunology
International Agricultural Development
Linguistics
Master of Education
Microbiology
Nutrition
Pharmacology and Toxicology
Physiology
Plant Physiology
Plant Protection and Pest Management
Preventive Veterinary Medicine
Range and Wildlands Science
Soil Science
Statistics
Textiles
Water Science

APPLYING FOR ADMISSION

Admission to a graduate program at the University of California requires a bachelor's degree that is comparable to a degree from the University of California both in distribution of academic subject matter and in scholarship achievement.

The primary requirement for admission to any program is evidence of intellectual achievement and promise. Your application will be evaluated primarily on the basis of your transcript to assure that your qualifications meet minimum standards as set by Universitywide and UC Davis Graduate Councils. Generally, you must have a minimum B average in undergraduate coursework from an institution of acceptable standing to be considered for admission. Graduate programs frequently require submission of additional materials such as a separate application form, Graduate Record Examination (GRE) scores, letters of recommendation, portfolios, or examples of written work to assist them in selecting from among qualified applicants. Admission to graduate study is limited by the number of spaces available in major programs. Not all eligible applicants can be admitted.

Applications are accepted for fall quarter only. You should begin the application process as early as possible in the academic year since many programs have early deadlines. In addition, your chances for receiving financial support are greatly enhanced by applying early. The application deadline is: June 1, unless otherwise indicated by the program, or until your proposed major program is full, whichever occurs first.

Contact the Graduate Division for the Combined Application for Admission and Fellowship Form.

The completed application form, along with the $35 nonrefundable application fee and official transcripts from each college and university you have attended, must be sent directly to the Graduate Division. Supplemental application materials required by the major program must be sent directly to the graduate adviser for that program. When all application materials have been received by the Graduate Division, they will be forwarded to your proposed major program where they will be evaluated along with the supplemental materials you have sent to the program adviser. The Graduate Admissions Advisory Committee for the program will submit its recommendation and evaluation to the Graduate Division; final admission decisions rest with the Dean of Graduate Studies and Research. This approval procedure applies to all applicants, including those seeking a transfer to UC Davis from another UC campus.

Applications for the degrees of Juris Doctor, Doctor of Medicine, Doctor of Veterinary Medicine, Master of Administration, and Master of Preventive Veterinary Medicine must be filed directly with the appropriate professional school.

Readmission

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 Readmission Application Fee of $35 at least six weeks before the beginning of the quarter in which you plan to enroll (see the Academic Calendar at the front of this catalog). The application is obtained from the Graduate Division Office. Transcripts of all work undertaken since you were last registered in graduate status at Davis must be presented with the application. (There is no assurance of reentry, as applicants for readmission will be considered in competition with other applicants for the program.)

International Students

Assessment of a foreign degree is based on the characteristics of the national system of education, the type of institution attended, and the level of study completed.
If you are an international student with credentials from universities outside the U.S., you should begin the application process as early as a year before the opening of the quarter in which you wish to enroll. Official copies or certified copies of all transcripts in English are required before your application can be processed. Completed applications along with the nonrefundable $35 application fee must be received from international students by April 1, unless your proposed program has an earlier deadline.

**English Requirement.** If English is not your native language and you have not studied at an institution where English was the language of instruction, you will be required to demonstrate proficiency in English by submitting your test scores from the Test of English as a Foreign Language (TOEFL). This test is given six times each year by the Educational Testing Service, CN6151, Princeton, NJ 08541-6151. The minimum score required for admission to graduate study at UC Davis is 550.

If you are admitted, even though you received a 550 or better score on the TOEFL, you will be required to take a special examination in English on the Davis campus before you register. This examination is to determine whether you can profit from coursework at the graduate level with English as the medium of instruction and submit acceptable scholarly work in that language. If you do not receive a satisfactory score on this examination, you will be assigned to remedial coursework and your graduate program may be deferred until your command of English is considered adequate.

**Visas.** If you need a Certificate of Eligibility for a student visa issued by UC Davis, you will be required to complete a Certificate of Finances form showing the availability of sufficient funding for your graduate program (see under International Student Services in Student Life section for complete details). Prior to registration, you will be required to sign either the Statement of Responsibilities for a Privately Funded Student or the Statement of Responsibilities for a Sponsored Student to show that you are able to undertake this level of expense for your education at UC Davis. No financial aid of any kind (grants, loans, fellowships, scholarships, or work-study awards) is available to international students during their first year of enrollment at UC Davis.

**Graduate Study Without an Advanced Degree Objective**

If you do not wish to pursue a degree but have educational objectives which require some graduate coursework, you may apply for "Coursework Only" in a specific graduate program. Your program of study must demonstrate definite scholarly or professional purpose, and you must meet regular admission standards and filing deadlines.

**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 if the courses were taken at another campus of the University—providing the units were not used to satisfy 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 Doctor of Philosophy degree, as granted at the University of California, 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. This 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 completion of a Ph.D. program at Davis is usually 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 undergraduate training and may include undergraduate courses to remove deficiencies. Each student must satisfy the degree requirements as published in the Graduate Announcement. 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 and should be submitted six weeks prior to the beginning of the quarter in which you wish to participate in the program.

PART-TIME ENROLLMENT

Some advanced degree programs are available to qualified graduate students who for reasons of occupation, family responsibility, or health are unable to attend full time. Students with part-time status must meet the same standards of quality for admission and for continuation in a graduate program as other students. Applicants desiring part-time enrollment in an approved program should file a petition with the Graduate Division after admission has been granted. Continuing graduate students who wish to change status between full-time and part-time must file a petition with the Graduate Division. To be considered eligible, graduate students must be enrolled for six units or fewer per quarter. Fee reductions that apply to part-time students are found under Fees and Expenses in this catalog. Application forms are obtained at the Graduate Division Office. See the Academic Calendar for filing deadlines.

EMPLOYEE-STUDENT STATUS

Reduced fees are available to UC career employees and certain UC retirees who are qualified for admission to the University. Once admission has been granted, a petition for the reduction in fees must be filed prior to each quarter of enrollment. Employee students pay one-third of the regular fees and may enroll for up to nine units or three courses per quarter whichever is greater. Employee students on the semester system may enroll for up to six units or two courses, whichever is greater. Detailed information is in the UC Staff Personnel Policy Manual (Sections 260.23 for employees, 775.7 for retirees, and 141.11 for the Administrative and Professional Staff Program) available in department offices, at the Library Reference Center, or the Staff Development and Professional Services office. Petitions can be obtained through the employee’s unit.

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 the chairperson of your graduate program on or before January 15. Applications for both new and continuing students may be obtained from the Graduate Admission/Fellowship Office, 252 Mrak Hall. International students are not eligible for fellowship consideration until they have completed one year as a graduate student at UC Davis. Information regarding graduate fellowships, which are supported by various federal and outside agencies, is available at the Graduate Division.

A limited number of Tuition Fee Fellowships are awarded each year to new and continuing international students based on academic merit. The available fellowships are allocated to graduate programs which choose individual recipients from among their graduate students. These fellowships are for the full amount of the nonresident tuition. A minimum grade-point average of 3.25 is required for eligibility. Application forms for Tuition Fee Fellowships are available at the Graduate Division Office, and must be filed with that office by April 1. International students are not eligible for a restricted fellowship unless they have completed at least 18 units of graded coursework at UC Davis. A limited number of tuition fellowships will be available to first-year international students. Students receiving any funding from a government or other outside agency, whether or not the fees are paid directly to the University of California, are not eligible for a Tuition Fee Fellowship.
Teaching assistantships and research assistantships are available in many departments. Interested students should inquire at the office of the program in which they wish to study.

The Financial Aid Office has information about loans and work-study for graduate students.

TEACHER CREDENTIAL PROGRAM

The teacher education program at UC Davis is administered by the Graduate Division.

Acceptance into the multiple-subject (elementary) teaching credential program, with either a regular or a bilingual emphasis (Spanish), 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 two following alternatives:

- the additional requirements for the approved UC Davis Diversified Waiver Program (must be completed by August 31, 1994); OR
- achieving a passing score on the National Teachers Examination (General Knowledge section only).

California state single-subject (secondary) teaching areas for which Davis students can qualify are: agriculture, 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 requirements for these state single subjects, or state-approved examinations available to test competence in subject areas, consult the appropriate adviser in the Division of Education or the Department of Applied Behavioral Sciences.

While admission to the teacher education program is by the Graduate Division, applications and filing deadlines should be obtained from the Division of Education, 174 Kerr Hall, or the Department of Applied Behavioral Sciences (home economics and agricultural education), 106 Academic Office Building-4. A scholarship record of B (3.0) is required for admission to the program.

- A passing score on the California Basic Educational Skills Test (CBEST) must be achieved prior to the Graduate Division application deadline.

The teacher education program is available to upper division students also. With careful planning, it is possible for students to finish the requirements for a non-renewable preliminary credential at the same time the bachelor's degree is completed. This credential allows recipients to teach for five years, but within that time an additional ("fifth") year of study must be completed for the professional clear credential. Specific requirements may be obtained from the Division of Education.

Students considering teaching as a career should consult the Division of Education or the Department of 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.
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:

School of Architecture and Urban Planning (LA)
Graduate School of Business Administration (B)
Schools (or Departments) of Education (B, D, I, LA, R, SB, SC)
Preparation for teaching credentials is available as follows:
Elementary Teaching (B, D, I, LA, R, SB, SC, SD)
Bilingual (Spanish) Emphasis—Elementary (D, I, LA, R, SB, SC, SD)
Secondary Teaching (B, D, I, LA, R, SB, SC)
Bilingual (Spanish) Emphasis—Secondary (I)

Special Education (B, I, LA, R, SB)
Pupil Personnel Services: Basic (Counseling) (B, I, LA, R, SB)
Agricultural Specialist Teaching (D)
Bilingual (Spanish) Specialist (D, SB)
Reading Specialist (B, LA, R, SB)
School Librarianship (B, LA)
School Psychology (B, D, LA, SB)
Clinical-Rehabilitative Services (SB)
Administrative (B, I, LA, R, SB)
Early Childhood Specialist (I)
Administration (B, LA)
Graduate School of Journalism (B)
Graduate Schools of Management (D, I, LA, R)
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.

MANAGEMENT

The UC Davis Graduate School of Management, which enrolls its ninth class in the fall of 1989, offers a two-year program of study in management and policy analysis leading to the Master of Administration degree. (See the School of Management section 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 (379 Kerr Hall, 752-0742) or Agricultural Economics (125 Temporary Building, 8, 752-6185); or see the Pre-Business School (Peer) Adviser located in 359 Kerr Hall, 752-6512.

TEACHING CREDENTIALS

Preparation for Study: Those interested in preparing to be a teacher should know that the majority of students complete a teaching credential as part of a graduate program. However, there is significant work that may be done as an undergraduate, including prerequisites or other courses related to schools and children. This not only better prepares students for the credential year, it relieves the stress of an already-crowded graduate professional year.

Advising: It is highly recommended that students consult the appropriate advising office as early as possible. All credential advising except Agriculture is done in the Student Advising Office of the Division of Education, 174 Kerr Hall (752-0757). Students interested in teaching Agriculture should go to the Department of Applied Behavioral Sciences in Academic Office Building 4 (752-1808).

Application: Students normally apply for the graduate credential program early in their senior year. See the Teacher Credential Program in the Graduate Division section of this catalog for additional information about acceptance into a credential program.

FORESTRY

Preparation for Study: Consult this catalog and the announcement of the Department of Forestry and Resource Management, UC Berkeley.

Preforestry adviser: C.C. Delwiche (Land, Air and Water Resources, 273 Hoagland Hall, 752-1511 or 752-1409).

LAW

Preparation for study: Consult this catalog, school announcements, and The Official Guide to U.S. Law Schools, prepared and published by the Law School Admission Council/Law School Admission Services.

Advising: Students interested in law school preparation should consult the Pre-Law Adviser, Pre-Law Advising Office, 108 South Hall, 752-3009. Information is available about law school admission procedures, academic program planning (see also under Advising Services), and professional possibilities.

School of Law, UC Davis: Consult this catalog, the catalog 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, nurse practitioner, physician assisting, 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 Internship and Career Center on campus. Contact the Health Sciences Advising Office, (South Hall, 752-2672) regarding curricula and schools for all health science fields.

Suggested Curricula: Since specific school requirements vary, students should either contact the schools directly, or contact the Health Sciences Advising Office for more detailed information.

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, test scores, work experience, campus or 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 Microbiology 107), and medical microbiology (Veterinary Microbiology 127).

Chemistry: 24 units, including Chemistry 1A, 1B, 1C, 5 and Biochemistry 101A-101B or Physiological Sciences 101A-101B.

Physics 6A, 6B, 6C.

Mathematics: none required for California state license. Calculus (Mathematics 16A-16B) and statistics (Statistics 13) recommended.

Strongly recommended courses include: hematology (Clinical Pathology 101L), immunology (Veterinary Microbiology 126L), 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); Physiology 110-110L; virology (Veterinary Microbiology 128 or Microbiology 162); histology (Zoology 122).

Suggested electives:

Genetics (Genetics 100); Human Anatomy 101; advanced immunology (Veterinary Microbiology 270); computer programming (Engineering 5, Computer Science Engineering 10, or 30); 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 or October—one year prior to the projected date of admission, but preferably in April. Check individual catalogs for exact prerequisites.

Biological sciences (at least one year with laboratory). Recommended: Biological Sciences 1; Zoology 2-2L; Physiology 110-110L; Zoology 100-100L; Biochemistry 101A-101B; Microbiology 2-3.

Chemistry 1A-1B-1C, and at least 8 units of organic chemistry with laboratory (e.g., either courses 9A-9B, 128A-129A, or courses 128A-128B-128C and 129A-129B-129C). Check individual catalogs for specific requirements.

English: one year, preferably to include two composition courses (e.g., English 1, 3, 103). Comparative Literature courses are also acceptable.

Rhetoric courses are not acceptable.

Physics 6A-6B-6C.

Psychology: one lower- and one upper-division course. Recommended: Psychology 1, 16, 112, 145, or 168.

Suggested electives: Statistics 13 or Human Anatomy 101, 101L; Mathematics 16A-16B-16C; Genetics 100; sculpture course, art practice.

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. Entrance requirements vary greatly from program to program. The Graduate Record Exam (GRE) or Graduate Management Aptitude Test (GMAT) is required for admission to most schools. Contact the school of your choice for particular requirements. Elective courses may be selected from the following subject areas:

Agricultural Economics.
Applied Behavioral Sciences.
Biological Sciences.
Community Health.
Economics.
Engineering.
Epidemiology and Preventive Medicine.
Food Service Management.
History.
Mathematics.
Statistics or Agricultural Science and Management.
Computer Science Engineering.
Political Science.
Psychology.
Rhetoric.
Sociology.

Medicine

Most students complete four years of preprofessional coursework prior to admission to medical school. Any major is appropriate for admission. 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, South Hall, for specific requirements for each school. The following courses are required by most schools.

Biological sciences: six quarters, including one year of laboratory. (Biological Sciences 1, Zoology 2-2L, Physiology 110, 110L, Microbiology 2 or 102, and 3 recommended).

Chemistry one year general inorganic (Chemistry 1A-1B-1C) and one year organic, with laboratory (e.g., Chemistry 128A-128B-128C and 129A-129B-129C).
Optometry

Two years minimum preparation is required prior to transfer into a four-year Doctor of Optometry degree curriculum. Students must participate in the Optometry Admission Testing Program, one year prior to projected date of admission. Inquire at the Health Sciences Advising Office for test dates. Check individual catalogs for exact prerequisites.

- General Biology and/or Zoology: Biological Sciences 1, Zoology 2 and 2L, and one upper division elective in Biological Sciences or Zoology;
- Microbiology 2 or 102, and 3;
- Human Anatomy 101 and 101L;
- Physiology 110 and 110L (required only by UC Berkeley)
- Chemistry: one year of general (Chemistry 1A, 1B, 1C) and two quarters of organic with laboratory (e.g., Chemistry 8A, 8B). Required by a few schools: 9 units of organic chemistry.
- English: one year (e.g. English 1, 3, 103). Rhetoric courses may fulfill this requirement.
- Physics 6A-6B-6C.
- Psychology: two courses, Psychology 1 and one upper division course (e.g., Psychology 112, 168).
- Suggested electives: economics, sociology, biochemistry, additional biological sciences, additional statistics.

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 highly recommended. Check individual catalogs.

- Biological sciences (one year with laboratory).
- Zoology 2-2L, 100; Microbiology 2 or 102, 3;
- Biological Sciences 1; Botany 2.
- 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. UOP B.S. degree program has general education requirements but does not require organic chemistry.
- Economics. One macroeconomics course (Economics 1B).
- English, one year: one each of composition, literature and one other.
- Mathematics 16A-16B (-16C required by some schools) and Statistics 13 (recommended).
- Physics: one year physics with laboratory (Physics 6A-6B-6C).
- Psychology: one course, such as Psychology 1.
- Rhetoric and Communication 1, 3 or 10.
- Suggested electives: courses in behavioral psychology, speech, communication, sociology, anthropology, history, and political science.

Nursing

Two years are usually required to complete prerequisites prior to transferring into two- or three-year baccalaureate nursing programs. An accelerated program is also available at a limited number of universities. In addition to the general requirements listed here, students must obtain a degree in the subject of their choice. General requirements include:

- Chemistry 1A, 1B, 8A, 8B.
- English 1.
- Human Anatomy 101, 101L.
- Microbiology 2 or 102, and 3.
- Physiology. Recommended: Physiology 2-2L or 110-110L.
- Psychology 1.
- Sociology 1.

Recommended courses include: Nutrition 10 or 101 or 110; Human Development 100A or Psychology 112; Anthropology 2; Rhetoric and Communication 3; Physics 6A, 10; Family Practice 92C, 192B; Community Health 101; Biological Sciences 19, Psychology 16; Sociology 127, 154.

Specific requirements vary from school to school and are subject to change; students are advised to contact specific schools regarding requirements. An R.N. license may also be earned through associate degree programs (A.D.N.) 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. Experience in the field is strongly recommended.

- Biological Sciences 1.
- Chemistry 1A, 1B, 1C.
- English 1 or 3.
- Human Anatomy 101, 101L.
- Human Development 100A-100B or Psychology 112.
- Physiology 2-2L or 110-110L (110-110L recommended).
- Psychology 1, 168.
- Sociology: one course or Anthropology 2.
- Suggested electives: Human Development 100C, 102, 130, 131, 141; additional psychology; Physics 6A-6B-6C, 10; Physiology 111A-111B, 112-113; Community Health 101; Genetics 10; Nutrition 10; art and design courses; Physical Education 103, 105, 113, 125, 131; Family Practice 92C, 192B; Rhetoric and Communication 1, 3; Microbiology 2, 3. CSU San Jose requires a "skills" course (i.e. drawing, ceramics, weaving).
Physical Therapy

Basic preprofessional training is available for both the undergraduate and graduate levels; students must obtain professional training from another school. Each physical therapy program has its own specific requirements; therefore, students should contact the school of their choice. Experience in the field is strongly recommended. Most graduate programs require the Graduate Record Exam (GRE) for admission. General requirements include:

- Biological Sciences 1
- Chemistry: 1A, 1B, 1C. Recommended: 8A, 8B.
- Computer Science Engineering 10. Required by some schools.
- English, one year.
- Human Anatomy 101, 101L.
- Physics, one year.
- Physiology 110-110L (required by majority of schools).
- Psychology 1 and 168.
- Suggested electives: Human Development 100A-100B or Psychology 112; Human Development 100C, 131, 141; Microbiology 2 and 3; Sociology 1, 3; Zoology 2-2L, 106, 143; Anatomy 215.
- Physical Education 101, 102, 103, 105, 113, 125, 131; Rhetoric and Communication 1, 3.
- Community Health 101 (required only by University of the Pacific); Family Practice 192B; additional psychology, and additional biology.

Physician Assisting

Physician assistant programs often require courses in English composition, sociology, psychology, chemistry, anatomy, physiology, microbiology, mathematics, and cultural anthropology. Additionally, one to two years of direct patient care (i.e., nurse, nurses aide, EMT, orderly, corpsman) are normally required. The majority of the programs are for training people who are interested in assisting the primary care physician in underserved areas; however, specialty training is available. Physician's assistants work in a wide variety of settings.

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 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, 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 Periodicals 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.
- Admissions to Schools and Colleges of Optometry, published by the American Optometric Association.
- 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.
School of Law
The School of Law offers a three-year professional curriculum leading to the degree of Juris Doctor. In addition to the traditional professional curriculum, the School provides professional skills training in interviewing and counseling, negotiation and dispute resolution, and trial practice. It also 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, or experience in the community. The School 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-legal 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 think critically. They should gain an understanding of people and institutions and know how to gather and weigh facts, to solve problems, and think creatively. They should be able to read rapidly with comprehension, and express themselves clearly, completely, and concisely, both orally and in writing.

Assistance in program planning may be obtained from the Pre-Law Advising Office, South Hall, 752-3009.

For additional information, see the Official Guide to U.S. Law Schools—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 schools, and the study of law, together with individualized information on all ABA approved law schools. It may be found at college bookstores or ordered from Law School Admissions Services, Box 2000, Newtown, PA 18940.

ADMISSION

Requirements for Admission

Your application for admission to the School of Law must show a record of sufficiently high caliber to demonstrate your ability to handle the rigors of law study. 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). The Committee seeks students of diverse backgrounds and 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 also major considerations.

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 Law School Admission Services. 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 ensure 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. The information booklet is also available in the Law School Admission Office and the Prelaw Advising Office on campus.

Admission Procedures

Complete details of admission procedures are included in the Law School Catalog.

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 catalog 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 $35 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 February 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. Applications received after February 1 will be considered but because applicants are admitted as promptly as possible, late applicants will be at a disadvantage.

2. You must take the Law School Admission Test and submit the Law School Application Matching Form with your application so that the score will 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 information packet. A transcript from each college or university attended must 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 your 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 come directly from the writer or from a college placement center, career center, or college pre-law office. The Admissions Committee cannot seriously consider your application before two letters have been received.

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 below), 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 considered for admission 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 of good standing including class rank from the dean of any law school previously attended; (2) at least one letter of recommendation from a law professor; (3) transcripts of all law school work; (4) LSAT score (no need to register with LSDAS—a copy of the report previously submitted to the school you are presently attending will suffice); and (5) an official transcript from the school where you earned your undergraduate degree, stating the date the degree was conferred. 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 early 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.

Recruitment of Underrepresented Groups

The students and faculty of the UCD School of Law recognize the great need for lawyers from underrepresented groups. The School, therefore, actively solicits applications from Asian, Black, Hispanic, Native American, Filipino, and other underrepresented students.

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 law students from underrepresented groups. CLEO applications may be obtained by writing to: Council on Legal Education Opportunity, 818 18th Street N.W., Suite 940, Washington, D.C. 20006.

Scholarships for Indian and Alaskan natives are available from American Indian Scholarships, Inc., 5106 Grant Avenue N.E., Albuquerque, New Mexico 87108. Applicants must be members of federally recognized Indian tribes or Alaskan native villages and must demonstrate need. The deadline for the fall term is June 1.

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, 8th 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.

After satisfactorily completing the professional curriculum of 88 semester units, and the required period of resident study, you will receive 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, 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 in the Programs and Courses section of this catalog.

Combined Degree Programs

Students with interests in areas such as anti-trust, business, labor law, criminal law, or environmental law, 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 four years. You will usually be able to earn up to 10 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.

Students have pursued degree programs 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, and with the School of Management for a M.Admin. degree. 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 notify the School of Law if that application is accepted.

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 1989-90

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<tr>
<th>Academic Year</th>
<th>Fall 1989</th>
<th>Spring 1990</th>
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<tr>
<td>First-year Introductory Program</td>
<td>Mon-Fri, Aug 21-25</td>
<td>Mon-Fri, Aug 21-25</td>
</tr>
<tr>
<td>Law School instruction begins</td>
<td>Mon, Aug 28</td>
<td>Mon, Jan 8</td>
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<tr>
<td>Labor Day holiday*</td>
<td>Mon, Sept 4</td>
<td>Mon, Sept 4</td>
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<tr>
<td>Thanksgiving holiday period**</td>
<td>Thurs-Fri, Nov 23-24</td>
<td>Thurs-Fri, Nov 23-24</td>
</tr>
<tr>
<td>Martin Luther King, Jr. holiday*</td>
<td>Mon, Jan 15</td>
<td>Mon, Jan 15</td>
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<tr>
<td>President's Day holiday*</td>
<td>Mon, Feb 19</td>
<td>Mon, Feb 19</td>
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<tr>
<td>Spring recess</td>
<td>Mon-Fri, Mar 26-30</td>
<td>Mon-Fri, Mar 26-30</td>
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<tr>
<td>Law School instruction ends</td>
<td>Tues, Dec 5</td>
<td>Fri, Dec 22</td>
</tr>
<tr>
<td>Reading period</td>
<td>Wed-Sat, Dec 6-10</td>
<td>Sat-Wed, Apr 28-May 2</td>
</tr>
<tr>
<td>Law School examination period</td>
<td>Mon-Fri, Dec 11-22</td>
<td>Mon-Fri, Dec 11-22</td>
</tr>
<tr>
<td>Last day of semester</td>
<td>Fri, Dec 22</td>
<td>Fri, May 18</td>
</tr>
<tr>
<td>Law School Commencement</td>
<td>Sat, May 19</td>
<td>Sat, May 19</td>
</tr>
</tbody>
</table>

*Academic and administrative holiday.

APPLICATION MATERIALS

The catalog of the School of Law and application materials may be obtained by writing to the Office of Admission, School of Law, 115 King Hall, University of California, Davis, CA 95616.
School of Management
PREPARATION FOR THE STUDY OF MANAGEMENT

A bachelor's degree and a strong interest in professional management are prerequisites for admission to the Graduate School of Management. The school seeks students from diverse professional and academic backgrounds and does not limit its consideration to applicants from any particular category of majors. Entry-level and mid-career applicants are considered, and women and minorities are encouraged to apply.

Although the program has no specific subject prerequisites, it is strongly recommended that students complete the following coursework prior to enrollment in the program:

*Economics*—the introductory courses in micro- and macroeconomics, and one upper division course in microeconomics (Economics 100).

*Mathematics*—an introductory course in calculus (Mathematics 16A).

*Statistics*—one course in elementary statistics (Statistics 13).

Well-developed English reading and writing skills are essential for success in the program.

APPLICATION

Admission is for the Fall Quarter only. Application materials may be obtained from the Graduate School of Management and must be completed and returned, with all supporting documents, by April 1. In order to allow the timely processing of your application, we have established a deadline of April 1. However, your application may be considered after the deadline. Completed applications for fellowship and graduate scholarships must be filed by January 15.

As indicated in the application form, the basic documents required are:

- transcripts from all institutions of higher education previously attended;
- scores from the Graduate Management Admission Test (GMAT);
- three letters of recommendation;
- a personal statement which discusses career objectives and educational reasons for seeking admission to the program.

Personal interviews are not a requirement, although visits from applicants are welcomed.

CRITERIA FOR ADMISSION

The major criterion of the committee granting admission is what an applicant has to gain from, and offer to, the program. Consideration of an applicant's undergraduate performance includes a review of trends in scholastic performance and areas of academic strength as well as an assessment of overall grade-point averages. Admissions standards and grading policies of the schools attended are also considered. Both verbal and quantitative scores on the GMAT are used to evaluate measurable general aptitude for management. Background and maturity as indicated by employment history, service and activity records, recommendations, and the applicant's personal statement are factors in the committee's evaluation. Professional management experience is not required for admission but is favorably considered.

The Graduate School of Management of the University of California, Davis, prepares men and women for management careers in business, government, and nonprofit enterprise. The School offers the principal components of leading graduate programs of business management in a two-year course of study leading to the Master of Administration degree. The Graduate School of Management admitted its charter class in the fall of 1981, and the planned enrollment at maturity is 300.

The two-year program provides both entry-level and mid-career students with an understanding of management approaches to problem solving and an awareness of the environment within which public and private management decisions are made. Successful completion requires not only a sophisticated understanding of a variety of functional skills in finance, marketing, production, program evaluation and accounting, but also an understanding of computers, information systems and the application of scientific methods to the identification and solution of management problems.

The program has a first-year core which emphasizes concepts and techniques appropriate to management in either the public or private sector so that students, no matter what their special career interests, are prepared to function in either sphere. Courses in the core cover economic analysis, policy analysis, quantitative methods, accounting, budget and control, marketing, finance, and organizational theory. During the second year, students specialize in one of several concentrations including Accounting, Agricultural Management, Environmental and Natural Resource Management, Finance, Management Information Systems, Management Science, Marketing, Science and Engineering Management, each with an emphasis in either the public or private sector. Joint degrees in Engineering and Management and Law and Management are also offered. The Graduate School of Management is able to accept well-qualified students into an individualized Ph.D. program. The program is administered by the Graduate Division, but students who are interested should write directly to the Graduate School of Management.

Strong emphasis is placed on individual attention, real-world problem solving, and group dynamics through study groups, teamwork, and special subjects.
School of Medicine
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.

ADMISSION POLICIES

The class entering in the fall of 1989 will be limited to ninety-three students selected on the basis of academic achievement, academic promise, and personal characteristics. The Admissions Committee uses these criteria to determine if a candidate 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 majority of openings in the entering class will be awarded to students who are legal residents of the State of California. The School of Medicine participates in the program of the Western Interstate Commission for Higher Education (WICHE). 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 the Admissions Office. You must 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 request two letters of recommendation along with a nonrefundable application fee of $35. These letters 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 usually 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-October and as late as September of the following year.

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-year classes begin work in early August 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

The School of Medicine requires all candidates to take the Medical College Admission Test (MCAT). 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 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, coursework 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). Required courses may not be taken on a Passed/Not Passed basis unless all courses at your undergraduate institution are graded this way.

The average accepted student has considerably higher numbers. The admissions committee may, therefore, elect to screen applicants at a level higher than these published minimum levels.

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.

School of Medicine Calendar 1989-90

The School of Medicine operates on a different schedule from the remainder of the campus. A more detailed academic calendar may be obtained from the Office of Curricular Support, 2427 Medical Sciences 1A.

SUMMER QUARTER 1989

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<th>Event Description</th>
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<td>Medical School instruction begins</td>
<td>Mon, July 3</td>
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<tr>
<td>Medical School instruction begins (electives only)</td>
<td>Mon, July 3</td>
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<tr>
<td>Medical School instruction begins (regular curriculum)</td>
<td>Mon, July 31</td>
</tr>
<tr>
<td>Medical School instruction ends</td>
<td>Mon, Sept 11</td>
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<tr>
<td>Medical School instruction ends</td>
<td>Fri, Sept 22</td>
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<tr>
<td>Academic and administrative holidays</td>
<td>Tues, July 4</td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Mon, Sept 4</td>
</tr>
</tbody>
</table>

FALL QUARTER 1989

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical School instruction begins</td>
<td>Mon, Sept 25</td>
</tr>
<tr>
<td>Medical School instruction begins</td>
<td>Thurs, Sept 28</td>
</tr>
<tr>
<td>Medical School instruction ends</td>
<td>Fri, Dec 8</td>
</tr>
<tr>
<td>Medical School instruction ends</td>
<td>Fri, Dec 15</td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Thurs-Fri, Nov 23-24</td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Mon-Tues, Dec 25-26</td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Fri-Mon, Dec 29-Jan 1</td>
</tr>
</tbody>
</table>

WINTER QUARTER 1990

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical School instruction begins</td>
<td>Mon, Jan 2</td>
</tr>
<tr>
<td>Medical School instruction begins</td>
<td>Mon, Mar 12</td>
</tr>
<tr>
<td>Medical School instruction ends</td>
<td>Wed, Mar 16</td>
</tr>
<tr>
<td>Medical School instruction ends</td>
<td>Fri, Mar 23</td>
</tr>
<tr>
<td>Medical School instruction ends</td>
<td>Mon, Jan 15</td>
</tr>
<tr>
<td>Medical School instruction ends</td>
<td>Mon, Feb 19</td>
</tr>
</tbody>
</table>

SPRING QUARTER 1990

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical School instruction begins</td>
<td>Tues, Mar 27</td>
</tr>
<tr>
<td>Medical School instruction begins</td>
<td>Mon, April 2</td>
</tr>
<tr>
<td>Medical School instruction ends</td>
<td>Tues, May 22</td>
</tr>
<tr>
<td>Medical School instruction ends</td>
<td>Thurs, June 7</td>
</tr>
<tr>
<td>Medical School instruction ends</td>
<td>Fri, June 8</td>
</tr>
<tr>
<td>Medical School instruction ends</td>
<td>Fri, June 15</td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Mon, Mar 26</td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Mon, May 28</td>
</tr>
</tbody>
</table>
School of Veterinary Medicine
The Doctor of Veterinary Medicine (D.V.M.) degree is granted upon completion of a course of study that usually requires six years. The final four years must be spent in the professional veterinary medical curriculum. Many 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 have completed 108 quarter units (72 semester units) in an accredited college or university before entering the School of Veterinary Medicine. Courses taken at other institutions may vary in units.

You should plan your pre-veterinary 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 (for example, computer science, agricultural economics, molecular and biochemical genetics) which will broaden their background in these areas. Some specialized areas include laboratory animal medicine, exotic animal medicine, public health, food animal practice, and biomedical research. Substantial experience with animals, which should include working with veterinarians, is required. This experience should entail more than having had family pets. The requirement can be fulfilled with 4 1/2 week-equivalents (180 hours) if it includes relevant experience with types of activities that give an appreciation and understanding of the profession of veterinary medicine. This should include experience with several animal species so as to understand the breadth of the profession. The Admission Committee will evaluate animal experience qualitatively. Evaluation of animal experience is derived from the application, narrative, and letters of evaluation. The experience requirement must be met in order to have an application evaluated by the Admission Committee.

Subject Requirements

<table>
<thead>
<tr>
<th>Quarter Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science courses</td>
</tr>
<tr>
<td>Lower Division</td>
</tr>
<tr>
<td>Chemistry (general, qualitative, organic, including laboratories)</td>
</tr>
<tr>
<td>Physics (general, no laboratory required)</td>
</tr>
<tr>
<td>Biology and Zoology (including laboratories)</td>
</tr>
<tr>
<td>Upper Division</td>
</tr>
<tr>
<td>Genetics (no laboratory required)</td>
</tr>
<tr>
<td>Embryology (no laboratory required)</td>
</tr>
</tbody>
</table>

English composition and additional English or Rhetoric .................................................. 12
Statistics ......................................................................................................................... 4
Humanities and/or Social Sciences ................................................................. 12

Total 74

Following is a list of courses taught on the UC Davis campus which fulfill the preceding subject requirements.

Units

<table>
<thead>
<tr>
<th>Lower Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1 ........................................... (5)</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 1C, 8A, 8B ................................ (5,5,5,3,3)</td>
</tr>
<tr>
<td>Physics 1A, 1B ....................................................... (3,3)</td>
</tr>
<tr>
<td>Zoology 2-2L .......................................................... (4,2)</td>
</tr>
<tr>
<td>English 1 and additional English or Rhetoric and Communication ................................ (4,4)</td>
</tr>
<tr>
<td>Statistics 13 or Agricultural Science and Management 150 ....................................... (4,4)</td>
</tr>
<tr>
<td>Humanities and/or Social Sciences ........................................................................ (4,4)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Upper Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genetics 100 ........................................................ (4)</td>
</tr>
<tr>
<td>Zoology 100 ............................................................. (4)</td>
</tr>
</tbody>
</table>

Total 74

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. Applications may be obtained any time after July 1 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, accompanied by a non-refundable application fee of $35 must be received by this office no later than November 1. All applicants are required to take the General Aptitude (including Analytical) and Subject Test in Biology of the Graduate Record Examination (GRE). GRE SCORES RECEIVED FROM THE NOVEMBER ADMINISTRATION OR LATER ADMINISTRATIONS FOR THE YEAR THE APPLICATION IS FILED WILL NOT BE ACCEPTED FOR CONSIDERATION. Applications for the examinations and additional information may be obtained from the Educational Testing Service, Box 23470, Oakland, CA 94623-0470.

The GRE must be taken within the five-year period prior to the time the application is submitted. The highest scores will be used when the GRE is taken more than once.

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.

Applicants with disadvantaged backgrounds (cultural, economic, social, educational, disabled, and other factors) are encouraged to apply to the Veterinary Medical Opportunity Program (VMOP). For further information and advising services, contact the Director of Student Affirmative Action by writing to the office of the Associate Dean—Student Services or by calling (916) 752-1806.
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 two years of undergraduate studies. The scores from the Graduate Record Examination are included in the evaluation of your academic record. The principal nonacademic criteria are your narrative statement, letters of evaluation, and personal interview. 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 2.50 in both the required science units and the cumulative undergraduate work.

Since scholastic achievement in the required science courses is a very important criterion for admission to the School, the Passed/Not Passed option should be avoided.

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.

Admission to first-year places in the Doctor of Veterinary Medicine curriculum will no longer be limited to California residents and to residents of states participating in the Western Interstate Commission of Higher Education (WICHE). A small number of uniquely qualified applicants who are not California residents may be admitted as nonresidents. For information related to the WICHE program, write to the Western Interstate Commission for Higher Education, Post Office Drawer P, Boulder, CO 80302. The criteria for determining residency are explained in the Statement of Legal Residence in the Appendix. Specific questions should be addressed to the Legal Analyst—Residence Matters, 590 University Hall, University of California, Berkeley, CA 94720. No other persons are qualified to give rulings on residency.

Any applicant applying for admission to the School of Veterinary Medicine from a state other than California, must enclose with his or her application, course descriptions of all required courses. This may be accomplished by sending current school catalogs or by copying relevant course descriptions from school catalogs.

In addition, applicants who have received part or all of their education in a country other than the United States must include: 1) a certified English version of their college transcripts; and 2) if English is their second language, official scores from the Test of English as a Foreign Language (TOEFL) examination taken within the five-year period prior to the time the application is submitted.

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 the Bachelor's Degree Requirements section in this catalog), 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
- Complete the bachelor's degree requirements in one of the colleges or schools of the University of California or at another accredited college or university
- 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 for candidacy to the Master of Preventive Veterinary Medicine (MPVM) degree program must have completed the Doctorate in Veterinary Medicine or the equivalent; final admission decisions rest with the Admissions Committee, MPVM program. An option should be selected from the four listed below at the time of application. Completed application materials must be submitted no later than ninety days prior to the quarter of planned enrollment. Application forms can be requested from the Coordinator, MPVM Program, School of Veterinary Medicine, University of California, Davis, CA 95616.

Candidates for the MPVM degree must satisfactorily complete a total of 50 units of coursework while in residence. This includes 28 units of core required coursework, 10 units of research in a field appropriate to the chosen option, and additional units of approved elective courses. One requirement of the MPVM program is to complete a research study which culminates in a written report and oral presentation. A committee, consisting of three faculty members, reviews each paper for acceptability and assigns an appropriate grade.

The degree program extends over a minimum of twelve months to a maximum of two years. Students who intend to complete the program in one calendar year must enroll in August unless they have recently completed and performed satisfactorily in a statistics course that has been approved by the MPVM Graduate Adviser and the Epidemiology and Preventive Medicine 400 instructor at the time of the student's acceptance into the program. Students meeting this requirement may enroll at the beginning of the Fall Quarter in late September. Students who intend to remain in the program for more than one year may enroll in the optimal course sequencing, but arrival in August is recommended.

Four options offered under the MPVM Program permit students to select an area of study that best identifies their individual interests and needs. The options and advisers are as follows:

1. Epidemiology and Herd Health Management
   (statistics, epidemiology, animal health economics, and disease control)
   Adviser: D. W. Hird

2. Veterinary Public Health
   (veterinary medicine applied to food safety and zoonoses)
   Adviser: C. Gentile

3. Laboratory Services
   (roles of diagnostic laboratories in animal disease surveillance and disease control)
   Adviser: K. M. Lam

4. Veterinary Programs Administration
   (administration of programs for control of animal diseases, veterinary laboratories, research, or educational veterinary service)
   Adviser: C. W. Schwabe

Inquiries regarding the program should be directed to the Coordinator, MPVM Program, 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 on the Davis campus. Additional detailed information may be obtained by writing the chairperson of the department in which you wish to study.
Programs and Courses
COURSE DESIGNATIONS

The Class Schedule and Room Directory, available several weeks before the beginning of each quarter, gives class hours and room numbers, changes to the General Catalog, and the most up-to-date information on registration and enrollment procedures. A supplement with changes to the General Catalog and the Class Schedule and Room Directory is available for Fall Quarter.

Here is a sample of how a course is listed in this catalog.

Top Line:
course number;  
title;  
units;  
quarters offered;  
instructor(s) (1)  
credit;  
workload;  
grade if other than letter grading.

Paragraph:  
Seminars—1 hour. Presentation and discussion of current topics in international agricultural development by visiting lecturers, staff, and students. May be repeated for credit. (R/P grading only.)

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 1989 would be an odd-numbered year and Winter and Spring Quarters 1990 would be even-numbered years.

A series of course numbers followed by two or three letters (for example, Animal Science 49A-49B-49C) is continued through three successive quarters, ordinarily from September to June. The first quarter course listed this way is a 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 160A and 160B), the A course is not a prerequisite to B, unless it is specifically mentioned in the list of prerequisites.

PREREQUISITES

Prerequisites for courses should be noted carefully; the responsibility for meeting these requirements rests mainly on the student. If you can demonstrate that your preparation is equivalent to that specified by the prerequisites, the instructor may waive these requirements for you. However, a prerequisite that requires that you complete 84 units before enrolling may not be waived.

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 Academic Information section for enrollment procedures) include:

- 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., 1AT-A1ATB-1ATC, 31ATS, 31ATB.

California Articulation Number (CAN) System. UC Davis participates in the CAN System. This system uses a common number to identify some of the transferable, lower division, introductory courses commonly taught within each academic discipline on California college campuses. The system assures students that CAN courses on one participating campus will be accepted "in lieu of" the comparable CAN courses on another participating campus. For example: CAN Economics 2 on one campus will be accepted for CAN Economics 2 on another participating campus. Each campus, however, retains its own numbering system.

In this catalog, the CAN designator is found at the end of the course description of each approved CAN course (e.g., CAN Anth 2, CAN Econ 1A).

For additional information contact the Relations with Schools/EOP Outreach Office, (916) 752-1099.

*Courses in the School of Law:
I. refers to Fall Semester (August - December)
II. refers to Spring Semester (January - May)
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 Academic Information section 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 84 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 97T 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 requiring adequate background in the subject proposed for study as well as prior completion of 84 units.

Autotutorial Courses can also be upper division courses (see under Lower Division Courses). Such courses would read, e.g., 105AT, 119AT, 141AT.

Research Conference Courses are courses in which advanced undergraduate students may participate in critical discussions of staff research activities. These one-unit courses are numbered 190C and are graded on a Passed/Not Passed basis.

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 290C courses and variable-unit 299 or 299D courses is Satisfactory/Unsatisfactory.

PROFESSIONAL COURSES FOR TEACHERS AND NURSE PRACTITIONERS

Courses numbered 300-399 are (1) teacher-training courses in the Division of Education and in other departments and are especially intended for teachers or prospective teachers. Included are courses designed to provide instruction to teaching assistants. (2) Also included are courses for certification of family nurse practitioners and physician assistants. These courses are open only to students enrolled in those programs.

OTHER PROFESSIONAL COURSES

Courses numbered 400-499 are professional training courses. Graduate students should consult their faculty adviser or contact the Graduate Division before enrolling in 400 series courses to determine if graduate credit may be awarded for the course in question (also note the dagger (†) footnote in prerequisites).

Note: Undergraduates should refer to their college's section regarding any restrictions on degree credit for courses in the 200, 300, or 400 series.

KEY TO FOOTNOTE SYMBOLS

The following symbols are used throughout the Majors and Courses section to indicate:

* Not to be given 1989/90

† Approved for graduate degree credit

1 Absent on leave, 1989/90

2 Absent on leave, Fall Quarter 1989 (Semester, for Law School)

3 Absent on leave, Winter Quarter 1990

4 Absent on leave, Spring Quarter 1990 (Semester, for Law School)

5 In residence at President's Office (University 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. A Supplement to the Class Schedule and Room Directory and General Catalog is published for Fall Quarter.
Afro-American Studies

15. Introduction to Afro-American Humanities (4) I. The Staff Lecture—4 hours. Introduction to Afro-American cultural tradition as it evolved from West Africa to the Caribbean, South America and North America via slavery. Offered in odd-numbered years.

80. Introduction to Black Politics (4) I. Thompson Lecture—4 hours. Introduction to the analysis of Afro-American politics, using conceptual frameworks from political science and other social sciences.

69. 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

100. Survey of Ethnicity in the U.S. (4) II. The Staff Lecture—4 hours. The history, culture, philosophy, and current problems of groups of African descent in the United States as viewed by the groups themselves. General Education credit: Contemporary Societies/Non-Introductory. Recommended: GE preparation: Anthropology 2 or Sociology 2.

101. Introduction to Research in the Afro-American Community (4) II. Thompson Lecture—4 hours. Prerequisite: course 10 or consent of instructor. Introductory survey of Afro-American Studies methods and techniques; problem and methodology in Afro-American Studies.

107. African Cultural Heritage in the Americas (4) III. The Staff Lecture—4 hours. Prerequisite: course 110 or consent of instructor. Analysis of African cultural systems as they adapted to the slave regimes in the antebellum and their adaptive mechanisms in the postbellum Americas.

110. West African Social Organization (4) III. The Staff Lecture—4 hours. Prerequisite: course 110 or consent of instructor. Ecology, population, social organization, and survival culture of West Africa in the pre-colonial, colonial, and post-colonial periods.

120. Afro-America: Pre-Emanicipation (4) I. Thompson Lecture—4 hours. Prerequisite: course 10 or consent of instructor. Ecology, social organization, and survival culture of Afro-America. Historical and comparative study of Afro-American populations in relation to other groups.

121. Afro-America: Post-Emanicipation (4) III. Thompson Lecture—4 hours. Prerequisite: course 120 or consent of instructor. Analysis of contemporary Afro-American adaptations and social organizations within the United States.

123. The Black Female Experience in Contemporary Society (4) III. The Staff Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Black female social, intellectual, and psychological development. Black women’s contributions in history, literature, and social science: life experiences of Black women and philosophical underpinnings of the feminist movement. Offered in even-numbered years.

133. The Black Family in America (4) III. The Staff Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Analysis of social research to examine relationships between Black family structures, patterns of functioning, and Black economic and social conditions. Examination of role differentiation within families by race and class. General Education credit: Contemporary Societies/Non-Introductory. Recommended: GE preparation: Anthropology 2. Offered in odd-numbered years.

145A. Black Social and Political Thought (4) III. Thompson Lecture—4 hours. Prerequisite: course 10 or 80, or consent of instructor. Exploration and analysis of Black social and political thought in the Americas.

145B. Black Intellectuals (4) III. Thompson Lecture—4 hours. Prerequisite: course 10, 145A, or consent of instructor. Prerequisite: critical analysis of select theoretical writings of Black intellectuals, and especially political and social thinkers, in the Americas.

150A. The Afro-American Visual Arts Tradition: A Historical and Cultural Study (4) I. The Staff Lecture—4 hours. Prerequisite: upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from 1600 to Reconstruction.

150B. The Afro-American Visual Arts Tradition: A Historical and Cultural Study (4) II. The Staff Lecture—4 hours. Prerequisite: upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from 1600 to Reconstruction.

197. Tutoring in Afro-American Studies (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of major committee: upper division standing with major in Afro-American Studies. Leading of small voluntary discussion groups affiliated with one of the department’s regular courses. May be repeated for credit for a total of 6 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) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Agrarian Studies

(College of Agricultural and Environmental Sciences)

The Major Program

Agrarian Studies is a multidisciplinary program designed for students who seek the "broad-view" and are challenged by the scientific, philosophical, and cultural concepts important to an understanding of agriculture and its relationship to man. Through a purposeful integration of the sciences and humanities, the major provides a sound general education important for effective leadership in agriculture and in many agriculturally or environmentally 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 complementary courses or, for those who qualify, by the Senior Honors Thesis.

Agrarian Studies

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

Social Sciences and Humanities ............................................ 50
Written and oral expression (see College requirement) ............ 8
Cultural anthropology or geography (Anthropology 2 or Geography 2-23) 4
Philosophy of biological sciences (Philosophy 105 or 106) ........... 4
Introduction to economics (Economics 1A, 1B, Agricultural Economics 120) 14
Restrictive Electives .......................................................... 20
Additional courses selected in consultation with advisor and from 2 or more of the following fields: agricultural economics, American studies, anthropology, classics, cognition, geography, history, languages, political science, metric, sociology.

Natural Sciences ................................................................. 61-63
Chemistry (Chemistry 1A, 1B, 8A, 8B) .................................... 16
Biochemistry (Biochemistry 101A, 101B) ................................. 6
upper division plant or animal physiology ................................ 6
Mathematics (Mathematics 16A plus two of the following: Mathematics 16B, Agricultural Science and Management 21, 150, Computer Science Engineering 30) 10-11
Soil science (Soil Science 100) ............................................. 4
Ecology (Plant Science 101 or Environmental Studies 100) ........ 4
Biological sciences (Biological Sciences 1 plus Botany 2 or Zoology 2 or Microbiology 2 or additional electives) 9-10
Restricted electives ............................................................ 12
Additional courses in 2 or more fields of science fundamentals, pursuits, e.g., biochemistry, botany, genetics, microbiology, nutrition, and

Proficiency in a foreign language is contributory to a general education and specifically useful to an understanding of various aspects of agricultural and rural society. Students specializing in the agricultural sciences are encouraged to choose French, German, Japanese, or Russian; those interested in agricultural education could well choose Greek or Latin; students preparing for international aspects of agriculture or "agribusiness" would have obvious choices based on geographical interests.

NOTE: For key to footnote symbols, see page 131.
Agrarian Studies Emphasis .................................................. 20
Perspectives on agriculture (Agrarian Studies 2) .................................. 4
Geography of agriculture (Geography 142) .................................. 4
Food and culture (Food Science and Technology 20) ......................... 4
History of U.S. agriculture (History 188A, 188B) ......................... 8
Agricultural Specialization .................................................. 30
Major field ................................................................. 18
Courses chosen to provide depth of understanding in one of the following or closely allied fields: animal sciences, food sciences, plant sciences, resource sciences, international agricultural development.

Complementary field ...................................................... 12
Senior Honors Thesis (Agrarian Studies 188H) OR closely related courses in either the natural sciences (e.g., botany, physiology, soil and water science, etc.) or the social sciences (e.g., agricultural economics, anthropology, geography, political science, etc.) chosen specifically to enhance understanding of agriculture in a scientific or a cultural context.

Unrestricted Electives ...................................................... 17-19
Total Units for the Major .................................................. 180

Major Adviser: R. J. Romani (Pomology).

Courses in Agrarian Studies

Questions pertaining to the following courses should be directed to the instructor or to the Pomology Department, 1035 Wickson Hall.

Lower Division Course

2. Perspectives on Agriculture (Agrarian Studies 4) II. Romani Lecture—3 hours; discussion—1 hour (alternate weeks); one-all-day field trip. Prerequisite: introductory course in the chemical or biological sciences recommended. Introduction to agrarian studies, exploring agriculture's vital role in past civilizations and in current societies. A review of important connections between agriculture and the natural and social sciences. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Botany 10.

Upper Division Course

188. Special Topic In Agrarian Studies (Agrarian Studies 1) II. Romani Discussion—1 hour. Prerequisite: course 2 or consent of instructor; open to lower division students. Group study of special topics in the relationships between agriculture and the arts and sciences. May be repeated for credit.

188H. Senior Honors Thesis (Agrarian Studies 2-6) II, III. Romani Independent study—2-6 hours; thesis. Prerequisite: Agrarian Studies 1. General GPA of 3.25 or higher: consent of master adviser. Two or three successive quarters of guided, scientific and/or scholarly research on an agriculturally-related subject of special interest to the student. (P/NP grading only.) (Deferred grading only, pending completion of thesis.)

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. An undergraduate program leading to a bachelor of science degree in Agricultural Education, for graduate study refer to the Graduate Division section in this catalog.


Courses in Agricultural and Home Economics Education

Questions pertaining to the following courses should be directed to the instructor or to the Department of Applied Behavioral Sciences, Advising Center, 101 Academic Office Building-4.

Lower Division Course

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Field placement—3-36 hours. Prerequisite: lower division standing; consent of instructor. Supervised internships off and on campus in areas of agricultural education. (P/NP grading only.)

Upper Division Courses

100. Concepts in Education (2) I. Pershing, Goldman; II. Leising, Varrella Lecture—2 hours; field observations. Prerequisite: upper division standing. Examination of educational institutions. Implications for those entering careers in teaching. (Sec. 1, Agriculture; Sec. 2, Home Economics.)

160. Vocational Education (3) II. Leising Lecture—3 hours. Philosophy and organization of vocational education, with particular reference to educational principles for agriculture, commerce, home economics and industry.


171. Audio Visual Communications (2) I, II. Pershing Discussion—1 hour; laboratory—3 hours. Concepts and principles of audio-visual communications related to education. (P/NP grading only.)

172. Multi-Media Productions (3) III. Pershing Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171 and consent of instructor. Theory and application of producing multi-media educational programs.

180. Consumer Education (3) III. The Staff (Goldman in charge) Lecture—3 hours. Prerequisite: Agricultural Economics 141 or 142 or Consumer Science 100. Examination 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 levels. Offered in odd-numbered years.

190. Seminar in Agricultural Education (2) I, II, III. The Staff Discussion—2 hours. Discussion of selected topics in agricultural education. May be repeated for credit with consent of instructor. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Field placement—3-36 hours. Prerequisite: upper division standing; consent of instructor. Supervised internships off and on campus in areas of agricultural education. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The 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.)

Professional Courses

300. Directed Field Experience in Teaching (2) II. Goldman, Pershing; III. Leising, Varrella 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. (Sec. 1, Agriculture; Sec. 2, Home Economics.)

301. Planning for Instructional Programs (3) III. Leising Lecture—3 hours; discussions—2 hours. Prerequisite: course 100. 300 and 301. Development of teaching strategies, with special emphasis on the designing of learning experiences, instructional execution, teaching aids. (Sec. 1, Agriculture; Sec. 2, Home Economics.)

306A. Field Experience with Future Farmers of America and Supervised Experience Programs (4) I. Leising Lecture-discussion—2 hours; field work—6 hours. Prerequisite: acceptance into the Teacher Education Program; course 306B (concurrently). Develop an understanding of the Future Farmers of America and supervised occupational experience programs through planning, conducting, and evaluating actual programs.

306B. Field Experience in Teaching Vocational Agriculture (5-18) I. Leising Lecture—5 hours; field work—18 hours. Prerequisite: acceptance into the Teacher Education Program; course 306A (concurrently): courses 100, 300, 301, 302. 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. Goldman Student teaching (corresponds with public school session). Prerequisite: acceptance into Teacher Education Program; course 306A (concurrently). Courses 100, 300, 301, 302. Supervised teaching in secondary school or community college agricultural or home economics programs. (Deferred grading only, pending completion of course.)

322. Resource Development: Agricultural Education (3) II. Leising

NOTE: For key to footnote symbols, see page 131.
Agricultural and Managerial Economics (College of Agricultural and Environmental Sciences)

The Major Program

The major in Agricultural and Managerial Economics is designed for students planning careers or graduate study in the field of applied economics. Preparatory courses are intended to equip students for upper division coursework, while breadth subject matter gives them the opportunity to broaden their academic horizons. Depth subject matter provides an analytical framework and tools suitable for analysis of the economic behavior of consumers, firms, and markets. Options within the major permit students detailed examination of areas of interest, with emphasis on theoretical and quantitative analysis.

Each student must specialize in at least one of three options: Agricultural Economics, which focuses on topics related to the production and marketing of foods and fibers; Consumer Economics, which focuses on issues related to decision-making, protection, and welfare; or Managerial Economics, which focuses on topics related to evaluating, financing, and managing business activities.

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.

QUANT METHODS, AGRICULTURAL ECONOMICS 105, 155
ECON 101 OR 135

(a) Agricultural Economics

At least 15 units must be from Agricultural Economics 120, 130, 131, 140, 145, 150, 160. The remaining 15 units must be selected from upper division courses in Agricultural Economics and/or Economics.

(b) Consumer Economics

At least 15 units must be from Consumer Economics 118A, 130, 141M, 142, 143, Consumer Science 100, 105. The remaining 15 units must be from the aforementioned courses or from Agricultural Economics 120, Applied Behavioral Sciences 171, Economics 121A, 121B, 125A, 126B, Environmental Studies 100, 128B, 136, 150A, 150B, 151A, 151B, 156A, 166B, Environmental Toxicology 101, 128A, 136, Political Science 100, 174.

(c) Managerial Economics


Breadth Subject Matter (see undergraduate handbook in Department Advising Office for complete list of courses) 40

Unrestricted Electives 40-48

Total Units for the Major 188

Advising Center for the major is located in University House Annex (752-6185).

Major Adviser: S. H. Sosnick (Agricultural Economics).

Graduate Study. See the Graduate Division section in this catalog.

Courses in Agricultural Economics

Lower Division Courses

1. Economic Basis of the Agricultural Industry (4) I. Learn Lecture—4 hours. Agriculture and man; the agricultural industry in U.S. and world economies; production, marketing and demand; agriculture land, capital and labor markets; economic and social problems of agriculture in urban and industrialized society emphasizing California.

2. Business Law (4) I, II. Allocasias; summer. Lecture—4 hours. Preparatory: sophomore standing. General principles of business law in the areas of contracts, business organization, real property, partnership and corporation; sales, commercial paper, employment regulations, and creditor-debtor against a background of the history and functioning of our present legal system.

3. 49A, 49B, 49C. Field Practice (1) I, II, III. Stausat Discussion—1 hour; three field trips. Preparatory: 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.)

4. Directed Group Study (1-3) I, II, III. The Staff (Chairperson in charge). Preparatory: consent of instructor. (P/NP grading only.)

5. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). Preparatory: consent of instructor. (P/NP grading only.)

Upper Division Courses

103A, Intermediate Microeconomics: Theory of Production and Consumption (4) I. King; II. Curtiss; III. Hefland Lecture—3 hours; discussion—1 hour. Preparatory: Economic 11A, 1B; Mathematics 116B. Theory of individual consumer and market demand; theory of production and supply of agricultural products, with particular reference to the individual firm; pricing, output determination, and employment of resources under pure competition. (Not open for credit

NOTE: For key to footnote symbols, see page 131.
Agricultural Economics

135

3 units of credit, so must enroll for course 141M. General Education Credit: Contemporary Societies/Non-Introductory. Recommended for students planning to take GM-intensive introductory course sequence Economics 1A-1B.

141M. Consumers and the Market (3) I. Heien Lecture—4 hours. Prerequisite: Economics 1A. Principles of consumer behavior; consumer demand theory; utility theory; and the effects of its performance on consumers. Agencies aiding and protecting consumers, sources of information available to consumers, consumer decision facilitating, plans for taking courses 100A, Economics 100, or the equivalent must enroll for this 3-unit course instead of course 141.

142M. The Production and Distribution of Goods and Services (3). I. Butler; Ill. Shepard Lecture—3 hours. Prerequisite: Economics 1B. Management of income and expenditures by the household; use of consumer credit; consumer protection; analytical methods of time, retirement, and estate planning. (Same course as Consumer Economics 142.)

143. Investments (3) II. Shepard Lecture—3 hours. Prerequisite: Agricultural Economics/ Consumer Economics 142 or consent of instructor. Survey of investment institutions, sources of investment information, and portfolio analysis. Analysis of the stock, bond and real estate markets from the perspective of the investor.

144. Farm and Rural Resources Appraisal (4) III. Johnston; Ill. House Lecture—4 hours; laboratory—3 hours; field trip. Principles of farm and ranch appraisal; land utilization in relation to problems of development and operation. Real estate instruments and surveying. (Same course as Consumer Economics 144.)

147. Natural Resource Economics (4) II. Herrfeldt Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A; enrollment open to non-majors only. Natural resource use problems and policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; economics, public policy use problems; resource use problems; and public policy issues. (Students who have had or are taking course Economics 100A, or the equivalent, may enroll in this course.)

147M. Natural Resource Economics (2) II. Herrfeldt Lecture—2 hours; discussion—1 hour. Prerequisite: Economics 1A; enrollment open to non-majors only. Natural resource use problems with emphasis on past and current policies affecting the use of the market and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights, conservation; private and public resource-use problems; and public issues. (Students who have had or are taking course Economics 100A, 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. Rochlin Lecture—3 hours. Prerequisite: Economics 1A and 1B; Mathematics 16A recommended. Relation of resources to economic growth; regional development; planning economic development with particular emphasis on resource use in agriculture; regional and national planning by both centralised and decentralised governments.

150. Agricultural Labor (4) I. Martin Lecture—3 hours; discussion—1 hour. Importance of family and hired labor in agriculture; farm labor market; unions and collective bargaining. California agriculture: simulation exercises; collective bargaining; effects of unionism on farm wages and earnings.

155. Quantitative Analysis for Business Decisions (4) I. Cuduto; II. Paris; Ill. Green Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A and Statistics 103. Introduction to selected topics in management science and operations research: decision analysis for management, mathematical programming, competitive analysis, and other.

157. Analysis for Production Management (4) III. Carman Lecture—4 hours. Prerequisite: course 100A; Statistics 103. Application of economic theory and quantitative methods in analyzing production systems in agriculture, including inventory control, production scheduling, quality control, simulation, systems approach, and work measurement.

168. Economics of Energy (4) II. Wise Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B of the equivalent; introductory course in calculus recommended. The role of energy in agriculture. Energy in agriculture. Energy issues. Topics include: cressnet economics, cressnet behavior, exploration and development, economic of alternative energy sources, and the role of energy in agriculture. Offered in even-numbered yrs. (Same course as Environmental Studies 169.)

171A. Financial Management of the Farm (4) I. Hazlett Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 11A-11B, and course 106. Financial analysis at the farm level: methods of depreciation, influence of the tax structure, inventory, cash, and accounts receivable manage-

ment; interest of short-term and long-term financing, and financial problem solving using a computer spreadsheet program. Students who have taken Economics 154 may not receive credit for this course.

171B. Financial Management of the Firm (4) I. Hazlett Lecture—3 hours; discussion—1 hour. Prerequisite: course 171A. Financial analysis of the firm: nature of capital budgeting; calculating the cost of capital; dividend policies; mergers and acquisitions; and special current topics in finance.

176. Economic Analysis in Resource Use (3) III. Larson Lecture—3 hours. Prerequisite: course 100A. Analytical treatment of resource allocation and scarcity in the presence of public policy issues, economic productivity and natural resources; demand, principles, and patterns of natural resource use; resource management. (Equivalent to resource economics 200.)

180. Agricultural Production Economics (4) II, Burt Lecture—3 hours; discussion—1 hour. Prerequisite: courses 106, 115; senior standing. Application of theory and quantitative methods to risk and uncertainty as they relate to production response, investment decisions, enterprise comparison, machine scheduling, crop insurance and government programs.

190A. Senior Research Project (2) II. Lecture—1 hour; discussion—1 hour. Prerequisite: course 100A and Statistics 103, or consent of instructor; senior standing. Individual student research project conducted under faculty guidance. Problem definition, study objectives, procedure, method of analysis, working outline, and final report or paper written to be completed in the first quarter. (Deadline graded only, pending completion of sequence.)

190B. Senior Research Project (2) II. 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 terminated and resubmitted by the student prior to the end of 190B. (Deadline graded only, pending completion of sequence.)

192. Internship (1-6). I, II, III. Summer. The Staff (Chairperson in charge of Internships) Laboratory—3-16 hours. Internship experience off campus in all subject areas offered in the Department of Agricultural Economics, 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.) Prerequisites: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-9) I, II, III. The Staff (Chairperson in charge.) Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200A. Microeconomics Theory (5) II. Innes Lecture—4 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics/200, Mathematics 16A-16B, or consent of instructor. Theories of behavior of individual economic agents. Characteristics of market equilibrium in perfectly competitive, monopolistic, and oligopolistic markets. (Same course as Economics 200A.)

200B. Microeconomics Theory (5) III. Helms (Economics) Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Consistent of intermediate microeconomic theory of welfare economics in a general equilibrium, linear economic models, externalities and market failure, social welfare func-

200C. Microeconomics Theory (4) III. Makowicki (Economics) Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A, 200B. Further topics in microeconomics, including risk and uncertainty, capital and growth, research project con-

200D. Microeconomics Theory (4) III. Makowicki (Economics) Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A, 200B. Further topics in microeconomics, including risk and uncertainty, capital and growth, research project con-

200E. Optimization in Economics (5) I. Roemer (Economics) Lecture—4 hours; discussion—1 hour. Prerequisite: Economics 200A. Elements of optimization for economic analysis: linear algebra, applications to systems of linear equations; multivariate analysis; linear and nonlinear programming. (Same course as Economics 200E.)

200F. Microeconomics Analysis (5) I. Hazlett Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A or courses 100A-100B and Mathematics 16A.

NOTE: For key to footnote symbols, see page 131.
Agricultural Education

See Agricultural Education; and Agricultural and Home Economics Education

Agricultural Education
(College of Agricultural and Environmental Sciences)

The Major Program

The Agricultural Education major serves those interested in teaching agricultural sciences in high schools or community 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 preparing for a position in educational administration are set. The 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.

UNITS
Preparatory Subject Matter .................. 58-63
Biological Sciences .......................... 17-19
Biological Sciences 1; Genetics 10 or 100; one of two from Botany 2, Zoology 2, Microbiology 2-3, Physiology 110.
Chemistry 1A-1B, and 4A-48 or 122A-128B ...................................................... 16 Mathematics and statistics, Mathematics 16A or 21A, and Agricultural Science and Management 150 or Statistics 13 ...................................................... 7-8 Computer Science, Agricultural Science and Management 2 ...................................................... 3 English 1 or 3 and 102 or 103. Rhetoric and Communication 1 or 2 ...................... 11-12 Economics 1A or 1B ...................................................... 5 Depth Subject Matter .................. 43-51

NOTE: For key to footnote symbols, see page 131.
Agricultural Engineering Technology

(College of Agricultural and Environmental Sciences)

Faculty

Norman B. Akeyson, M.S., Professor Emeritus
Roy Bainier, M.S., Professor Emeritus
William J. Chancellor, Ph.D., Professor
Pictlaw (Paul) Chen, Ph.D., Professor
Michael J. Delwiche, Ph.D., Associate Professor
Alferog E. Garrett, D. D., Professor
D. Ken Giles, Ph.D., Assistant Professor
John R. Goss, M.S., Professor Emeritus
Mark E. Grismer, Ph.D., Assistant Professor
George R. Hanna, M.Ed., Lecturer Emeritus
Bruce R. Hartsough, Ph.D., Assistant Professor
S. Milton Henderson, M.S., Sc.D., Professor Emeritus
David R. Hillis, Ph.D., Professor
Bryan M. Jenkins, Ph.D., Associate Professor

Robert A. Kepner, B.S., Professor Emeritus
John M. Krochta, Ph.D., Professor
Coby Longright, Ph.D., Professor Emeritus
Kathryn McCarthy, Ph.D., Assistant Professor
Michael J. McCarthy, Ph.D., Assistant Professor
R. Larry Merson, Ph.D., Professor
John A. Mills, Ph.D., Professor Emeritus
Stanton R. Morrison, Ph.D., Professor Emeritus
Loren W. Neubauer, Ph.D., Professor Emeritus
Michael O'Brien, Ph.D., Professor Emeritus
Raul H. Piccolroza, Ph.D., Assistant Professor
James W. Rumsey, M.S., Assistant Professor
Thomas R. Rumsey, Ph.D., Associate Professor
R. Paul Singh, Ph.D., Professor
Henry E. Studer, M.S., Professor Emeritus
Shivkasa V. Upadhyaya, Ph.D., Associate Professor
Wesley W. Wallender, Ph.D., Associate Professor
Wesley E. Yates, M.S., Professor Emeritus

Courses. Courses are listed under Agricultural Engineering Technology (below), Consumer Technology, and Engineering: Agricultural.

Agricultural Engineering Technology

(200 units credit)

Faculty. See under Department of Agricultural Engineering.

Major Programs and Graduate Study. For the Bachelor of Science program see the major in Engineering; for graduate study see the Graduate Division section in this catalog.

Courses in Agricultural Engineering Technology

These courses are intended primarily for students not majoring in Engineering. Majors in Engineering should refer to courses in Engineering: Agricultural. Questions pertaining to the following courses should be directed to the instructor or the Department Office, 203 Bailer Hall.

Lower Division Courses

15. Plane Surveying (3) III

Lecture—2 hours; laboratory—3 hours. Prerequisite: plane trigonometry. Not open to students in engineering. Principles of measurement of horizontal distances, horizontal and vertical angles, elevations and differential levels, including stadia methods. Field problems with special reference to agricultural, forestry and landscaping applications.

98. Directed Group Study (1-5) I, II, III
The Staff (Staff in charge).

Special Study for Lower Division Students (1-5) I, II, III
The Staff (Staff in charge).

Upper Division Courses

101AT. Field Production Mechanization (1 I, II, III, Studens Tutorial). Prerequisite: Physics 1A or 1A, course 105 (may be taken concurrently). Orchard, vineyard and small fruit production machinery. Functions, capabilities and operating principles. (P/NP grading only.)

102. Farm Tractors (1 I, II, III, Chancellor). Rumsey, J. Study. Prerequisite: Physics 1A or 1A, course 105 (may be taken concurrently). Types of farm tractors, operating principles, power transmission components, power-take-off drives, implement hitches and controls, traction and drawbar power, operator safety, comfort and conveniences. (P/NP grading only.)

103. Hydraulic Power and Controls (1 I) Studer
Lecture-laboratory—2 hours. Prerequisite: upper division standing; Physics 6A. Principles of operation and construction of hydraulic systems. Function and application of pumps, motors, and valves for controlling machines.

104AT. Field Machinery (1 I, II, III, J. Rumsey
Lecture-discussion—1 hour. Prerequisite: Agricultural Practices 49, or concurrent enrollment in one of the following: course 101AT, 102AT, 104AT, Agricultural Practices 49; or consent of instructor. Farm machinery performance, selection, scheduling and maintenance as affected by technical features, costs and operator abilities, as well as by crop, soil and weather characteristics. Discussion of technical information from accompanying tutorial or practice courses to management principles.

110. Experiments in Food Engineering (1 I, S. Singh
Lecture—2 hours (first five weeks of quarter). Prerequisite: Animal Sciences 2 or consent of instructor. Animal energetics; heat and vapor transmission in buildings; psychrometrics; ventilation; hot-water protection. Environmental considerations affecting the choice of animal shelter.

113. Animal Environment and Shelters (1 I, Studier
Lecture—2 hours (first five weeks of quarter). Prerequisite: Animal Sciences 2 or consent of instructor. Animal energetics; heat and vapor transmission in buildings; psychrometrics; ventilation; hot-water protection. Environmental considerations affecting the choice of animal shelter.

114. Greenhouse Environment and Equipment (1 I, Studier
Lecture—2 hours (last five weeks of quarter). Prerequisite: Plant Science 2 or Botany 2. Study of shelters and equipment providing a suitable environment for plant growth: temperature and humidity regulation; energy conservation, lighting.

134. Pesticide Application Techniques (1 I, S. Giles
Lecture—1 hour. Prerequisite: upper division standing, Chemistry 1B, introductory course in environmental toxicology, and Physics 1A or 8A or 1A; introductory course in endocrinology, botany, plant pathology or nematology recommended. Emphasis will be on safe application of pesticides. Requirements of closed mixing and handling systems to protect workers. Disposal of pesticide materials. Selection and operation of ground and aerial spray application systems. Techniques to minimize spray drift hazards.

141. Technology for Agriculture in Developing Regions (3) I. Chancellor
Lecture—2 hours; laboratory-discussion—2 hours. Prerequisite: Physics 1A or 1A. Basic design, installation, and operation principles of irrigation systems for tropical agriculture, man- and, engine-powered devices. Energy requirements and costs, support infrastructure, development, and productivity potential. (Same course as International Agricultural Development 141.)

141AT. Equipment Technology for Developing Agriculture (1 I, II, I. Chancellor
Lecture—2 hours. Prerequisite: course 141 or International Agricultural Development 141 (may be taken concurrently). Autotrol (slide-tape) presentation of machinery, irrigation, and marine equipment technology applications, operation, and maintenance. (P/NP grading only.)

143. Turf and Landscape Irrigation (2 I, H. Higa
Lecture—2 hours. Prerequisite: Physics 1A or 8A. Basic design, installation, and operation principles of irrigation systems for turf and landscape: golf courses, parks, highways, public buildings, etc. Course emphasis is on hardware associated with sprinkler and drip irrigation systems.

152. Alternative Energy Applications in Agriculture (2 I, B. Jenkins, T. Rumsey
Lecture—2 hours. Prerequisite: Chemistry 1B and Physics 1A recommended. Alternative energy sources: solar radiation; energy production from biomass by anaerobic digestion, fermentation and gasification; utilization of methane, ethanol, and producer gas from these processes. Practical systems for collecting, converting, storing, and using the energy for agricultural purposes.

161A. Fundamentals of Aquacultural Engineering (3) I. Piedrahita
Lecture—3 hours. Prerequisite: Biological Sciences 1I, Mathematics 86B, Chemistry 1B. Basic principles of water chemistry and water treatment processes as they relate to aquatic systems.

161B. Fundamentals of Aquacultural Engineering (3) I. Piedrahita
Lecture—3 hours. Prerequisite: course 86A. Design of aquatic systems: system methodology, principles of fluid mechanics, site selection and facility planning, management operations, computer modeling.
Agricultural Practices

138 Agricultural Practices

192. Internship in Agricultural Engineering Technology (1-5)
I, II, III. The Staff (Student in charge)
Work-team experience—3-15 hours. Prerequisites: upper division standing; approval of project prior to period of internship. Supervised work experience in agricultural engineering technology. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Student in charge)
Prerequisites: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Student in charge) (P/NP grading only.)

Graduate Courses

233. Agricultural Chemical Application Technology (3) III. G. R. Smith
Lecture—2 hours; laboratory—3 hours. Prerequisites: Plant Protection and Pest Management 202A. Principles and theory of safe and efficient application of pesticides by aerial and terrestrial equipment. Theory, design, selection and operation of nozzles, pumps, and spray systems. Selection of application techniques to minimize spray drift. Closed systems for safe mixing and loading of toxic chemical materials.

296. Group Study (1-5) I, II, III. The Staff (Student in charge)

299. Research (1-12) I, II, III. The Staff (Student in charge) (S/U grading only)

Professional Course

317. Teaching Agricultural Mechanics (3) II, J. R. Rumsey
Lecture—1 hour; laboratory—3 hours; farm paper. Prerequisite: a course in physics, 6 units related to agricultural mechanics or a related field. How to teach practical mechanics in Agricultural Education Teacher Credential Program. Methods of teaching agricultural mechanics in secondary schools. Curriculum planning. Development of teaching materials and teaching aids. Review of subject matter. Safety-planning facilities including selection, arrangement and management of tools, equipment and teaching materials.

Agricultural Practices

Courses in Agricultural Practices

Questions pertaining to the following courses should be directed to the instructor or to the Office of the Department of Agricultural Engineering, 2030 Baler Hall.

Lower Division Course

48. Field Equipment Operation (2) I, II, J. R. Rumsey
Lecture—1 hour; laboratory—3 hours. Operation, adjustment and repair of farm tractors and equipment. Principles of operation, equipment terminology and use of tilling, cultivating, thinning and planting equipment. Typical cultural practices sequences. (P/NP grading only.)

Upper Division Course

148. Field Equipment Maintenance (2) II, J. R. Rumsey
Lecture—1 hour; laboratory—3 hours. Prerequisite: Consumer Technology 15 and 101 or consent of instructor. Trouble shooting and major repair of farm equipment. Intermediate welding to include hardfacing and inert gas welding. Class projects on maintenance, repair and fabrication. (P/NP grading only.)

Agricultural Science and Management

The Major Program

The Agricultural Science and Management major is designed to prepare students for career opportunities on farms and ranches, in land management, and in agricultural and food industries. The program provides a core of science and technology necessary for the understanding of how agricultural and food systems work, along with basic elements of economics, business, and management. Students may select from among several options allowing concentration of their agricultural science and technology courses in a degree program in computing sciences serves as an appropriate complement to this major.

Agricultural Science and Management

B.S. Major Requirements:

For convenience in program planning, the usual courses taken for specific requirements are shown in parentheses. Equal courses are acceptable; and a more comprehensive course treatment (e.g., Physics 1A and 1B rather than 1A only) will be useful for some. Students should consider using some portion of their unrestricted elective units to go beyond the minimum requirements shown for the Preparatory and Deep Subject Matter areas.

Prerequisites Subject Matter

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>General biological sciences (Biological Sciences 1, plus for Animal Science and Range Science options)</td>
<td>20</td>
</tr>
<tr>
<td>Zoology 251</td>
<td>8</td>
</tr>
<tr>
<td>Animal Science 2; for Food Science option, two courses from Microbiology 23, Botany 2 or Zoology 251; for Plant Science option, Botany 2)</td>
<td>10-19</td>
</tr>
<tr>
<td>Physical science (Chemistry 1A, 6A, 8A, 6B, plus for Food Science option, Physics 6A; for Plant Science option, Physics 1A, 1B)</td>
<td>16-22</td>
</tr>
<tr>
<td>Mathematics (Mathematics 16A-16B and Agricultural Economics and Management 150)</td>
<td>10</td>
</tr>
<tr>
<td>Economics (Economics 1A, 1B, 11A, 11B)</td>
<td>18</td>
</tr>
</tbody>
</table>

Breath Subject Matter

English, two courses from English 1, 3, 20, 103; or one course from the previous list and one from English 104, Comparative Literature 1, 2, 3, Philosophy 6, 10 and Rhetoric and Communication 1, 7 (Not more than 4 units advanced placement credit allowed toward degree).

General Education requirement (see General Education section in this catalog)

Business Management

<table>
<thead>
<tr>
<th>Business Management</th>
<th>18-21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plus three courses covering three additional topics in economics and business management, such as: marketing (Agricultural Economics 113, 130, 136); finance (Agricultural Economics 118A, 118B, 145, 171A, 171B); business systems (Agricultural Economics 155, 157); and business organization (Agricultural Economics 123)</td>
<td>9-12</td>
</tr>
</tbody>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>50</th>
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</thead>
<tbody>
<tr>
<td>Four options are offered, each with 50 units of courses. Students should consult with an advisor before beginning work in one of these options to ensure that the course pattern and preparatory subject matter are chosen to best suit the student's objectives. Variations on these options can be developed with the approval of the faculty advisor.</td>
<td></td>
</tr>
</tbody>
</table>

Animal Science option

Genetics 100, Animal Genetics 187
Nurtion 115
Physiology 110
Animal science 20


Restricted electives

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Courses to support student's objectives chosen with advisor's approval from the following or other areas: agricultural engineering technology; agronomy; plant science; range management; soil science; and water science; Plant Science 2 or Agronomy 100; computer science (Agricultural Science and Management 21) recommended.</td>
<td></td>
</tr>
</tbody>
</table>

Food Science option

Biochemistry 101A, 101B
Chemistry 1C
Physics 6B

Food science and technology

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Science and Management 101, 104-105, 110A, 110B, and 10 additional units in food science and technology chosen with advisor's approval.</td>
<td></td>
</tr>
</tbody>
</table>

Plant Science option

Botany 111A, 111B, 120 c-121
Entomology 100-105L or 110
Genetics 100

Plant Pathology 120
Plant Science 2

Soil Science 100, 108
Water Science 110

Restricted electives

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>13-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional courses chosen with advisor's approval from agricultural engineering technology, Agricultural Science and Management 21, and upper division courses with concentration in agronomy, environmental horticulture, plant science, pomology, vegetable crops or viticulture.</td>
<td></td>
</tr>
</tbody>
</table>

Range Science option

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range Science 100, 133, 145, 160</td>
<td></td>
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<tr>
<td>Animal Science 41, 41L, 128</td>
<td></td>
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<tr>
<td>Agronomy 112</td>
<td></td>
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<tr>
<td>Nutrition 115</td>
<td></td>
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<tr>
<td>Botany 111A, 117</td>
<td></td>
</tr>
<tr>
<td>Soil Science 100</td>
<td></td>
</tr>
<tr>
<td>Resource Sciences 101</td>
<td></td>
</tr>
<tr>
<td>Agricultural Economics 140, 147</td>
<td></td>
</tr>
<tr>
<td>Agricultural Science and Management 21</td>
<td></td>
</tr>
</tbody>
</table>

Unrestricted Electives to bring total to 180 units.

Total Units for the Major

180


Advising Center for the major is located in 1149 Meyer Hall (752-6118); and peer advising is in 1139 Meyer Hall.

Graduate Study. Refer to the Graduate Division section in this catalog.

Courses in Agricultural Science and Management

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 132 Hunt Hall.

Lower Division Course

Lecture—2 hours; laboratory-discussion—2 hours. Prerequisite: high school algebra. Concepts of computing in an agricultural context; applications of microcomputers using BASIC, spreadsheets, database management, word processing and communications.

Upper Division Courses

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 21 or the equivalent experience. Strengths the development of modular algorithms embedded in FORTRAN to solve quantitative agricultural problems.

150. Applied Statistics in Agricultural Sciences (4) I. Geng (Agronomy and Range Science)
Lecture—3 hours; discussion-laboratory—2 hours. Applications of statistical methods to the analysis and interpretation of research data in plant, animal, behavioral, food and nutritional sciences. Lectures cover basic concepts and statistical methods. Specialized laboratory sections cover procedures, data processing and interpretations.
Agronomy
(College of Agricultural and Environmental Sciences)

Courses in Agronomy

Questions pertaining to the following courses should be directed to the Instructor or to the Advising Center, 132 Hunt Hall.

Lower Division Courses

92. Agronomy Internship (1-12) I, II, III, summer. The Staff (Department Chairperson in charge)
Laboratory—3 hours. Prerequisite: 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) III, Travis
Lecture—3 hours; discussion—1 hour. Prerequisite: a general course in biology or plant science. This course is designed to introduce students to crop production and agronomic problem solving using ecological, physiological, and genetic principles.

101. Principles of Agronomy Laboratory (1) III, Travis
Lecture—3 hours. Prerequisite: course 100 (may be taken concurrently). Field-oriented introduction to principles of agronomic crop production.

110. Perspectives in Biotechnology (3) II, Valentine
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 10 or Genetics 10. Current issues in biotechnology will be related to their impact on the biological sciences and society. Examples of genetic manipulation through transformation and transfer in agriculture and medicine will be stressed.

111. Cereal Crops of the World (4) III, Quislet
Lecture—3 hours; laboratory—3 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 on recent developments and scientific improvements.

113. Crop Ecology (3) III, Raguse
Lecture—3 hours. Prerequisite: Botany 2 or consent of instructor. Forages as a world resource in food production. Ecological principles governing the adaptation, establishment, growth and management of perennial and annual forages, including pastures, rangelands and hay; aspects of forage quality and its effect on feeding value to livestock. Offered in odd-numbered years.

115. Fiber, Oil and Sugar Crops in a Changing World (4) I, Iraire
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100, 100L; Botany 2. Industrial crops as world resources of food, fiber, and consumer goods. The relationship of crops to their physical and biotic environment; technological changes, socioeconomic and political forces that shape crop production, and utilization practices. Offered in odd-numbered years.

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 physiology. Techniques for morphological analysis of crop plant growth.

159. Internship (1-12) I, II, III, summer. The Staff (Department Chairperson in charge)
Laboratory—3 hours. Prerequisite: completion of 64 units and 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.)

197. Tutoring in Agronomy (1-5) I, II, III, The Staff (Chairperson in charge)
Tuturing—1-3 hours. Prerequisite: course to be tutored or the equivalent; upper division standing and consent of instructor. Designed for undergraduate students who desire teaching experience. Students assist in courses under the direction of the faculty. May be repeated for credit up to a total of 5 units. Some course may not be tutored more than one time. (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: 6 upper division units of agronomy. (P/NP grading only.)

Graduate Courses

205A. Design, Analysis and Interpretation (3) II, Plant
Lecture—3 hours. Prerequisite: Agrlultural Sciences and Management 150 or the equivalent; Agrlicultural Science and Management 21 recommended. Planning and analysis of field and laboratory experiments with emphasis on use of multiple regression, multivariate analysis, and dynamic simulation techniques in the biological interpretation of results.

207. Plant Population Biology (3) II, Rice, Jain
Lecture—2 hours; laboratory—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Studies 100, Zoology 125, Botany 117, or Entomology 110). Advanced undergraduate course in genetics and evolution (e.g., Genetics 100, 103, or Botany 10). Provides entry-level graduate students and advanced undergraduates with introduction to both theoretical and empirical research in plant population biology. Emphasis will be placed on linking ecological and genetic approaches to plant population biology. Offered in odd-numbered years. (Same course as Ecology 207.)

221. Advanced Plant Breeding (4) III, Teuber
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 205A, Genetics 150, and Plant Science 113. Philosophical methods and problems in developing improved plant species. Topics include: breeding, heterosis, progeny testing, breeding methods, index selection, pedigree conservation, and breeding for stress. Laboratories include tours of breeding facilities and calculation and interpretation of quantitative data.

222. Quantitative Genetics and Plant Improvement (4) II, The Staff
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, The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: course 222 or consent of instructor. Theory and application of selection to plant populations for improvement of quantitative characteristics. Statistical genetic analysis of quantitative characters, methods for obtaining maximum efficiency in plant breeding schemes. Offered in odd-numbered years.

224. Chromosome Evolution (3) I, Dvorak
Lecture—3 hours. Prerequisite: Genetics 100 or the equivalent. Structure and function of chromosomes. Dynamics of their evolution at the molecular and structural levels. Offered in odd-numbered years.

225. Plant Genetics (4) I, Gape
Lecture—3 hours; discussion—1 hour. Prerequisite: Genetics 100 or the equivalent; basic genetics, algebra and calculus. Pedigree analysis; inheritance of Mendelian traits in higher plants. Analysis of nuclear and organellar genomes; repro- ductive system segregation, recombination, and linkage of Mendelian traits; transposable elements; sporephore or gametophytes; and environmentally induced heritable variation.

226. Manipulation of Plant Chromosomes (3) I, Dvorak
Lecture—3 hours. Prerequisite: Genetics 100 or the equivalent. Application of chromosome manipulation in plant genetics and plant physiology. Development and utilization of genetic tools: gene mapping; analysis of genetic architecture of plant genomes, and interspecies gene transfer. Offered in even-numbered years.

232. Advanced Topics in the Physiology of Crop and Range Plants (3) III, The Staff
Lecture—3 hours. Prerequisite: Botany 118B or Plant Science 102. Physiological aspects of vegetative and reproductive growth of field crops and forage plants in relation to nitrogen utilization and photosynthesis.

NOTE: For key to footnote symbols, see page 131.
American Studies

(College of Letters and Science)
David Scofield Wilson, Ph.D., Program Director
Program Office, 816 Sproul Hall (762-3377)

Committees in Charge
Nicole W. Biggart, Ph.D. (Sociology)
Vincent A. Crockenberg, Ph.D., (Education)
Daniel J. Crowley, Ph.D. (Art, Anthropology)
Jay Mechling, Ph.D. (American Studies)
Michael Smith, Ph.D. (Psychology)
Robert Sommer, Ph.D. (Psychology), Chairperson
David Van Leer, Ph.D., (English)
Charles E. Walker, Ph.D. (History)
Deborah Weiner, Ph.D. (Art History)
David Scofield Wilson, Ph.D. (American Studies)

Faculty
Jay Mechling, Ph.D., Professor
David Scofield Wilson, Ph.D., Associate Professor

The Major Program
Students who choose the American Studies major are usually those who feel too limited by a departmental approach to American experience. American Studies lower division courses are an introduction to interdisciplinary study through attention to significant cultural themes, such as science and technology, gender images, or nature. American Studies features close contact between students and instructors, special attention to student writing, and the combination of classroom and fieldwork.

The major program offers the advanced student of American civilization some strategies for combining disciplines with the aim of describing and interpreting American cultural systems. The American Studies core courses provide the student the opportunity to conduct original research in the company of interdisciplinary teachers and students. The Integrative Skills Core equips students with the methods and techniques they will need in order to get the most out of their upper-division coursework for the major and to be able to undertake the senior research project that culminates the student's program of study. These skills include field-work techniques in natural cultural settings, principles and practices of the criticism of verbal materials, and principles and practice of the criticism of visual materials. The student also plans an upper-division emphasis in close consultation with an American Studies adviser, and undertakes a senior research project.

Career Alternatives. As an interdisciplinary program, 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 has meant that graduates 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 their internships in American institutions.

American Studies

A.B. Major Requirements:

Preparatory Subject Matter: One course from American Studies 1 series 4
American Studies 30: 3
American Studies 45: 4
Two courses chosen from History 17A, 17B, 72A, 72B: 8

Depth Subject Matter: 48
American Studies core courses: 20
American Studies 120, 140A, 140B, 190A-190B
Interpretable Skills core courses: 12
(a) Fieldwork: American Studies 301 (Sacramento Valley Studies)
(b) Criticism: Visual, choose one course from Comparative Literature 147 (theorizing visuality and criticism), English 110A (Introduction to principles of criticism, Rh 110A (Rhetorical criticism), Communication 120 (rhetorical criticism)
(c) Criticism: Visual, choose one course from Art 147 (theory and criticism of photography), Art 148 (theory and art of visual culture in the present), Rhetoric and Communication 143 (Media criticism: broadcast)

Emphasis: 16
in consultation with an American Studies advisor, the student designs a program of 16 units of upper division coursework with at least one subject matter in American civilization. The coursework should come from at least two disciplines.

Total Units for the Major: 56

Recommended
Completion of the College requirement in English composition before enrolling in American Studies 190A

Minor Program Requirements:

American Studies: 20
American Studies, upper division courses: 20
No more than 4 units of coursework at the 100-109 level counted toward this total.

Faculty Advisers: Jay Mechling, D. S. Wilson.
Teaching Credential Subject Representative: J. Mechling. See also the Teacher Education Program.

Courses in American Studies
Lower Division Courses

10A. Technology, Science and American Culture (4) L. Mechling. Lecture—2 hours; discussion—1 hour; short papers. American science and technology as cultural systems which define the natural world and man's relation to it; mutual influence and interaction of those systems and other cultural systems (arts, politics, social thought, religion, etc.). General Education credit: Contemporary Societies/Introduction.

18. Religion in American Lives (4) L. Wilson. Lecture—2 hours; discussion—1 hour; tutorials and field exercises. Examines ways Americans have ordered their lives with religion; how that-day-today churches, imported faiths, and individual culture differ or converge; attention to "civic religion" and mass-media evangelism; genres of religious experience, such as testimony, song, dance, ritual, meditation, vision, trance. General Education credit: Civilization and Culture/Introduction.

1E. Nature and Culture in America (4) L. Wilson. Lecture—3 hours; discussion—1 hour; tutorial conferences. A survey of a wide range of fields in America; Indian and non-Indian approaches to nature contrasted; attention to institutions and individuals (artists, scientists, naturalists, etc.); survival theory and practice; classwork, field study, directed independent projects, individual or collective.

1F. The Popular Image of Women in America (4) I. The Staff. Lecture—2 hours; discussion—1 hour; directed analysis of popular media. Lecture; media exposure; special projects. Examines the image of women as presented in popular media. Emphasis on the political gender roles and the connection between the popular feminine image and the demands of the larger American culture.

2. Forms of American Wisdom (2) I, II, III. Mechling. Wilson Lecture—1 hour; discussion—1 hour. Exploration of the forms wisdom takes in America—e.g., folk knowledge, prophetic scriptures, public religion, social attention to coming terms with today's social context. (PINP grading only.)

10. American Civilization (4) L. Mechling, Wilson Lecture—2 hours; discussion—2 hours. Intended for student not specializing in American Civilization of American society and culture from a variety of perspectives. Examples from American landscape, building, ritual, folklore, literature, and art.

30. Fieldwork in American Civilization II (5) I, II. The Staff. Lecture—1 hour; discussion—1 hour. Practical introduction to multidisciplinary techniques of gathering, organizing, and interpreting data. Emphasis on student participant observation, interviewing, above-ground archaeology, photographic anthropomology, and in the application of these techniques to the study of a literate, post-industrial civilization.

45. Introduction to American Studies (4) I. Wilson, Mechling Lecture—2 hours; discussion—2 hours; examination of written reports and conferences with individual students. Prerequisites: a course from the course 1 sequence, or Anthropology 2, or Sociology 2. The elements of American Studies will be introduced to the background and general nature of American Studies, and the methods and philosophies of the academic disciplines which deal with the United States. (No GE credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2 or Sociology 2.)

98. Directed Group Study (1-5) I, II, III. The Staff. (Chairperson in charge) Prerequisite: consent of instructor. Primary for lower division students. (PINP grading only.)

99. Individual Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PINP grading only.)

Upper Division Courses

101A. Special Topics (4) I, II, III. The Staff (Chairperson in charge) Seminar—3 hours, intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, assigned for non-majors as well as majors. Content will vary according to the instructor and in accord with the following titles: (A) Popular Culture Studies; (B) Women's Studies; (C) Material Aspects of American Culture; (D) American National Character; (E) American Lives through Autobiography; (F) American Participation between Arts and Ideas; (G) New Directions in American Culture Studies; (H) Problems in Cross-Cultural American Studies. May be repeated for credit in different subject area.

111. Sacramento Valley Studies (4) I. Wilson Lecture—2 hours; discussion—1 hour; fieldwork. Prerequisites: course 1 or 45 or Anthropology 2 recommended, or consent of instructor. A comparative study of the major cultures in the Graziano Valley, including their relationship to environment and physical, cultural, social environment, their interrelationships, and their relationships with the dominant American culture.

120. American Folklore and Folkfflifs (4) I. Mechling Lecture—3 hours; fieldwork—1 hour. The theory and method of the study of American folk traditions, including oral lore, customs, music, and material folk culture (arts, crafts, architecture, costume, food). Emphasis upon the collection, classification, and analysis of California and urban folk traditions. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Sociology 2.

125. Corporate Culture (4) I. Hargreaves Lecture—2 hours; discussion—1 hour; fieldwork—1 hour. Prerequisite: course 1 or course 30, 120, Anthropology 2, Psychology 18, or Sociology 1; consent of instructor. Exploration of the small group cultures of American corporate workplaces, including the role of environment, stories, jokes, rituals, ceremonies, personal style, and play. The effects of cultural diversity upon corporate cultures, both from within and in contact with other corporate cultures.

130. American Popular Culture (4) I. Mechling Lecture—discussion—3 hours; fieldwork and written reports. Prerequisite: course 1 or 45 or consent of instructor. American popular expression and contemporary culture, and the relationship between this system and elite folk cultures. Exploration of theories and methods for discovering and interpreting patterns of American popular culture. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: American Studies 45, Anthropology 2, or Sociology 2.

NOTE: For key to footnote symbols, see page 131.
Anatomy
See Anatomy (below); Human Anatomy (Medicine, School of)

Anatomy
(School of Veterinary Medicine)
Dallas M. Hyde, Ph.D., Chairperson of the Department
Department Office, 1321 Haring Hall (752-1174)

Faculty
George H. Cardinet III, D.V.M., Ph.D., Professor
Leslie J. Faulkin, Jr., Ph.D., Professor
Dallas M. Hyde, Ph.D., Professor
RALPH L. KETTLE, D.V.M., Ph.D., Professor
Kent P. Kipkinton, Ph.D., Assistant Adjunct Professor
Charles G. Plopper, Ph.D., Professor
Judith A. St. George, Ph.D., Assistant Adjunct Professor
Susan M. Stover, D.V.M., Ph.D., Assistant Professor

Fern Tablin, V.M.D., Ph.D., Assistant Professor
William Thuribeck, M.D., Adjunct Professor
Walter S. Tyler, D.V.M., Ph.D., Professor
Reen Wu, Ph.D., Associate Adjunct Professor

Courses in Anatomy
Upper Division Courses
100. Systemic Anatomy (2) I. Tyler and staff Lecture—2 hours; laboratory—3 hours. Prerequisite: course 100 (anatomy) and course 1000. Lecture describes the general anatomy of the dog and other species.
101. Systemic Anatomy Laboratory (2) I. Tyler and staff Laboratory—3 hours. Prerequisite: course 100 (anatomy) and course 1000. Lecture describes the general anatomy of the dog and other species.

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. Advanced Anatomy of the Forelimb (1) I. Hyde Lecture—12 hours total; discussion—6 two-hour sessions; laboratory—12 three-hour sessions. Prerequisite: graduate standing and consent of instructor; course 100. Gross and microscopic anatomy of the forelimb of the dog and human.
201B. Advanced Anatomy of the Head (1) I. Hyde Lecture—12 hours total; discussion—6 two-hour sessions; laboratory—12 three-hour sessions. Prerequisite: graduate standing and consent of instructor; course 100. Gross and microscopic anatomy of the forelimb of the dog and human.
201C. Advanced Anatomy of the Hindlimb (1) I. Hyde Lecture—12 hours total; discussion—6 two-hour sessions; laboratory—12 three-hour sessions. Prerequisite: graduate standing and consent of instructor; course 100. Detailed dissection of the hindlimb of the dog and human.
201D. Advanced Anatomy of the Thorax (1) I. Hyde Lecture—12 hours total; discussion—6 two-hour sessions; laboratory—12 three-hour sessions. Prerequisite: graduate standing and consent of instructor; course 100. Detailed dissection of the thorax and its contents of the dog and human.
201E. Advanced Anatomy of the Abdomen (1) I. Hyde Lecture—12 hours total; discussion—6 two-hour sessions; laboratory—7 three-hour sessions. Prerequisite: graduate standing and consent of instructor; course 100. Gross and microscopic anatomy of the abdomen and its contents of the dog and human.
201F. Advanced Anatomy of the Pelvis (1) I. Hyde Lecture—12 hours total; discussion—11 two-hour sessions; laboratory—8 three-hour sessions. Prerequisite: graduate standing and consent of instructor; course 100. Gross and microscopic anatomy of the pelvis and its contents of the dog and human.

202. Organology (2) I. II. The Staff (Chairperson in charge) Lecture—2 hours; laboratory—2 hours. Prerequisite: course 100 or 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. The electron microscopic appearance of cells, tissues, and organs of animals emphasizing the structural basis for their physiological functions. Offered in even-numbered years.

207. Perspectives in Morphological Research (3) I. II. The Staff (Wu, Tablet 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 stereology, computer analysis of images, scanning and transmission electron microscopy, histochemistry, autoradiography, rapid freezing, and vascular injection. Offered in odd-numbered years.

215. Veterinary Histology (4) II. The Staff (Faulkin in charge) Lecture—4 hours; laboratory—4 hours. Prerequisite: Zoology 2-3L. The microscopic anatomy of tissues and organs of mammals and avian species. Offered in odd-numbered years.

271. Neuronal Morphology of Domestic Animals (5) I. Kettle Lecture—33 hours total; discussion—8 two-hour sessions; laboratory—9 three-hour sessions. Prerequisite: graduate standing and consent of instructor. Integrated study of the central nervous system including gross and microscopic anatomy, neurophysiology, and neuroanatomical examination of domestic animals.

273. Tumor Biology (3) I. The Staff (Faulkin in charge) Lecture—4 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.

290. Seminar (1-5) I, II, III. The Staff (Chairperson in charge) Lecture—1 hour. (S/U grading only.)

291. Topics in Biology of Respiratory System (1) I, II, III. Tyler, Hyde, Plopper, S. George, Wu, Prkinton Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Topics concerning structure and function of respiratory system. Prerequisite: course 100. Topics include: breathing, pulmonary reaction to toxins, pulmonary inflammation, lung-associated disease, biology of lung cells, tracheobronchial epithelium, nasal cavity structure and function. May be repeated for credit. (S/U grading only.)

297. Advanced Group Study in Surgical Anatomy (2-4) I, II, III. The Staff (Chairperson in charge) Laboratory—9—12 hours. Prerequisite: Veterinary Medicine 407C or consent of instructor. Selected topics in topographical, regional, or gastrointestinal anatomy as they apply to the clinical sciences.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Laboratory—6—15 hours. Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—6—36 hours. Prerequisite: consent of instructor. (S/U grading only.)

Anesthesiology
See Medicine, School of

Animal Behavior (A Graduate Group)
Hugh Dingle, Ph.D., Chairperson of the Group
Group Office, 148 Young Hall (Psychology)
(752-1880/1855)

Faculty. The Group includes faculty from eleven departments in three schools and colleges.

Graduate Study. The Ph.D. program in Animal Behavior is an interdisciplinary program which trains students for teaching and research in a variety of areas including psychology, zoology, animal science, veterinary science, ecology, and wildlife biology. Students choose one of the three areas of specialization: (1) ethology and evolutionary bases of animal behavior; (2) physiological basis of animal behavior, and (3) behavior of domestic animals. All three specializations emphasize the adaptive and evolutionary bases of animal behavior. Resources available to students. In addition to various departmental facilities, include those of the California Primate Research Center and the Agricultural Field Stations.

There is an early application deadline of February 15 for Fall Quarter.

Preparation. Appropriate preparation is a bachelor's or master's degree in one of the several disciplines.
Animal Biochemistry

See Biochemistry; and Biochemistry and Biophysics

Animal Genetics

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Animal Science.

Major Program. See the major in Genetics.

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, 1149 Meyer Hall.

Upper Division Courses


Lecture—4 hours; laboratory—2 hours. Prerequisite: course 106 or the equivalent. Principles of quantitative genetics applied to improvement of livestock and poultry. Effects of mating systems and selection methods are emphasized with illustration from current breeding programs.


Lecture—3 hours. Prerequisite: course 107. Methods and procedures in quantitative animal breeding, including: expected value, animal and male parent selection, index restricted selection, empedored traits, genetic and environmental correlations, and best linear unbiased prediction.

109. Introduction to Parameter Estimation (3) I. Fumoto

Lecture—1 hour. Prerequisite: course 107 or the equivalent. Course 108 recommended. Procedures for estimation of reproductivity, heritability, and genetic and environmental correlations. Concept of expected value, estimation of variance components and the simulation of biological data.

110. Proseminar in Horse Genetics (1) I. Fumoto

Seminar—1 hour. Prerequisite: course 107. Animal Science 115, or consent of instructor. Selected topics presented by students on recent advances in the genetics of the horse. (P/NP grading only.)

111. Directed Group Study (1-5) I, II, III. The Staff (Bradford in charge)

Prerequisite: consent of instructor. Selected topics relating to animal genetics. (P/NP grading only.)

112. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Bradford in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

204. Theory of Quantitative Genetics (3) Gill

Lecture—3 hours. Prerequisite: course 106 or the equivalent. Theoretical basis of quantitative genetics and the consequences of Mendelian inheritance. Concepts used to estimate quantitative genetic differences and basis for partitioning the phenotypic variance. Offered in odd-numbered years.

205. Advanced Domestic Animal Breeding (3) I. Fumoto

Lecture—5 hours; laboratory—2 hours. Prerequisite: course 107 and Animal Science 205. Course 204 recommended. Procedures for the genetic evaluation of individuals to include selection indices and mixed model analysis for single and multitrait data. Methods of estimating genetic trends. Offered in even-numbered years.

207. Quantitative Genetics and Animal Breeding Theory (3) E. Alp habitat (Avian Sciences)

Lecture—2 hours; laboratory—2 hours. Prerequisite: Statistics 108 and 108A or 1301B and 1308B. Quantitative genetic theory, including inbreeding and crossing over systems, selection for cross performance, major quantitative genes, control populations, and is selected and applied to planning of breeding programs. Offered in even-numbered years.

208. Estimation Genetic Parameters (3) I. Touchberry (Animal Science)

Lecture—3 hours. Prerequisite: course 107 and Animal Science 205; courses 204 and 209 recommended. General methods for the estimation of components of variance and covariance and their application to the estimation of heritability, response to selection and genetic correlations are considered. Specific emphasis is given to procedures applicable to livestock populations under selection.

209. 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. Evaluation, utilization, conservation and exchange of animal germ plasm resources; exploitation of heterosis; selection programs in the absence of central data processing; population structure and rate of improvement; roles of governmental and group breeding schemes; research needs. (SU grading only.) Offered in odd-numbered years.

210. Group Study (1-5) I, II, III. The Staff (Bradford in charge)

Prerequisite: consent of instructor. Lectures and discussions of advanced topics in animal genetics. (SU grading only.)

211. Research in Animal Genetics (1-12) I, II, III. The Staff (Bradford in charge)

(SU grading only.)

Animal Nutrition

See Nutrition

Animal Physiology

(College of Agricultural and Environmental Sciences)

Verne E. Mendel, Ph.D., Chairperson of the Department

Department Office, 196 Briggs Hall (752-0223)

Faculty

Marylynn S. Barkley, Ph.D., Associate Professor

James B. Boda, Ph.D., Professor Emeritus

Earl E. Carters, Ph.D., Associate Professor

Harry W. Colvin, Jr., Ph.D., Professor

Perry T. Cuppa, Ph.D., Professor Emeritus

Charles A. Fuller, Ph.D., Associate Professor

Jack M. Goldberg, Ph.D., Associate Professor

John M. Horowitz, Jr., Ph.D., Professor

Barbara A. Horowitz, Ph.D., Professor

Andrew T. Ishida, Ph.D., Assistant Professor

Frederick W. Lorenz, Ph.D., Professor Emeritus

Verne E. Mendel, Ph.D., Professor

Gary P. Mobley, Ph.D., Professor

Frank X. Ogawara, Ph.D., Professor Emeritus

Pamela A. Pappone, Ph.D., Assistant Professor

Edward A. Rhodes, Ph.D., Professor

Grace L. Rosenquist, Ph.D., Assistant Adjunct Professor

Robert P. Scobey, Ph.D., Professor (Neurology)

Arnold J. Stillman, Ph.D., Professor Emeritus

Arthur H. Smith, Ph.D., Professor Emeritus

Linda R. Watkins, Ph.D., Professor

Jeffrey Weiden, Ph.D., Professor

Barry W. Wilson, Ph.D., Professor

Charles M. Winget, Ph.D., Lecturer

Dorothy E. Woollery, Ph.D., Professor

Courses. See the course listing under Physiology (Animal).
in aquaculture are advised by faculty members from this area of study.

An Animal Science option is available in the Agricultural Science and Management major. This option places greater emphasis on economics, business, and management than the Animal Science major.

Animal Science

B.S. Major Requirements:

Preparatory Subject Matter

<table>
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<th>Units</th>
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<td>35-54</td>
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General biological sciences: Biological Sciences 1, 2, 3, Zoology 1, or Botany 2

Physical sciences: Chemistry 1A, 1B, 1A, 1B, and
10 units of mathematics (equivalent to Mathematics 16A-16B), including statistics

Animal Sciences 1, 2, 41, and 41L

Depth Subject Matter

58-68

Physiological Sciences 101A-101B (Biochemistry 101A-101B may be substituted with consent of adviser)

Genetics, Genomes, and Evolutionary Biology 9

Nutrition, 110, and 115 or 124 (124 for Aquaculture option)

Physiology, Physiology of Animals and Wildlife and Fisheries Biology 121 (for Aquaculture option)

Laboratory, one course (4 units minimum)

Aquaculture option, one course from Animal Sciences 113, 114, 115, 116, 140, 160;

CR Aquaculture option, one course from Animal Sciences 113, 114, 115, 116, 118, 140, 160;
and at least 12 units from Animal Sciences 104, 105, 106, 120, 121L, 123, 124, 128, 131, 133, 135, Animal Genetics 108, 109, Nutrition 122, 122L, 123, 124, Physiology 121, 121L, 130, Agricultural Engineering Technology 161A, 161B;
and at least 12 units from Zoology 100, 100L, 112L-112L, 142, Wildlife and Fisheries Biology 151, 151L, Microbiology 177, 177L

Breath Subject Matter

20

Written and oral presentation (see College requirement)

General Education requirement (see General Education section in this catalog)

Additional social sciences and humanities

Unrestricted Electives

44-49

Faculty advisers assist students in selecting electives according to individual interests and objectives.

Chemistry 1C, Physics 1A, 1B, and Zoology 100 and additional English courses are recommended for completion of course requirements for application to School of Veterinary Medicine.

Total Units for the Major 180

Master Adviser, R.L. Baldwin

Advising Center for the major is located in 1149 Meyer Hall. 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. degree. Detailed information may be obtained by contacting the graduate adviser. See also the Graduate Division section in this catalog.

Graduate Adviser, C.C. Calvert.

Animal Science

Courses in Animal Science

Lower Division Courses

1. Domestic Animals and People (4) I. Brown


2. Introductory Animal Science (4) III. Berger

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1 and Biological Sciences 1 or 2. Introduction to feeding, nutrition, animal behavior, and animal production. The applications of scientific knowledge to animal production.

15. Introductory Horse Husbandry (3) II. Roser

Lecture—3 hours. Prerequisite: course 2 recommended. Introduction to care and use of light horses emphasizing the basic principles for selection of horses, responsibilities of ownership, recreational use and raising of foals.

21. Livestock and Dairy Cattle Judging (2) III. Van Leeuwen

Laboratory—6 hours. Prerequisite: course 1 or 2 recommended. Evaluation of type as presently applied to light horses, meat animals and dairy cattle. Relationship between form and function, form and carcass quality, and form and milk production.

22A-22B. Animal Judging (2-2) I-II. Van Leeuwen

Laboratory—6 hours; weekend field trips. Prerequisite: course 21. Prerequisite: consent of instructor. Study of the production and application of animals with emphasis on visual appraisal of conformation and its accurate description. Course is required for inter-collegiate judging competition. (P/NP grading only.)

41. Domestic Animal Production (2) I. DePeters

Lecture—2 hours. Prerequisite: courses 1 and 2. Principles of farm animal management, including dairy and beef cattle, sheep, and swine. Industry trends, general husbandry, nutrition, and reproduction.

41L. Domestic Animal Production Laboratory (2) II. DePeters

In (charge), Van Leeuwen

Laboratory—6 hours. Prerequisite: course 41 (may be taken concurrently). Animal production principles and practices, including field trips to dairy cattle, beef cattle, sheep and swine operations, and campus laboratories. (P/NP grading only.)


Discussion—1 hour; laboratory—3 hours. The application of the principles of elementary biology; the art and science of management and husbandry, dairy, goats, hogs, sheep, swine, and laboratory animals. (P/NP grading only.)

92. Internship in Animal Science (1-12) I, II, III

The Staff (Department Chairperson in charge)

Laboratory—3-18 hours. Prerequisite: consent of instructor. Work-learning experience off and on campus in dairy, livestock, and aquaculture production, research, and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of internship Approval Request Form must be met. (P/NP grading only.)

98. Directed Group Study (1-10) I, II, III

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (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

104. Principles of Domestic Animal Behavior (3) I. Price

Lecture—3 hours. Prerequisite: Biological Sciences 1 or Zoology 2 or the equivalent. To examine the basic principles of animal behavior as applied to domesticated species. Emphasis will be placed on behavior development and animal behavior. External (exogenous) and physiological mechanisms influencing behavior will be discussed. (Students who have received credit for Zoology 155 may receive only 2 units for this course.)

150. Behavioral Adaptations of Domestic Animals (2) I. Price

Lecture—2 hours. Prerequisite: course 104 or the equivalent. To explore an in-depth examination of the behavior of domestic animals and the role of behavior in management.

160. Domestic Animal Behavior Laboratory (2) II. Price

Laboratory—6 hours. Prerequisite: course 104 or the equivalent. Prerequisite: research experience with the behavior of large domestic animals. Experimental design, methods of data collection and analysis, and reporting of experimental results.

113. Principles of Swine Production (4) I. Berger, Calvert, Parker

NOTE: For key to footnote symbols, see page 131.
Carcasses as related to meat palatability, ante- and post-mortem handling, and, 135. Experimental Biochemistry Laboratory (4) I. Ashmore Lecture—2 hours; laboratory—2 hours. Prerequisite: course each in biochemistry and physiology; consent of instructor. Corequisite: 130. Animal Growth (4) I. Ashmore and 131. Experimental Biochemistry Laboratory (4) I. Ashmore, Lee. Bradford Lecture—2 hours; laboratory—2 hours. Prerequisite: consent of instructor. Corequisite: Application of experimental biochemistry and molecular biology techniques to the research on nutrition, metabolism, and development of livestock production. 136. Laboratory in Animal Science (2) I, II, III. The Staff (Chairperson in charge) Discussion—2 hours. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in the animals sciences. May be repeated for credit with approval of the staff. 137. Tutoring in Animal Science (1-2) I, II, III. The Staff (Chairperson in charge) Tutoring—1-2 hours. Prerequisite: Animal Science or related major; advanced standing; consent of instructor. Tutoring of students in lower division animal science courses; weekly conference with instructors in charge of courses; written critiques of teaching procedures. May be repeated once for credit. (P/NP grading only.) 138. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.) 139. 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 205. Computer Analysis of Biological Data (3) II. Favela Lecture—2 hours; laboratory—2 hours. Prerequisite: consent of instructor. Corequisite: a course in computer science. Analysis and displays of biological and ecological data; planning and execution of programs; computation of statistical parameters. 235. Advanced Techniques in Animal Nutrition Research (2) I, II, III. The Staff (Chairperson in charge) Lecture—1 hour; laboratory—3 hours. Prerequisite: graduate standing and consent of instructor. Application of advanced laboratory techniques to animal nutrition research; use of mechanistic models for experimental design and data analysis; surgical procedures necessary in nutrition research; review of current literature. May be repeated for credit when topics differ. (S/U grading only.) 290. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Reports and discussions of topics of interest in genetics, nutrition, and form and function as they apply to animal sciences. (S/U grading only.) 290C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour; prerequisite: graduate standing. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (S/U grading only.)
Two courses from Anthropology 101, 114, 117, 120, 121, 128, 129, 126, 127, 128, 129, 130, 131, 133, 135
One additional upper division Anthropology course

Teaching Credential Subject Representative. — See also the Teacher Education Program.

Graduate Study. The Department offers a program of study leading to the M.A. and Ph.D. degrees in Anthropology. Further information regarding graduate study may be obtained at the Department Office and at the Graduate Division.

Graduate Advisor. R.L. Bettinger.

Courses in Anthropology

Lower Division Courses

1. Human Evolutionary Biology (4) I. McHenry; II. Rodman; III. Norconk
   Lecture—3 hours; discussion—1 hour. Introduction to human evolution. 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 background. General Education credit: Nature and Environment/Introductions. (CAN 27)

2. Cultural Anthropology (4) I. Davis; II. Joseph; III. Curley
   Lecture—3 hours; discussion—1 hour. Introduction to cultural diversity and the methods used by anthropologists to account for it. Family relationships, kinship; religion; ethnicity, race, and social mores in a wide range of societies. Current problems in tribal and peasant societies. General Education credit: Contemporary Society/Politics. (CAN Anth 4)

3. Introduction to Archaeology (4) I. True
   Lecture—3 hours; discussion—1 hour. Development of archaeological practice and theory. (CAN Anth 4)

4. Introduction to Anthropological Linguistics (4) I. Wall
   Lecture—3 hours; discussion—1 hour. Exploration of the role of language in social interaction and world view, minority languages and their status in the society. Oral and written expression, the social motivation of language change. Introduction of analytical techniques of linguistics and demonstration of their relevance to language and cultural issues. General Education credit: Contemporary Societies/Introductions.

5. Preseminar in Biological Anthropology (4) II. Norconk
   Seminar—3 hours; term paper. Prerequisite: course 1 and consent of instructor. (CAN Anth 4)

15. Behavioral and Evolutionary Biology of the Human Life Cycle (5) I. The Staff; II. Norconk; III. Rodman
   Lecture—3 hours; discussion—1 hour. Term paper. Introduction to the biology of birth, childhood, marriage, the family, old age, and death. Examines comparative characteristics of nonhuman primates and other animals as well as cross-cultural variability in human behavior. General Education credit: Science and Environment/Introductions. (CAN 27)

23. Introduction to World Prehistory (4) III. Seaton
   Lecture—3 hours; discussion—1 hour. Broadly surveys patterns and changes in the human species' physical and cultural evolution from earliest evidence for "humanness" to recent development of large-scale complex societies or "civilizations." Lecture and laboratory course in archaeology reconstructing the past. General Education credit: Nature and Environment/Introductory.

25. Cross-Cultural Communication (4) II. Wall
   Lecture—3 hours; discussion—1 hour. Prerequisites: course 4 or 2 and Linguistics 1. Description and analysis of communicative behavior in multi-ethnic societies. Analysis and cross-cultural study of linguistic and nonlinguistic communication in face-to-face interaction. Language as a sociocultural resource. Conversation and more formal speech genres. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 4; or Anthropology 2 and Linguistics 1.

96. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
   Primarily intended 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.)

NOTE: For key to footnote symbols, see page 131.
146 Anthropology

us: case 2 or consent of instructor. Survey of anthropo-
logical theory and methodology. Prerequisite: consent of instructor. Comparative exploration of the "individual" in foraging, pastoral, agricultural, and industrial societies. Examination of class and state formation, ethnicity, poverty, ruralization, urbanization, economic and political change on the "individual." Offered in odd-numbered years. (Former course 196.)

121. Women and Development (4) J. Joseph Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Current world problems of cultural diversity and development issues concerning women in agriculture, industry, international division of labor, political movements, revolutions, politics of health, education, family and reproduction. Impact of colonialism, capitalism, the world economy, and the electronic age on women and development. Offered in even-numbered years.

136. Race and Sex: Race Mixture and Mixed Populations (4) J. Fordyce Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Current world problems of cultural diversity and development issues concerning women in agriculture, industry, international division of labor, political movements, revolutions, politics of health, education, family and reproduction. Impact of colonialism, capitalism, the world economy, and the electronic age on women and development. Offered in even-numbered years.

135. Peasant Society and Culture (4) J. Orlove Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative study of peasant communities, utilizing historical and ethnographic sources: analysis of urban-rural relationships and problems of economic development and change. Offered in odd-numbered years. (Former course 162.)

137. Theory in Social-Cultural Anthropology (4) J. Boyd Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative study of major theoretical orientations in social-cultural anthropology, including evolutionary, historical, functionalist, symbolic, and marxist approaches. Selected controversies are examined to clarify strengths and limitations of extant theories. (Former course 162.)

140A. Cultures and Societies of West and Central Africa (4) J. Curley Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Ethnographic survey of West Africa and Congo Basin with analysis of interactions, environmental factors, sociocultural changes, economic and political development. Offered in even-numbered years. (Former course 139A.)

140B. Cultures and Societies of East and South Africa (4) J. Curley Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Ethnographic survey of Eastern and Southern Africa with analyses of selected societies which illustrate problems of interethnic interaction, cultural change, and political development. Offered in odd-numbered years. (Former course 139B.)

141A. Indians of North America (4) J. Macri Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Introductory. Prerequisite courses of North America: origins, languages, civilizations, and history. (Former course 105A.)

141B. Native Americans in Contemporary Society (4) J. Siercom Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Current social, economic, and political problems of contemporary Native Americans. Offered in even-numbered years.

141C. Ethnology of California and the Great Basin (4) B. Gartner Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Introductory. Prerequisite courses: Native peoples of California and the Great Basin and their lifeways at the time of European contact. Offered in even-numbered years. (Former course 136.)

142. Peoples of the Middle East (4) J. Joseph Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Peoples of the Middle East (including North Africa). Discussion of class relations, kinship organization, sex/gender systems, religious beliefs and behavior, ethnic relations, political systems, impact of world systems, political and religious movements. Offered in odd-numbered years. (Former course 137.)

143. Ethnology of Southeast Asia (4) J. Davis, Yengoyan Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Introductory. Prerequisite courses: Patterns of culture and social organization from prehistory to the present in the context of historical, ecological, economic, and political settings. Emphasis on the relation of ethnic minorities to national states. Offered in odd-numbered years.

144. Contemporary Societies and Cultures of Latin America (4) J. Orlove Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Introduction to contemporary sociocultural structure of Latin America. Origins, maintenance and changes in inequality, economic organization, family and reproduction, responses to environment and time, racial and ethnic diversity, and cultural influences on political, social, and economic development. Offered in even-numbered years.

145. Colonialism and Ethnicity in the Caribbean (4) J. Orlove Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or Afro-American Studies 10. Examination of the contemporary situation and their diverse geography, history, and economic life, then showing how selected nations have attempted to solve the problems arising from ethnic diversity in nation-building. (Former course 140.)

147. Peoples of the Pacific (4) J. Boyd Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Ethnographic survey of aboriginal cultures of Oceania. Comparison of origins, prehistory, and traditional social organization of peoples of Polynesia, Micronesia, and Melanesia, and the political changes associated with colonialism and national independence.

148. Peoples of China (4) J. Wallacker Lecture—4 hours; discussion—2 hours. Prerequisite: course 2 or consent of instructor. Origins and development of Chinese culture in the context of the peoples of China proper and its neighboring lands. Comparisons with other high cultures are drawn to shed light on the problem of independent development versus diffusion. Offered even-numbered years. (Former course 195.)

149. Culture of Japan (4) J. Shimbamoto Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Development of Japanese cultural traditions; social organization; religion. Offered in even-numbered years. (Former course 191.)

151. Primate Evolution (4) J. McHenry Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Zoology 2. Origin and relationships of the primates, monkeys, apes, and humans. (Former course 103C.)


153. Human Biological Variation (4) I. Smith Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Zoology 2. Origin, adaptive significance and methods of analysis of genetic differences among human populations. Special attention will be given to the genetics of populations as those in blood groups, plasma proteins, red cell enzymes, physiology, morphology, pigmentation and dermatoglyphics. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Anthropology 1.

154A. The Evolution of Primate Behavior (5) J. Rodman Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1. Examines ecological diversity and evolution of social systems of primates, monkeys, and apes, and the social behavior of the primates in the context of appropriate ecological and evolutionary theories.

154B. Ecology and Sociobiology of Primates (4) J. McHenry Lecture—2 hours; laboratory—6 hours. Prerequisite: course 154A, Statistics 13 (or the equivalent), and consent of instructor. Continuation of course 154A for students wishing to specialize in methods of studying, describing and analyzing the ecology and sociobiology of primates. Laboratory consists of direct observation of living primates, with future participation in an applied or descriptive analysis of observations. Offered in even-numbered years.


156. Human Osteology (4) J. McHenry Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or the equivalent. Introductory study of the human skeleton, including bone growth, pathology, radiology, evolution, dentition, and variations in race, sex, and age. Offered in odd-numbered years.

157. Anthropological Genetics (3) J. Smith Lecture—3 hours. Prerequisite: course 1 or Biological Sciences 1, and Genetics 100, 105, or 106. Processes of genetic evolution resulting in biological differences among human populations. Special attention will be given to the adaptive significance of genetic variation in blood group antigens, serum proteins and red cell enzymes (hemoglobin), genetics of cytochrome (cytochrome oxidase, succinate dehydrogenase, ferritin, and acid phosphatase), immunodiffusion and immunoelectrophoresis on agarose. Offered in even-numbered years. (P/NP grading only)

158. The Evolution of Females and Males: Biological Per-

159. The Evolution of Females and Males: Biological Per-

160. The Evolution of Females and Males: Biological Per-

161. The Evolution of Females and Males: Biological Per-

162. The Evolution of Females and Males: Biological Per-

163. The Evolution of Females and Males: Biological Per-

164. The Evolution of Females and Males: Biological Per-

165. The Evolution of Females and Males: Biological Per-

166. The Evolution of Females and Males: Biological Per-

167. The Evolution of Females and Males: Biological Per-

168. The Evolution of Females and Males: Biological Per-

169. The Evolution of Females and Males: Biological Per-

170. Archaeological Theory and Method (4) J. Bettinger Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and 2. Introduction to history and development of archaeological theory and method, with particular emphasis on the basic dependence of archaeological thought on the historical development of archaeology in the New World. (Former course 153A.)

171. Archaeology and the Environment (4) J. Beaton Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Examines theoretical, methodological and practical considerations in reconstruction of environmental histories and their relevance in studies of the New World. General Education credit: Anthropology/Environmental. Offered in even-numbered years. (Former course 103B.)

172. New World Prehistory: The First Arrivals (4) I. True Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or 9. Prerequisite: consent of instructor. Chronology and prehistory of the peopling of the New World. Cultural adaptation and development of early inhabitants of North and South America. Offered in even-numbered years. (Former course 103C.)

NOTE: For key to footnote symbols, see page 131.
173. New World Prehistory: Archaic Adaptations (4) II, I, II, III. The Staff (Chairperson in charge)
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor; course 170 recommended. Introduction to prehistoric hunting and gathering adaptations across North America with particular emphasis on the East, Southeast, Midwest, Plains, Southwest, and Northwest. Offered in odd-numbered years. (Former course 103D.)

174. New World Prehistory: Formative Life-ways in North and South America (4) II, III. True 
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Transition from hunting and gathering subsistence to sedentary farming in the Americas. Consideration of the cultural and environmental adaptations to various ancient environments found on the North American continent. Offered in even-numbered years. (Former course 103E.)

175. New World Prehistory: The High Cultures Mesoamerican and Andean South America (4) II, I, II. True 
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Urban developments and the rise of civilization in Mexico and Peru. Offered in even-numbered years. (Former course 103F.)

176. Prehistory of California and the Great Basin (4) I, II. True 
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Description and analysis of the prehistoric peoples of California and the Great Basin from earliest times to European contact. Offered in odd-numbered years. (Former course 106A.)

177. Archaeology of the Pacific Rim (4) II. Beaton Lecture—3 hours; discussion—1 hour. Prerequisite: course 3, 23 or consent of instructor; course 170 recommended. Archaeological problems and evidence pertaining to human colonialism and indigenous adaptation to various environments found on the Pacific Rim. Explorations are sought for important trajectories, trends and discontinuities in Pacific Rim prehistory. Offered in odd-numbered years.

178. Hunter-Gatherers (4) III. Bettinger 

179. Ethnobiology (4) I. Bettinger 
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Relationships between human behavior and its sociocultural consequences. Ethnography by anthropologists examines residence patterns, site-formation processes, hunting/foraging behavior and other artifact creating activities and how these contribute to modern anthropological thinking. (Former course 193.)

180. Field Course in Archaeological Method (9) Summer. The Staff 
 Lecture—6 hours; daily field investigation. Prerequisite: course 3. On-site course in archaeological methods and techniques of excavation in the western United States, generally California or Nevada. Introduces basic methods of archaeological survey, mapping, and excavation. (Former course 190.)

183. Laboratory in Archaeological Analysis (4) III. Bettinger 
 Lecture—2 hours; laboratory—6 hours. Prerequisite: course 181 or consent of instructor. Museum preparation, advanced field investigation, and guidance in preparation of museum material for publication. May be repeated for credit with consent of instructor. Limited enrollment. Offered in even-numbered years. (Former course 180.)

184. Prehistoric Technology: The Material Aspects of Prehistoric Adaptation (4) II, I, II. True 
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Physical characteristics of lithic, ceramic, textile and wooden implements as elements in prehistoric survival and development. Emphasis is descriptive, but the significance of materials, techniques and tools in prehistoric settlement patterns, and culture change are discussed. Offered in even-numbered years.

(e) Special Study Courses

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Chairperson in charge)
 Prerequisite: open only to majors of standing senior who qualify for independent study of a research project involving the writing of an honors thesis. (P/NP grading only.)

219. Field Course in Linguistics (4) III. Omland 
 Lecture—2 hours; laboratory—1 hour. Prerequisite: courses 113, 115. Techniques of eliciting, recording, and analyzing work with a native speaker.

221. Rural Transformation in Postcolonial Societies (4) II. Orbay 
 Lecture—3 hours; seminar—1 hour. Prerequisite: courses 223, 285. Consent of instructor. Problems of rural transformation arising out political and economic interaction between central states and localities in Africa and Asia. Cross-listed with MEA 121.

222. Problems in Urban Anthropology (4) III. Johnson 
 Lecture—3 hours; seminar—1 hour. Prerequisite: consent of instructor. Study of the use of anthropology in the study of urban problems in the United States and other countries. Cross-listed with MEA 121.

223. Economic Anthropology (4) I. Davis 
 Lecture—3 hours; seminar—1 hour. Prerequisite: course 122 or consent of instructor. Recent current problems in the analysis of economic systems. Cross-listed with MEA 121.

224. Comparative Religion (4) I. Vengovan 
 Lecture—3 hours; seminar—1 hour. Prerequisite: course 124 or consent of instructor. Study of the use of anthropology in the study of religious systems in the United States and other countries. Cross-listed with MEA 121.

225. Problems in African Society and Culture (4) I. Curry 
 Lecture—3 hours; seminar—1 hour. Prerequisite: course 125 or consent of instructor. Study of the use of anthropology in the study of African culture and society. Cross-listed with MEA 121.

226. Problems in Afro-American Studies (4) III. Crowley 
 Lecture—3 hours; seminar—1 hour. Prerequisite: course 126 or consent of instructor. Study of the use of anthropology in the study of Afro-American culture and society. Cross-listed with MEA 121.
Applied Behavioral Sciences

(College of Agricultural and Environmental Sciences)
Michael P. Smith, Ph.D., Chairperson of the Department
Lawrence V. Harper, Ph.D., Vice Chairperson of the Department
Department Office, 106 Academic Office Building-4
Community Studies and Development (752-0770)
Human Development (752-0771)

Faculty
Curt Acredolo, Ph.D., Lecturer
J. Howard Adams, Ph.D., Professor Emeritus
Louise M. Bachtold, Ed.D., Professor Emeritus
Keith Barton, Ph.D., Professor
Edward J. Blakely, Ed.D., Professor
Marc Braverman, Ph.D., Lecturer
Stephen B. Brush, Ph.D., Associate Professor
Brenda K. Bryant, Ph.D., Professor
Carol A. Gabal, Ph.D., Professor
James Chisholm, Ph.D., Associate Professor
Susan Crockenberg, Ph.D., Professor
Noreen G. Dowling, Ph.D., Lecturer
Jack D. Forbes, Ph.D., Professor (Applied Behavioral Sciences, Anthropology)
Isao Fujimoto, M.A., Lecturer S.O.E.
Barbara G. Goldman, Ph.D., Lecturer and Supervisor of Teacher Education
James Grieshop, Ph.D., Lecturer
Lawrence V. Harper, Ph.D., Professor
Glenn R. Hawkes, Ph.D., Professor Emeritus
Sarah V. Hultzen, Ph.D., Lecturer Emeritus
Elwood M. Juergenson, Ph.D., Professor Emeritus
George Kagiwada, Ph.D., Associate Professor
Rosemarie Kraft, Ph.D., Associate Professor
James G. Leising, Ph.D., Lecturer and Supervisor of Teacher Education
Peter C.Y. Leung, M.S., Lecturer S.O.E.
George C. Longfish, M.F.A., Professor
David B. Lynn, Ph.D., Professor Emeritus
E. Dean MacCannell, Ph.D., Professor
Lorraine M. Looney, Ph.D., Lecturer
Robert W. Pershing, M.Ed., Lecturer
Marc Piliasuk, Ph.D., Professor
Ernesto Pollitt, Ph.D., Professor
David Rieling, M.A., Senior Lecturer S.O.E.
Michael P. Smith, Ph.D., Professor
Kay Jeanne Stockman, Ph.D., Lecturer
Orville E. Thompson, Ph.D., Professor Emeritus
Jane N. Welker, M.A., Senior Lecturer S.O.E.
Miriam J. Wells, Ph.D., Professor
Emmy E. Werner, Ph.D., Professor

The Major Program

The Applied Behavioral Sciences major provides a broad, comparative understanding of social science theories, methodologies, and issues relevant to the study of communities and the people in them. The program is concerned with the study of social organization and change, and with the ways that information can be used to solve social problems and improve quality of life. The major emphasizes the integration of theory and practical experience and features a perspective on learning that stresses self-development and critical thinking.

Two identifying features of the major are: (1) its interdisciplinary character, enabling students to bring together courses from different disciplines; and (2) its emphasis on viewing social problems in context, enabling students to master not only a circumscribed area of expertise but to understand the social setting in which the expertise will be applied.

Principal subjects of study within the major are: community and organizational development, social change processes, the role of culture and ethnicity in shaping community life, community research methodologies, the impacts of innovation and technology on community development, and the effects of social, economic, and political systems on communities and the people in them. In addition, the Applied Behavioral Sciences major includes a student designed concentration, and a requirement to fulfill the student's academic and career interests. Examples of recently approved areas of concentration are: Organizational Planning and Management, Aging and Community Development, Community Health Development, Community Mental Health, Community Development and the Asian American, Socio-Environmental Planning, and Community Education.

Applied Behavioral Sciences graduates are prepared for occupations in community and human services. Areas of employment have been in community development, social research, program evaluation, organizational and educational consulting, city and regional planning, and community health. The major provides effective preparation for graduate or professional study in the social and behavioral sciences.

Applied Behavioral Sciences

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>22-28</td>
</tr>
<tr>
<td>Introduction to Behavioral Science</td>
<td>4</td>
</tr>
<tr>
<td>Ethnicity and American communities</td>
<td>4</td>
</tr>
<tr>
<td>Introduction to social science theory</td>
<td>4</td>
</tr>
<tr>
<td>Economics 1</td>
<td>4</td>
</tr>
<tr>
<td>Statistics 13 or 32</td>
<td>3-4</td>
</tr>
<tr>
<td>Computer logic and operational science</td>
<td>2</td>
</tr>
<tr>
<td>Subject Matter</td>
<td>4</td>
</tr>
<tr>
<td>Written or oral expression</td>
<td>12</td>
</tr>
<tr>
<td>Science and mathematics</td>
<td>12</td>
</tr>
<tr>
<td>Humanities</td>
<td>8</td>
</tr>
<tr>
<td>Social sciences (choose from Anthropology, Economics, Political Science, Psychology, Sociology)</td>
<td>8</td>
</tr>
<tr>
<td>Methods for community research</td>
<td>12</td>
</tr>
<tr>
<td>Applied Behavioral Sciences</td>
<td>4</td>
</tr>
<tr>
<td>Social theory and community change</td>
<td>4</td>
</tr>
<tr>
<td>Applied Behavioral Sciences</td>
<td>4</td>
</tr>
<tr>
<td>Political processes and community change</td>
<td>4</td>
</tr>
<tr>
<td>Community development and transfer of knowledge</td>
<td>12</td>
</tr>
<tr>
<td>Evaluation of human service programs</td>
<td>4</td>
</tr>
<tr>
<td>Field of concentration</td>
<td>37</td>
</tr>
<tr>
<td>Additional upper division courses related to major, determined in consultation with faculty advisor</td>
<td>4</td>
</tr>
</tbody>
</table>

Other Requirements

In consultation with faculty and staff advisor, Applied Behavioral Sciences majors must develop a program of study which will comprise an area of specialization. Students must submit a written proposal for approval to be reviewed by a faculty committee. The department also requires satisfactory completion of a faculty supervised senior project.

Majors Adviser, E.D. MacCannell

Advising Center is located in 101 Academic Office Building-4 (752-2244).

Minor Program Requirements:

The Applied Behavioral Sciences faculty offers the following minor programs:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian American Studies</td>
<td>20</td>
</tr>
<tr>
<td>Asian American Studies 1 or 2, 100 or 110, and 101, 158, or 130</td>
<td>12</td>
</tr>
<tr>
<td>Two courses selected from the following in consultation with faculty advisor</td>
<td>8</td>
</tr>
<tr>
<td>Asian American Studies 111, 112, 150, Applied Behavioral Sciences 151, 152</td>
<td>8</td>
</tr>
</tbody>
</table>

Minor Adviser, G.R. Hawkes.

New major and minor programs in Asian American Studies in the College of Letters and Science are currently under development. The minor program will eventually replace the Asian American Studies minor in the College of Agricultural and Environmental Sciences. Students enrolled in the existing minor should check the Class Schedule and Room Directory for supplementary information about course offerings and minor program requirements.

Related Courses. See Environmental Studies 10, 101, 133.

Courses in Applied Behavioral Sciences

Lower Division Courses

1. The Community (4) I. MacCannell
   Lecture—4 hours. Basic concepts of community analysis and planned social change. The dynamics of community change through case studies of communities including peasant, urban ghetto, suburban marine and California farm workers

2. Ethnicity and American Communities (4) II. The Staff

17. Population and Community (2) I. II. Fujimoto
   Lecture—2 hours. Dynamics and challenges offered by de-
Applied Mathematics (A Graduate Group)

J. Blake Temple, Ph.D., Chairperson of the Group

Group Office, 551 Kerr Hall (752-8131)

Faculty. Consists of members from a variety of departments whose research interests are mathematically oriented. Departments represented include Biological Sciences, Chemistry, Computer Science, Economics, Electrical and Mechanical Engineering, Environmental Studies, Epidemiology and Preventive Medicine, Genetics, Land, Air and Water Resources, Management, Mathematics, Obstetrics and Gynecology, Statistics, and Wildlife and Fisheries Biology.

Graduate Study. Students prepare for careers relating to the application of mathematics to problems in the physical and life sciences, engineering, and management. The degree requirements consist of two years of rigorous training in applied mathematics followed by coursework and a research dissertation under the direction of a member of the Applied Mathematics Graduate Group. The M.S. degree provides preparation (1) for further study in applied mathematics or an application area, or (2) for a career in industry or public service. The Ph.D. degree provides preparation for a career in research and/or teaching. Areas of research in the program include differential equations, fluid mechanics, numerical analysis, operations research, systems theory, probability and stochastic processes, mathematical biology, and mathematical physics. Detailed information may be obtained by writing to the Graduate Coordinator, Department of Mathematics.

New applicants are admitted to the fall quarter only.

Preparation. The program encourages application from students who have prior training in engineering, physical and life sciences, mathematics, economics, and related fields. Applicants must have completed two years of undergraduate mathematics including linear algebra, differential equations, vector calculus and a rigorous course in advanced calculus is encouraged.

Graduate Advisers. A. M. Hastings (Mathematical Sciences); S. Whitaker (Chemical Engineering).

Applied Physics

See Physics

Aquaculture

See Animal Science; Agricultural Engineering Technology; and Wildlife and Fisheries Biology

Art

(College of Letters and Science)

Cornelia Schultz, M.F.A., Chairperson of the Department

Department Office, 111A Art Building (752-0105)

Art History

(Art History can be found immediately following Art Studio.)

Art Studio

Faculty

L. Price Amerson, Jr., Ph.D., Adjunct Lecturer
(Director, Nelson Gallery)
Squall Carthew, M.F.A., Associate Professor
Richard D. Cramer, M.F.A., Professor Emeritus
Roy DeForest, M.A., Professor
William Henderson, M.F.A., Professor
Harvey Himsworth, M.A., Professor
David Hollowell, M.F.A., Assistant Professor
Ralph M. Johnson, M.A., Professor Emeritus
Manuel J. Neti, Professor
Roland C. Peterson, M.A., Professor
Lucy A. Pulis, M.F.A., Assistant Professor
Irwin Rogoff, Ph.D., Assistant Professor
Cornelia Schultz, M.F.A., Associate Professor

The Major Program

Studio Art offers courses leading to the Bachelor of Arts degree. The program is composed of courses which provide knowledge and experience which are necessary to a broad understanding of the visual aspects of the humanities and provides a basis for further study and practice, leading to careers in the professions of artist, teacher and other aspects of the field of art.

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 overfull courses, requesting independent study courses, etc.

Transfer Students. Prior to enrolling in Art courses at Davis, ask your faculty advisor to evaluate transfer courses in art.

NOTE: For key to footnote symbols, see page 131.
Upper Division Courses

Note: Upper division courses are listed under three groups: (A) Practice of Art; (B) Theory and Criticism; (C) Special Study Courses.

Group A: Practice of Art

101. Painting: Materials and Carriers (4) I, II, III. Hollowell and staff. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Examination in media and their supports.

102. Painting (4) I, II, III. Hencvear, Schulz, Theibaud 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 once for credit with consent of instructor.

103. Advanced Drawing (4) I. Carmworth Laboratory—8 hours; to be arranged—4 hours. Prerequisite: courses 2, 3, 4, or consent of instructor. Advanced drawing: composition and form in black and white and color. May be repeated once for credit with consent of instructor.

104. Figure Drawing and Painting (4) I, II. Deforest, Theibaud Laboratory—12 hours. Prerequisite: courses 4 and 101, or consent of instructor. Advanced figure drawing and painting using the human figure as subject. May be repeated once for credit with consent of instructor.

110. Photography (4) I, II, III. Himmel, Petersen, and staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, or consent of instructor. Photography as an art form. Experiments with camera and light sensitive materials.

111. Photography (4) I, II. Himmel Laboratory—12 hours. Prerequisite: course 110 or consent of instructor. Art of camera and light sensitive materials: tonal control, multiple exposure, synthetic negatives, etc. May be repeated once for credit with consent of instructor.

115. Film-making (4) I. Henderson Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Film-making as an art form, sound and 16 mm movies. camera and sound track. May be repeated once for credit with consent of instructor.

121. Architectural Design (4) I. Cramer Laboratory—12 hours. Prerequisite: course 2, 3, 4, 5, or consent of instructor. Design and engineering. Small buildings as art forms, visualized in cardboard, balsa, or plastic models.

125. Printmaking and Relief (4) I. Petersen Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, or consent of instructor. Woodcut, linocut, metal-plate relief and experimental uses of other materials.

126. Printmaking and Intaglio (4) I, II. Petersen and staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Metal plate etching, aquatint, dry point, and soft-ground, burnish engraving and related methods. May be repeated once for credit with consent of instructor.

127. Printmaking and Lithography (4) I. DeForest Laboratory—12 hours. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Stone and metal-plate lithography and other printmaking methods. May be repeated once for credit with consent of instructor.

131. Sculpture: Non-Metal Materials (4) I, Pulis Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in compliant materials, e.g., wood, plaster, plastics, etc. May be repeated once for credit with consent of instructor.

142. Sculpture: Ceramics I (4) I, II. The Staff Laboratory—8 hours; to be arranged. Prerequisite: course 2, 3, 4, 5, or consent of instructor. Introduction to ceramic processes.

143. Sculpture: Ceramics II (4) I, II. Ammon Laboratory—8 hours; to be arranged. Prerequisite: course 142 or consent of instructor. Introduction to color, as well as glazing and use of kiln. May be repeated once for credit with consent of instructor.

144. Sculpture: Figure Modelling (4) II. Ner Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in various media using the human figure as subject. May be repeated once for credit with consent of instructor.

145. Sculpture: Concepts and Materials (4) II. Pulis Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2 and 5. Relationship between ideas and three-dimensional visual communication is explored in depth through the use of a variety of approaches and media. May be repeated once for credit with consent of instructor.

146. Sculpture: Ceramics III (4) III. Carmworth Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 141, 143, 144, or 145. Advanced form and color. Clay sculptures in relief and round. May be repeated once for credit with consent of instructor.

Group B: Theory and Criticism

147. Theory and Criticism of Photography (4) I. Hermalin Lecture—3 hours; term paper. Prerequisite: course 2 or 5 and one art lecture course. Development of camera vision, ideas, and aesthetics and their relationship to the fine arts from 1839 to the present.

148. Theory and Criticism: Painting and Sculpture (4) III. Theibaud Lecture—3 hours; term paper. Prerequisite: course 2 or 5, and one art lecture course. Study of forms and symbols in historic and contemporary masterpieces.

Group C: Special Study Courses

162. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—term paper or catalog. Supervised program of internships at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated once for credit. (P/N grading only.)

163. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/N grading only.)

169. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/N grading only.)

Graduate Courses

201. Experiments in Art and Visual Communication (4) I, II, III. The Staff Lecture—3 hours. Original work produced for class discussion and criticism. May be repeated for credit.


203. Seminar: Critical Evaluation (1) I. The Staff (Graduate Adviser in charge) Seminar—1 hour. May be repeated for credit. (S/U grading only.)

204. Seminar: Comprehensive Qualifying (4) I. The Staff (Graduate Adviser in charge) Seminar—1 hour. Further critical evaluation of the student's work to determine eligibility to begin the Comprehensive Project. May be repeated for credit. (S/U grading only.)

205. Individual Study (1-5) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

206. Comprehensive Project (9) 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. (S/U grading only.)

Professional Courses


402. Museum Training: Exhibition Methods (4) III. Ammon Seminar—3 hours; exhibition of fine art and popular exhibitions. Problems of different types of museums and their exhibition problems. Lighting and techniques of display with emphasis on actual design. Exhibition with unusual representation forms.

Note: Various of the above courses are not offered each year; please check quarterly schedules.

Art History

Faculty

Joseph A. Baird, Ph.D., Professor Emeritus
Daniel J. Crowley, Ph.D., Professor, (Art, Anthropology)

Mary H. Feng, Ph.D., Professor
Robert J. Grigg, Ph.D., Associate Professor
Seymour Howard, Ph.D., Professor
Dianne Sachko Macleod, Ph.D., Associate Professor
iri Rogoff, Ph.D., Assistant Professor
Jeffrey Ruda, Ph.D., Associate Professor
Deborah Weiner, Ph.D., Assistant Professor

The Major Program

The History of Art program focuses upon the influential role of the visual arts in civilization. It examines works of art as expressions of changing aesthetic and cultural viewpoints and as reflections of significant material and ideological developments in society. Art history is unusual among the human disciplines in that it emphasizes visual as well as verbal intelligence, providing more than the standard advantages of a liberal arts training. This program offers a wide and representative introduction to the major fields and issues in art historical studies.

The major prepares students for advanced study either in graduate school, or in professional programs. It can also serve as a foundation for careers in teaching, research, museums, galleries, arts administration, art criticism, publishing, and art investment. Since the study of art history deals with the histories of ideas and with different cultures, societies, and events as well as objects and images, we urge majors to strengthen their training with courses in history, literature, philosophy, foreign languages, and political science.

Art History

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>Art 1A, 1B, 1C, 1D</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>One studio course in drawing or painting</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>One studio course in sculpture or ceramics</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nine upper division art history courses, which must be taken in at least five of the following seven areas</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>a) Ancient</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>b) Medieval/Northern Renaissance</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>c) Southern Renaissance/Baroque</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>d) Modern Painting, Sculpture</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>e) Modern Architecture</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>f) China/Japan</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>g) Non-Literary</td>
<td></td>
<td>36</td>
</tr>
</tbody>
</table>

Total Units for the Major: 60

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArtHistory</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Five upper division art history courses (one lower division substitute course permissible)</td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>

Courses must be chosen from at least three of the following subject areas with no more than two courses in any single area: (a) Ancient; (b) Medieval/Northern Renaissance; (c) Southern Renaissance/Baroque; (d) Modern Painting, Sculpture; (e) Modern Architecture; (f) China/Japan; and (g) Non-Literary.

Honors Program. An Honors Program is available to Art History majors who are seriously considering attending graduate school. To be eligible for the program, a student must have a grade-point average of 3.7 in the major. In addition to meeting the standard major requirements, the student completes one quarter of language in German or Chinese, one seminar (courses 190 or 198), and writes an honors thesis (course 199). Students participating in this program are candidates for Departmental recommendation for graduation with honors. See the Letters and Science section of this catalog and consult the Department for more information.

NOTE: For key to footnote symbols, see page 131.
Courses in Art (History)

Lower Division Courses
1A. Ancient Art (4) I. Howard
Lecture—3 hours; discussion—1 hour. Art of the pagan Mediterranean world in the historical context of the fall of the Roman Empire. General Education credit with concurrent enrollment in course 1AG: Civilization and Culture/Introductory.

1AG. Writing on Ancient Art (1) I. Howard
Discussion—1 hour; short papers. Prerequisite: course 1A (concurrently). Small group discussions and preparation of short papers for course 1A. General Education credit with concurrent enrollment in course 1A: Civilization and Culture/Introductory.

1B. Medieval and Renaissance Art (4) II. Grigg
Lecture—3 hours; term paper or gallery studies and review. Traditional arts and crafts of European artists of the medieval period. General Education credit with concurrent enrollment in course 1BG: Civilization and Culture/Introductory.

1BG. Writing on Medieval-Renaissance Art (1) II. Grigg
Discussion—1 hour; short papers. Prerequisite: course 1B (concurrently). Small group discussions and preparation of short papers for course 1B. General Education credit with concurrent enrollment in course 1B: Civilization and Culture/Introductory.

1C. Baroque and Modern Art (4) III. MacLeod
Lecture—3 hours; discussion—1 hour. Major styles and masters of the Western world after the Counter Reformation. General Education credit with concurrent enrollment in course 1CG: Civilization and Culture/Introductory.

1CG. Writing on Baroque-Modern Art (1) III. MacLeod
Discussion—1 hour; short papers. Prerequisite: course 1C (concurrently). Small group discussions and preparation of short papers for course 1C. General Education credit with concurrent enrollment in course 1C: Civilization and Culture/Introductory.

1D. Asian Art (4) I. Fong
Lecture—3 hours; discussion—1 hour. Introduction to the art of Asia through a study of Oriental ink painting and architecture, Buddhist sculpture, Indian temples, Chinese ceramics, Japanese prints, and art in Mao's China. General Education credit with concurrent enrollment in course 1DG: Civilization and Culture/Introductory.

1DG. Writing on Asian Art (1) I. Fong
Discussion—1 hour; short papers. Prerequisite: course 1D (concurrently). Small group discussions and preparation of short papers for course 1D. General Education credit with concurrent enrollment in course 1D: Civilization and Culture/Introductory.

1EH. Introduction to Art: Art and Civilization (2) III. The Staff
Lecture—3 hours; term paper or gallery studies and review. Looking at art to understand how aesthetic experience relates to cultural context; in a variety of historical situations from ancient to modern time. Intended for students not specializing in art. (P/NP grading only.)

1F. Woman as Artist and Subject (4) I. MacLeod
Lecture—3 hours; discussion—1 hour. Assessment of women's contribution to the visual arts. Examines the role of women as artists and as subjects in art movements from Renaissance to present. Two midterms; final examination. Offered in even-numbered years.

20. Myths and Symbols in Chinese Art (4) II. Fong
Lecture—3 hours; discussion—1 hour. History of China as seen in the artistic expressions of its mythologies and symbols perpetuated in folk tales, ancestral worship, Confucian lore, Taoist lore, Buddhist lore, and Chinese literature. Intended for majors.

25. Introduction to Architectural History (4) II. Weiner
Lecture—3 hours; discussion—1 hour. FORMAL and social history of architecture, examining design principles, major traditions, and concepts of architectural history with a focus on issues in Western architecture. Emphasis on eighteenth and nineteenth centuries. General Education credit with concurrent enrollment in course 25B: Civilization and Culture/Introductory.

25W. Writing on Architectural History (1) II. Weiner
Discussion—1 hour. Prerequisite: course 25 concurrently.

26. Cour, John
Lecture—3 hours; term paper or gallery studies and review. History of the history of Art as an art form as well as an art form itself. Further information may be obtained by writing to the Graduate Advisor or consulting the Graduate Announcement.

Upper Division Courses

20. Arts of Sub-Saharan Africa (4) I. Crowley
Lecture—3 hours; term paper or gallery studies and review. Traditional arts and crafts of sub-Saharan Africa; particular attention to the relationship between sculpture and culture in West and Central Africa.

21. Arts of the Indies of the Americas (4) III. Crowley
Lecture—3 hours; term paper or gallery studies and review. Development of art in North America, explaining and comparing the influences of aboriginal North America, Mesoamerica, and Polynesia, as seen in their cultural contexts. Prerequisite: art history and the Near East.

21A. Early Greek Art and Architecture (4) I. Howard
Lecture—3 hours; gallery studies and term paper. Prerequisite: upper-division standing. Examination of the history and significance of major monuments in Greek art and architecture from the Homeric, Archaic Age to the Golden Age and the death of Pericles.

21B. Later Greek Art and Architecture (4) I. Howard
Lecture—3 hours; gallery studies and term paper. Prerequisite: upper-division standing. Examination of the history and significance of major monuments in Greek art and architecture from the Silver Age of Aristotle to Alexander the end of the Hellenistic Age and the death of Alexander.

21M. Roman Art (4) III. Howard
Lecture—3 hours; gallery studies and term paper. Prerequisite: course 21. The art of the Roman Republic and Imperial Rome.

21S. History of Printmaking (4) I. Ruda
Lecture—3 hours; term paper or gallery studies and review. Development of graphic media in the Western world from the fifteenth century to the present.

21C. Chinese Art (4) II. Fong
Lecture—3 hours; term paper or gallery studies and review. Survey of the modern art forms that are traditionally known as Chinese art. Prerequisite: course 21.

21E. Chinese Painting (4) III. Fong
Lecture—3 hours; term paper or gallery studies and review. The unique form of ink painting, with or without colors, depicting human forms, animals, plants, landscape—the favorite and enduring theme of the Chinese scholar-painter.

21E. The Arts of Japan (4) II. Fong
Lecture—3 hours; term paper or gallery studies and review. The unique form of ink painting, with or without colors, depicting human forms, animals, plants, landscape—the favorite and enduring theme of the Chinese scholar-painter.

21E. The Arts of Japan (4) II. Fong
Lecture—3 hours; term paper or gallery studies and review. The unique form of ink painting, with or without colors, depicting human forms, animals, plants, landscape—the favorite and enduring theme of the Chinese scholar-painter.

21E. The Arts of Japan (4) II. Fong
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21E. The Arts of Japan (4) II. Fong
Lecture—3 hours; term paper or gallery studies and review. The unique form of ink painting, with or without colors, depicting human forms, animals, plants, landscape—the favorite and enduring theme of the Chinese scholar-painter.
Asian American Studies

Courses in Asian American Studies

Direct questions pertaining to the following courses to the instructor or to the Applied Behavioral Sciences Advising Center, 101 Academic Office Building 4 (404-44).

Lower Division Courses

1. Introduction to Asian American Studies (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2 or consent of instructor. Asian American culture and history, racism, and culture clash as they relate to the identity and growth of the Asian American community.

2. Asian Calligraphy (3) I. Leung Lecture—2 hours; laboratory—3 hours. Prerequisite: knowledge of Chinese. Introduction to Asian calligraphy and its role in traditional Chinese and Japanese culture.

3. Internship (1-12) I, II, III. The Staff (Master Adviser in charge) Credit 1-36 hours. Prerequisite: consent of instructor. Supervised internship off and on campus in Asian American community, government, non-profit organizations, and ethnic community centers.

Upper Division Courses

1. Asian American Communities (4) I, II. Kagawa Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2 or consent of instructor. Historical and contemporary examination of Asian American communities in the United States, including issues related to identity, culture, and social change.

2. Asian American Women (4) I. The Staff Lecture—4 hours. Prerequisite: course 1 or 2. History and struggle of Asian American women in America, focusing on media representation and social movements.

3. Philippine American Experience (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2. Examination of the history and experiences of Filipino Americans in the United States.

4. Legal History and the Asian American (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2. Consent of instructor. Examination of the historical and contemporary events and legal issues affecting Asian Americans.

5. Internship (1-12) I, II, III. The Staff (Master Adviser in charge) Field placement opportunities, including internships off and on campus in Asian American community organizations and government agencies.

Asian American Studies

(Collage of Agricultural and Environmental Sciences)

Faculty. See under Department of Applied Behavioral Sciences.

Program of Study. Concentration in Asian American Studies is available through the Applied Behavioral Sciences major. A minor program, Asian American Studies, may also be applicable to students interested in this field.

American History and Institutions. This University requirement can be satisfied by one of the following courses in Asian-American Studies: 1, 2, 3. (See also under University requirements.)

Related Courses. For courses in Asian languages, see Cantonese (below) and Chinese, and Japanese. For other Asian courses, see Chinese and Japanese and East Asian Studies.

NOTE: For key to footnote symbols, see page 131.
Asian Studies
See American Asian Studies; and East Asian Studies

Astronomy
See Physics

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; climate variations; 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 in the private sector, and education. Examples of career areas are agricultural meteorology, air-pollution forecasting and control, weather modification, hurricane and severe weather forecasting and research, weather satellite meteorology, and numerical weather forecasting. The course of study provides a mathematical and physical science background on which a career can be built in research, education, resource management, or various areas of direct problem solving. In addition to a broad background in meteorology, the major includes a minor area to be chosen from mathematics, computer science, environmental studies, resource management, or a physical or biological science.

Atmospheric 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.

- Preparatory Subject Matter
  - Preparatory Subject Matter
  - Mathematics
  - Computer science
    - Engineering (5 or the equivalent in FORTRAN programming)
  - Physics
    - (Physics 1A-8B, 21B, 21C)
  - Chemistry
    - Chemistry 1A, 1B)
  - Biological science (Biological Sciences 1, Botany 2 or Zoology 2-29L)
  - English and/or rhetoric (see College requirement)

- Meteorology
  - Atmosphere
    - Depth Subject Matter
      - Atmospheric Science
        - Atmospheric Science
  - Upper division Atmospheric Science courses
  - Upper division Atmospheric Science courses
  - Breath Subject Matter
  - General education (see General Education requirement)

- Restricted Electives
  - Earth and planetary sciences (Earth and planetary sciences)
  - Geology 111, 117, Geology 105, 113, 115, Resource Sciences 103, Soil Science 100, Water Science 100, 141, or courses approved by adviser)
  - Coordinated group of courses (minor area) to be chosen with adviser's approval
    - Mathematics, computer science, environmental studies, resource management, or a physical or biological science

- Unrestricted Electives
  - Total Units for the Major

92. Atmospheric Science Internship (1-12) I, II, III. The Staff (Chairperson in charge)
  - Lecture—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work-learning experience off and on campus in atmospheric science, supervised by a member of the faculty. (P/NP grading only.)

96. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
  - Prerequisite: consent of instructor. (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

105. Microclimate of Agricultural Systems (3) I. Paw U
  - Lecture—3 hours. Prerequisite: upper division standing in biological or physical sciences. Intended for nonmajors. Energy balance, air and soil temperature, wind, water vapor, carbon dioxide patterns within the microclimate structure. Microclimate modification by windbreaks, frost protection and other measurements. Students who have completed course 133 may receive only one unit of credit.

110A. Weather Analysis and Forecasting (4) III. Soong Lecture—2 hours; laboratory—2 hours. Prerequisite: course 121B (may be taken concurrently). Thermodynamic variables and processes, kinematic and dynamic processes and their relationship to observed weather. Laboratory work includes thermodynamic diagrams, pressure surface and vertical cross-section analyses.

110B. Weather Analysis and Forecasting (4) I. Carroll Lecture—2 hours; laboratory—2 hours. Prerequisite: course 121A; knowledge of FORTRAN (Engineering 5). Application of dynamic theory to weather systems. Operational forecasting techniques including interpretation of numerical forecasts, local detailed forecasts, 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 28A; course 60 (may be taken concurrently). Atmospheric states: thermodynamic system; 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. The Staff
  - Lecture—3 hours. Prerequisite: course 120, Mathematics 22C, and Physics 28A. 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; vortexily. The physical basis of modern numerical methods in meteorology.

121B. Atmospheric Dynamics (3) III. The Staff
  - Lecture—3 hours. Prerequisite: course 121A. The dynamics of the atmosphere in geophysical and laboratory systems: Rossby waves; Helmholz waves; the effect of turbulence; boundary layers; the Ekman layer. The dynamics of convective motion: the boundary problem; penetrative convection; convective plumes; cumulus models.

124. Meteorological Instruments and Observations (3) I. Paw U
  - Lecture—2 hours; laboratory—3 hours. Prerequisite: course 60 and Physics 8B. Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included. Offered in odd-numbered years.

126. Radiation and Satellite Meteorology (3) II. Weare Lecture—3 hours. Prerequisite: course 60, Physics 28C (may be taken concurrently); Mathematics 22B, 22C. Concepts of atmospheric radiation and the use of satellites in remote sensing. Emphasis on the modification of solar and related radiation by the atmosphere. Estimation from satellite data of atmospheric variables such as temperatures and winds.

127. Remote Sensing (3) I. Paw U
  - Lecture—3 hours; discussion—1 hour. Prerequisite: two courses in a biological discipline; Mathematics 16B. Atmospheric and radiative interactions. Physical basis for plant, animal and human response and adaptation to short-term and long-term meteorological events. Students who have completed course 105 may receive only two units of credit.

149A. Introduction to Air Pollution (3) I. Carroll, Chang and Raabe (Civil Engineering)
  - Lecture—3 hours. Prerequisite: Mathematics 22B, 22C; Chemistry 1B; course 121A or Engineering 103A. Examination of physical and chemical aspects of air pollution. Emphasis on geographical processes and air-pollution meteorology as well as physical and chemical properties of pollutants. (Same course as Civil Engineering 149A.)

150. Numerical Weather Prediction (4) I. Grojahn Lecture—3 hours; discussion—1 hour. Prerequisite: course
121B and Engineering 5. Numerical techniques and their applications to geological problems. Finite differencing and spectral methods, design of forecast models, parameterization of physical processes and predictability. Written computer programs and report these topics.

158. Boundary-Layer Meteorology (3) II. Shaw Lecture—3 hours; discussion—1 hour. Prerequisite: course 121A. Growth, development and structure of the atmospheric boundary layer. Effect of the underlying surface extending to a maximum of about two kilometers under convective conditions. Turbulent diffusion in the boundary layer. The frictional and near the ground surface.

192. Atmospheric Science Internship (1-12) II, III. The Staff (Chairperson in charge) Laboratory—3-36 hours. Prerequisite: completion of 64 units and the approval of a team of experienced advisees on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.)

196. Directed Group Study (1-8) II, III. The Staff (Chairperson in charge) Prerequisite: three upper division units in Atmospheric Science. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) II, III. The Staff (Chairperson in charge) Prerequisite: three upper division units in Atmospheric Science and at least an overall B average. (P/NP grading only.)

Graduate Courses

200. Atmospheric Processes (3) I. The Staff Lecture—3 hours. Prerequisite: Mathematics 22B-22C; Physics 6C. Advanced phenomenological and physical study of atmospheric structure and processes including radiation, statics, thermal structure and weather phenomena. Acceleration of atmospheres and the major topics covered in courses 60, 110A-110B, 120, and 123. Credit not allowed to students having completed any two of these courses.

210. Atmospheric Physics (3) III. The Staff Lecture—3 hours; laboratory—121A (may be concurrent). Selective introduction to the physical processes within the atmosphere. Emphasis will be given to radiative transfer, and remote sensing, global atmospheric physics, and the physical and dynamic processes in the upper atmosphere.

211. Advanced Atmospheric Dynamics (3) III. Grofjohn Lecture—3 hours. Prerequisite: courses 121B and 240. Emphasis on recent theoretical work in dynamic meteorology. Derivations of filtered equations from the primitive equations, potential vorticity and other conservation laws; linear barotropic and baroclinic instability theory; nonlinear wave-interaction; wave-cyclone life cycles; and related topics. Offered in even-numbered years.

212. Advanced Boundary-Layer Meteorology (3) III. Shaw Lecture—3 hours; laboratory—121B. Characteristics of the atmospheric boundary layer under convective and nocturnal conditions. Heat budget at the surface and boundary layer forcing. Similarity theory and scaling of the boundary layer. Instrumentation and simulation techniques. Offered in even-numbered years.


215. Atmospheric Radiation (3) II. Grofjohn Lecture—3 hours. Prerequisite: course 240, and one year of fluid dynamics. Processes determining transport and diffusion of primary and secondary pollutants. Models of turbulence, of the atmospheric boundary layer and of mesoscale wind fields, as applicable to pollutant dispersion problems are presented. Offered in odd-numbered years.

217. Topics in Advanced Biometeorology (3) II. Paw U Lecture—2 hours; discussion—1 hour. Prerequisite: course 133 or consent of instructor. Study of current topics in biometeorological interactions of plants with the weather. Biological energy budgets and adaptations to changes in energy regime. Quantification of weather parameters for optimum biological responses. Offered in odd-numbered years.

240. General Circulation of the Atmosphere (3) III. Grofjohn Lecture—3 hours. Prerequisite: course 121B. Large-scale, oceanic and atmospheric circulation. Energy and momentum balances derived and compared with observations. Theoretical framework developed to synthesize observed features.

241. Climate Dynamics (3) II. Weare Lecture—3 hours. Prerequisites: courses 120, 121A, 121B or the equivalent—Applied Science Engineering 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. Introduction to primitive equation climate models. Offered in even-numbered years.

250. Mesoscale Meteorology (3) II. Soong 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. Methods of observational study and numerical modeling of the structure and temporal behavior of these weather systems. Offered in odd-numbered years.

270-G. Topics in Atmospheric Science (1-3) II, III. The Staff Discussion—1-3 hours. Applications and concepts in (A) Meteorological Statistics; (B) Computer Modeling of the Atmosphere; (C) Design of Experiments and Field Studies in Meteorology; (D) Solar and Infrared Radiation in the Atmosphere; (E) Aerosol and Cloud Physics; (F) Atmospheric Chemistry; (G) General Meteorology.

270-S. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: graduate standing in Atmospheric Science or related field. Current developments in selected areas of atmospheric research. Topics will vary according to student and faculty interests. (S/U grading only.)

270-A. Research Conference in Atmospheric Science (1) I, II, III. The Staff Discussion—1 hour. Review and discussion of current literature in (A) Air Quality Meteorology; (B) Biometeorology; (C) Boundary-Layer Meteorology; (D) Climate Dynamics. Prerequisite: course 150. The major topics covered in courses 60, 110A-110B, 120, and 123. Credit not allowed to students having completed any two of these courses.

280. Group Study (1-5) III, III. The Staff (Chairperson in charge) Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

290. Research (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

### Atmospheric Science (A Graduate Group)

Richard D. Grofjohn, Ph.D., Chairperson of the Group (752-2246)

Group Office, 151 Hoagland Hall (752-1406)

Faculty includes fifteen faculty members from the Department of Atmospheric Science, Agricultural Engineering, Civil Engineering, Geography, Physics, the Laboratory for Energy-Related Health Research, and the Division of Environmental Studies.

Graduate Study. The Graduate Group in Atmospheric Science offers both the M.S. and Ph.D. degree programs. The student can place major emphasis on graduate work in one or more of the following fields: air quality meteorology, biomecorology, boundary-layer meteorology, climate dynamics, and mesoscale meteorology. The diverse and extensive backgrounds of the faculty allow opportunities for interdisciplinary training and research.

Preparation. The Group encourages applications from all interested students with backgrounds in the physical or natural sciences. Basic qualifications for students entering the Atmospheric Science graduate program include mathematics to the level of vector calculus and differential equations, and one year of college-level physics. Considerable flexibility may be allowed for students with high academic potential, but it is expected that deficiencies in preparatory material and in key undergraduate atmospheric science courses be completed within the first year of graduate study.

Graduate Advisor: S.T. Soong (Land, Air and Water Resources, 752-6151).

### Note:
For key to footnote symbols, see page 131.

### Avian Medicine

See Epidemiology and Preventive Medicine

### Avian Sciences

(College of Agricultural and Environmental Sciences)

Ray E. Burger, Ph.D., Chairperson of the Department

Department Office, 3202 Meyer Hall (752-1300)

Faculty

 Ursula K. Abbott, Ph.D., Professor Hans Ablanpalp, Ph.D., Professor Ray E. Burger, Ph.D., Professor Ralph A. Ernst, Ph.D., P.D., Lecturer C. Richard Grau, Ph.D., Professor Annie J. King, Ph.D., Associate Professor Kirk C. Klaasing, Ph.D., Associate Professor H. Howard Kratzer, Ph.D., Professor James R. Milliam, Ph.D., Associate Professor Frank X. Ogasawara, Ph.D., Professor Emeritus Kathryn Radke, Ph.D., Assistant Professor Pran N. Vohra, Ph.D., Professor Emeritus Wesley W. Weathers, Ph.D., Professor Barry W. Wilson, Ph.D., Professor Wilbur O. Wilson, 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, caged exotic bird management, and basic and applied laboratory research on birds—and a broad knowledge of biological science. You may seek a career in health-oriented research, the teaching of biology, gamebird production, domestic and foreign agricultural extension and advisory services, governmental agencies or a diversified and progressive poultry industry. The flexibility of the program and the close personal interaction between students, faculty, and specialists in the field permit you to play a large role in selecting and designing your own course work. You may specialize in a bachelor's program that qualifies you for a particular job; or you may choose a program to meet other broader intellectual and cultural interests. Independent study, undergraduate research, and work-experience programs are features emphasized in the program.

### Avian Sciences

B.S. Major Requirements:

(For convenience in program planning, the usual courses taken to satisfy the major requirements are shown in parentheses where possible. Equal or more comprehensive courses are acceptable.)

**Units**

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
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<tr>
<td>Avian sciences (Avian Sciences 11 or 13)</td>
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<tr>
<td>Biological sciences (Biological Sciences 1, Microbiology 2, Animal Science 1, 2, Zoology 3, and/or Plant Science 10)</td>
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<td>Chemistry (Chemistry 1A, 1B, 8A, 8B)</td>
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<td>Mathematics (Mathematics 16A, 16B)</td>
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<tr>
<td>Statistics (Statistics 13)</td>
<td>4</td>
</tr>
<tr>
<td>Computing (Agricultural Science and Management 21)</td>
<td>3</td>
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<tr>
<td>Physics (Physics 1A and 1B)</td>
<td>8</td>
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</tbody>
</table>
Avian Sciences (A Graduate Group)

156

Depth Subject Matter

101. Patterns in Avian Biology (3) W. Weathers Lecture—3 hours. Repeatable to the equivalent. Patterns of reproduction, locomotion, foraging, growth and development, energetics, and temperature regulation exhibited by birds. Ecological and evolutionary adaptations and allozyme analysis of life history traits. 

102. Fertility and Hatchability (4) III. Abbott Lecture—2 hours; discussion—1 hour; laboratory—3 hours; one field trip; report by students. Genes 100 and Zoology 100. Analysis of normal avian embryonic development and reproductive failures resulting from nutritional, genetic and environmental problems. Exploration of the use of avian etenoys in research on drugs, pesticides and other contaminants, and in biomedical research.

103. The Avian Egg (1) III. Grau Lecture—1 hour; laboratory—1 hour; course 111 or 100 (or the equivalent), or consent of instructor. Eggs of domestic and wild birds as components of the total reproductive process. Egg formation, structure, composition, appearance, genetic and environmental influences, including pollution. Eggs as foods for embryos and humans. Offered in even-numbered years.

105. Caged Exotic Bird Management (2) III. Grau Lecture—2 hours; discussion—1 hour. Prequisite: upper division standing in a biological sciences major; course 100. Caged birds, as a subset of wild birds, will be examined with respect to anatomy, behavior, breeding, physiology, nutrition, diseases, habitat and human needs, and history of use by man. Relationships between poultry and cage bird business will be explored.

120. Game Bird Production (3) J. Woodard Lecture—2 hours; laboratory—2 hours. Prequisite: course 100; Animal Sciences 1 and 2. Introduction to husbandry of popular wild game bird species kept in captivity. Bird identification, feeding, housing, rearing and marketing.

130. Poultry Breeding and Genetics (3) I. Aplanpalpian Lecture—2 hours; laboratory—2 hours. Prequisite: course 100 and Animal Sciences 1 and 2. Application of genetic principles in poultry. Action of major genes in the control of morphology, reproduction and disease resistance. Breeding plans and genetic tests for major genes as well as traits with quantitative inheritance.

149. Advanced Poultry Management (4) III. Ernst Lecture—3 hours; discussion—1 hour. Prequisite: course 100. Application of basic principles to environmental management of poultry, including such topics as brooding, disease prevention, recycling, lighting programs, housing design and hatchery management. Offered in odd-numbered years.

150. Nutrition of Birds (3) II. Vohra, Grau Lecture—2 hours; discussion—1 hour. Prequisite: Preparatory course in poultry 101, Animal Sciences 1 and 2. Comparison of digestive tracts, food habits, effects of nutrients on growth, reproductive processes, energy production, and variety and health status of specific species of birds. Effects of pesticides and other non-nutrient substances on their life cycle.

151. Nutrition of Wild Birds (2) III. King Laboratory—6 hours. Prequisite: course 150. Methods to obtain droppings and samples from wild birds. Study and proximate analysis of diet. Determination of vitamins, minerals, fats, fatty acids and other nutrients in wild birds with emphasis on laboratory equipment.

160. Seminar in Avian Sciences (1-3) I, II, III. The Staff Seminar—1 hour. Prequisite: upper division standing in Avian Science or consent of instructor. May be repeated three times for credit. (P/NP grading only.)

161. Internship in Avian Sciences (1-12) I, II, III. The Staff Internship—1-12 hours. Contact the Chairperson in charge.

189. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prequisite: consent of instructor. (P/NP grading only.)

198. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201. Laboratory in Avian Experimental Embryology and Teratology (4) III. Abbott Laboratory—twenty-nine consecutive 3/4-hour days, plus 6 extra days—total of 23 days. Consent of instructor. Causes of abnormal morphogenesis in avian embryos including genetic, chemical, and physical-environmental factors; the application of transplantation, organ culture, and other experimental techniques. Offered in even-numbered years.

220. Cellular Proliferation and Oncogenesis (4) II. Riedke Lecture—3 hours; term paper. Prequisite: Biochemistry 101B, Zoology 121A-121B, Genetics 102B. Regulation of growth and division of animal cells. Oncogenesis, retroviruses and genetic factors will be discussed in the context of normal and cancerous growth. Critical reading and writing are stressed.

230. Avian Endocrinology (2) I. Millen Lecture—2 hours. Prequisite: coursework in endocrinology, avian biology or reproductive physiology advisable. Examination of current issues in avian endocrinology with emphasis on endocrine aspects of reproductive physiology. Offered in odd-numbered years.

250. Advanced Poultry Nutrition and Feed Formulation (3) II. Klaing Lecture—2 hours; including use of computer for least cost formulation. Prequisite: Nutrition 115 or the equivalent. Nutrient requirements of growing and reproducing poultry as affected by environment. Evaluation of conventional and non-conventional feedstuffs for dietary energy, protein quality, vitamins, minerals, growth promotants and toxicants. Use of computers for least cost formulations.

260. Topics in Avian Physiological Ecology (2) I. Weathers Lecture—1 hour; seminar—1 hour. Prequisite: course 100, and Physiology 110 or Physiological Sciences 101A-101B; senior or graduate standing. Energy and nutrient requirements of captive and free-living birds. Metabolic requirements for growth, maintenance, reproduction, and thermoregulation. Energy and nutrient limits to the life spans of birds and their ecological correlates. Offered in odd-numbered years.

261. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Reports and discussions of recent advances and selected topics of current interest in avian genetics, physiology, nutrition, and poultry technology.

262. Research Conference (1) I, II, III. The Staff Discussion—1 hour. Prequisite: graduate standing and consent of instructor. Major projects lead research discussions with their graduate students. Research papers are reviewed and project proposals presented and evaluated. Format will combine seminar and discussion. (S/U grading only.)

277. Supervised Teaching in Avian Sciences (1-4) I, II, III. The Staff (Chairperson in charge) Tutoring—1-4 hours. Prequisite: graduate standing and consent of instructor. Tutoring of students in lower, upper division and graduate courses for a week or a semester conference with instructor in charge of course; written critiques of teaching methods in lectures and laboratories. (S/U grading only.)

285. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prequisite: consent of instructor. (S/U grading only.)

288. Research (1-12) I, II, III. The Staff (Chairperson in charge) Prequisite: consent of instructor. (S/U grading only.)

Avian Sciences (A Graduate Group)

Hans Aplanpalp, Ph.D., Chairperson of the Group

Graduate Group Office, 3202 Meyer Hall (752-1300)

Faculty. Consists of members from several departments in the College of Agricultural and Environmental Sciences and the School of Veterinary Medicine.

Graduate Study. Graduate students may be enrolled in Avian Sciences courses after the completion of the M.S. degree program to students

NOTE: For key to footnote symbols, see page 131.
Biochemistry

College of Agricultural and Environmental Sciences

The Major Program

The Biochemistry major introduces students to the chemistry of living organisms and the experimental techniques that are used to probe the structures and functions of biologically important molecules. Because the program focuses on the molecular basis of life processes, it is suitable for students interested in pursuing graduate studies or professional careers in a wide variety of contemporary biological sciences. These include basic research (e.g., biochemistry, cell biology, molecular genetics, biotechnology, human or veterinary medicine and dentistry, and biochemistry-teaching) students who enjoy both chemistry and biology who are comfortable with quantitative approaches to problem solving will find biochemistry a fruitful field of study.

Choice of College

The Bachelor of Science degree is offered by both the College of Agricultural and Environmental Sciences and the College of Letters and Science. 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. Students in the College of Agricultural and Environmental Sciences must accumulate 54 units of upper division courses to graduate. Further information can be obtained from the Division of Biological Sciences Office, 376 Maier 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>
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<th>Course</th>
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<td>Preparatory Subject Matter</td>
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Bacteriology

See Microbiology

Biochemistry and Biophysics

(College of Agricultural and Environmental Sciences)

Don M. Carlson, Ph.D., Chairperson of the Department

Department Office, 149 Briggs Hall (752-3611)

Faculty

Judy Callis, Ph.D., Assistant Professor
Don M. Carlson, Ph.D., Professor
Sterling Chaykin, Ph.D., Professor
Eric E. Cunn, Ph.D., Professor
Richard S. Cridle, Ph.D., Professor
Michael E. Dahms, Ph.D., Professor
Roy H. Dyer, Ph.D., Professor
Гmartynn E. Etzl, Ph.D., Professor
Charles S. Gasser, Ph.D., Assistant Professor
Jerry L. Hedrick, Ph.D., Professor
Ken Hill, Ph.D., Lecturer
Lloyd L. Ingham, Ph.D., Professor Emeritus
E. B. Knicely, Ph.D., Assistant Professor
J. Clark Lagarias, Ph.D., Associate Professor
Robert M. McNamee, Ph.D., Professor
Irwin H. Siegel, Ph.D., Professor
Larry R. Sprechenmann, Ph.D., Lecturer, S.O.E.
Paul K. Stumpf, Ph.D., Professor Emeritus
Merna R. Villarejo, Ph.D., Professor

Major Programs and Graduate Study. See the major in Biochemistry and for graduate study see Biochemistry (A Graduate Group) and the Graduate Division section in this catalog.

Related Courses. See Food Science and Technology 210, 250, 250L

Courses in Biochemistry and Biophysics

Questions pertaining to the following courses should be directed to the Instructor.

Upper Division Courses

109A. General Biochemistry (3) I, II, III. Cridle, Etzl, Lagarias. McNamara. Sprechenmann, Kimiec, Hill. Lecture—3 hours. Preerequisite: 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.


109L. General Biochemistry Laboratory (5) I, II, III. Chaykin, Sprechenmann, McNamara, Hill. Lecture—3 hours; laboratory—4 hours. Prerequisite: course 109B (may be taken concurrently). Chemistry 4, introduction to laboratory methods and procedures employed in studying biochemical processes. Course also offers a special seminar for those who need experience in the use of biochemical techniques as laboratory tools.

102L. Advanced Undergraduate Laboratory (4) I, II. Sprechenmann Lecture—2 hours; laboratory—2 hours. Prerequisite: course 102L and consent of instructor. Advanced biochemical laboratory methods and procedures, including some of the more recent technological advances. Experiments include techniques from areas such as immunohemetics, nuclear acid manipulation and sequencing, high-performance liquid chro- mochromatography, and membrane biochemistry.

Graduate Courses

290. Seminar (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

290L. Research (1-12) I, II, III. The Staff (S/U grading only.)

Biochemistry (A Graduate Group)

Harry R. Mathews, Ph.D., Chairperson of the Group

Group Office 149 Briggs Hall (752-3601)

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. M. E. Dahms (Biochemistry and Biophysics), J. C. Lagarias (Biochemistry and Biophysics), N. R. Villarejo (Biochemistry and Biophysics).

Physics 8D is optional. Students enrolling the Physics 8 sequence should elect Mathematics 21A-21B-21C and 22A-22B-22C.

Units earned in satisfaction of American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.

NOTE: For key to footnote symbols, see page 131.
122. Plant Biochemistry (3) I. Conn, Lagarias Lecture—3 hours. Prerequisite: course 101B. The chemistry of important plant constituents and processes such as photosynthesis and respiration; carbohydrate, fat, and nitrogen metabolism.

123. An Introduction to Enzymology (3) II. Whittaker Lecture—3 hours. Prerequisite: course 101B. Principles of physical, chemical and catalytic properties of enzymes and their application to the metabolism of living systems. Lecture—3 hours. Qualitative and quantitative evaluation of influence of reaction conditions on activity are stressed. Specificity and mechanism of action illustrated by consideration of selected enzymes.

12L. Enzymology Laboratory (2) II. Whittaker Lecture—1 hour; laboratory—3 hours. Prerequisite: course 101B; course 123 (concurrently). Laboratory procedures involved in separation and study of enzymes.

13. Behavior and Analysis of Enzyme Systems (3) III. Segall Lecture—3 hours. Prerequisite: course 101B. Introduction to enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include steady-state kinetics, patterns of feedback inhibition, control by enzyme activity, allosteric enzymes, multienzyme systems, enzyme assays, and membrane transport.

143. Structure-Function Relations of Proteins (3) I. Cridde, Hedrick Lecture—3 hours. Prerequisite: courses 101A, 101B, and 101L (may be taken concurrently). Correlation of structure and biological function. Molecular models of enzymes that explain their physical functioning. Physical and chemical methods used in determination of protein structure. Function measured by kinetic and binding models and as affected by physical parameters.

153. Molecular Biology of Eukaryotic Cells (3) S. Dahmus Lecture—3 hours. Prerequisite: course 101B and 101L. Genes 100. Structure, expression and regulation of eukaryotic genes. Chromatin structure; gene transcription; RNA processing and RNA processing and RNA processing; protein synthesis and transcriptional control; development, immune system and oncogenes.

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 (10-12) I, II, III. The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: consent of instructor. Technical skills and experience on and off campus supervised by a member of the Biochemistry and Biophysics faculty. (P/NP grading only.)

194H. Biochemistry Honors (1-5) I, II, III. The Staff, The Staff Prerequisite: 4 units of course 199 with faculty director; senior standing; grade-point average of at least 3.25; consent of instructor. Honors project in Biochemistry. Laboratory research and seminar followed by presentation of the work in a written thesis and in a seminar. (P/NP grading only.)

197. Tutoring in Biochemistry (1-3) I, II, III. The Staff (Chairperson in charge) Discussion—1-5 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 (1-4) 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

210A. Physical and Chemical Biochemistry (4) I. Lagarias, Chidie, Benisek (Biological Chemistry) and Troy (Biological Chemistry) Lecture—4 hours. Prerequisite: course 101B; Chemistry 107B-107B or 110C, 128C, 129C. Biochemical thermodynamics, equilibrium and properties of biomacromolecules, including enzyme kinetics and methods for determining size and shape of macromolecules.

210B. Integration of Metabolism and Regulatory Phenomena (2) I, II. (Biological Chemistry), Freedland (Physiological Sciences) Lecture—3 hours. Prerequisite: course 210A or consent of instructor. Regulatory phenomena that occur in control of metabolism; e.g., regulation at enzyme level; integration of metabolism; and pathways including homoisotension, hormonal influences, turnover of enzymes, comparative aspects of metabolism, regulation of amino acids and lipid metabolism in living systems. Offered in odd-numbered years.

210C. Molecular Biology (3) S. Hershhey (Biological Chemistry), Dahmus, Dei, Bradford (Biological Chemistry) Lecture—3 hours. Prerequisite: course 210A. Structure and organization of nuclear chromatin: DNA replication, recombination and modification; transcription and RNA processing; protein biosynthesis and turnover; transcriptional and post-translational control of metabolic pathways. Topics drawn from above. Examinations on eukaryotic and prokaryotic cells, and viruses.

201D. Cellular Biochemistry (3) I. McNamara, Eizler, Troy (Biological Chemistry), Tsuts (Biological Chemistry) Lecture—3 hours. Prerequisite: course 210A. Structure and function of cell membranes and cell surface components with emphasis on biochemical principles involved in cell growth, cell development and cell-cell interactions. Biochemical aspects of some differentiated systems, such as the immune system.

202A-202B. Advanced Biochemical Methods (1-1) I-III. The Staff Lecture—1 hour. Prerequisite: course 210A (may be taken concurrently), and 101L, or the equivalent. Laboratory methods and procedures used in chemical research.

202L. Advanced Biochemistry Laboratory (5) I, II, III. The Staff Laboratory—15 hours. Prerequisite: course 210A (may be taken concurrently), and 101L or the equivalent. Two five-week assignments in biochemistry research laboratories. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated twice for credit.

203. Carbohydrates (3) I. McNamara, Villarreal, Troy Lecture—2 hours. Prerequisite: course 210B. Chemistry, metabolism, and biological functions of the various classes of carbohydrates and their polymers. Biochemistry of simple and complex carbohydrates and polysaccharides. Offered in even-numbered years.

204. Gene Expression (3) III. Kniec Lecture—3 hours. Prerequisite: course 153 or 202C. Examination of current concepts on the mechanisms of gene expression on transcription. Interaction of cis-acting elements and regulatory domains will be examined in detail with emphasis on the transcriptional systems.

205. Biochemical Mechanisms (3) II. The Staff Lecture—3 hours. Prerequisite: course 210B or consent of instructor; Chemistry 110C. 131. Bond structures of biochemical interest and application of modern organic and inorganic chemical principles to a study of the mechanisms of biochemical reactions.

208. Membrane Biochemistry (2) I. McNamara, Villarreal Lecture—2 hours. Prerequisite: course 210A. Advanced topics in membrane microbiology with emphasis on the structure and function of membrane proteins and lipids. Offered in even-numbered years.

212. Chemical Modifications of Proteins (3) II. Benisek (Biological Chemistry) Lecture—3 hours. Prerequisite: course 101B, Chemistry 28C. Chemical approaches to studying proteins, emphasis on the use of chemical modifications as a tool in the study of active sites, particularly of enzymes, and relating the structure of proteins to their functions. Offered in even-numbered years.

215. Kinetics of Biological Systems (2) III. The Staff Lecture—2 hours. Prerequisite: courses 210A, 210B, FORTRAN IV (may be taken concurrently). Kinetic behavior of multivariable biological systems; mathematical methods and analysis of types of data with accent 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.

250. Biochemical Literature (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: course 210C or consent of instructor. Critical reading and evaluation of current biochemical literature. Selected papers will be presented and discussed in detail. (S/U grading only.)

270. Advanced Research Conference (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: course 210C or consent of instructor. Presentation and critical discussion of research activities of various members of local biochemical community; primarily designed for graduate students. (S/U grading only.)

271. Current Progress in Biochemistry (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: course 210C or consent of instructor. Seminar topics by faculty members of the department and other institutions, subject to their own research activities. (S/U grading only.)

298. Group Study (1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)

Professional Course

386. The Teaching of Biochemistry (1) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: graduate student in Biochemistry; consent of instructor. Practical experience in methods and problems of teaching biochemistry. Includes analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion sessions, observing and guiding student laboratory work, formulation of topics and questions for examinations under supervision of instructor. Permission of the instructor required for Ph.D. degree. May be repeated for credit. (S/U grading only.)

Biological Chemistry

See Medicine, School of Biological Sciences

(Intercollegiate Division)

Robert D. Grey, Ph.D., Dean of Biological Sciences

Merx R. Villarreal, Ph.D., Associate Dean

Division Office, 376 Mkrak Hall (752-0410)

Faculty

Faculty includes members from departments of Animal Physiology, Biochemistry and Biophysics, Botany, Genetics, Microbiology and Zoology; and academic advisors for divisional majors and instructors of upper division courses in curricula of divisional majors.

Willard J.C. Pfeiffer, Ph.D., Lecturer (Biological Sciences, Microbiology)

Programs of Study

The Division of Biological Sciences is an intercollege unit which coordinates the teaching and research of the departments of Animal Physiology, Biochemistry and Biophysics, Botany, Genetics, Microbiology, and Zoology. Four majors leading to an A.B. degree are offered in Biological Sciences, Botany, Microbiology, and Zoology. Seven majors are offered within the Division leading to a B.S. degree in disciplines of the Division. A few above-named majors may be included in the Biological Sciences. The major programs are described under the respective departmental listings, except for the majors in Biological Sciences (outlined below).

The 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 major involving considerations as broad as those of 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 by the College of Letters and Science. The Bachelor of Science degree is offered by both
Biological Sciences

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>42-49</td>
</tr>
<tr>
<td>Microbiology 2 (or 102)</td>
<td>4-6</td>
</tr>
<tr>
<td>Botany 1</td>
<td>5</td>
</tr>
<tr>
<td>Zoology 2-2</td>
<td>6</td>
</tr>
<tr>
<td>Chemistry 1A-1B</td>
<td>10</td>
</tr>
<tr>
<td>Chemistry 8A-9B or 12A-12B-12C-12DA</td>
<td>6-11</td>
</tr>
<tr>
<td>Mathematics and/or statistics</td>
<td>6</td>
</tr>
</tbody>
</table>

Note: A new three-quarter introductory biology sequence is under consideration and may alter these requirements. The Division of Biological Sciences will issue an announcement in the Class Schedule and Room Directory if this change occurs.

Recommended: Chemistry 1C; Physics 6A, 6B, 6C; a course in computer programming.

Course List for Group Requirement

A (organismal biology): Microbiology 105, 162; Botany 102, 105, 106, 114, 118, 119; Entomology 101, 102, 103; Veterinary Microbiology 127, 128; Wildlife and Fisheries Biology 111, 120; Zoology 100, 105, 116, 132, 136, 137.

B (population biology and ecology): Anthropology 154A; Microbiology 120, Botany 117, 141; Entomology 104; Environmental Studies 100, 121; Genetics 105; Geology 150C; Wildlife and Fisheries Biology 110, 151; Zoology 125.

C (evolutionary biology): Anthropology 151, 152; Botany 100, 116, 140; Genetics 103; Geology 107; Plant Science 109; Zoology 148.

D (physiology): Biological Sciences 121, Botany 111A, 111B; Microbiology 130A-130B; Physiology 110, 117, 119; Physiology 115; Plant Physiology 130, Zoology 142, 143.

E (biochemistry and cell biology): Biochemistry 101A-101B; Botany 113; Zoology 130; Zoological Sciences 101A-101B; Physiology 100A-100B.

Total Units for the Major: 78-85

Breadth Subject Matter

College of Letters and Science students: Refer to the College section for a description of requirements to be completed in addition to the major.

Biological Sciences

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>66-73</td>
</tr>
<tr>
<td>Microbiology 2 (or 102)</td>
<td>5</td>
</tr>
<tr>
<td>Botany 1</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry 1A-1B</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 8A-9B or 12A-12B-12C-12DA</td>
<td>6-11</td>
</tr>
<tr>
<td>Mathematics 16A-18B-16C</td>
<td>8</td>
</tr>
<tr>
<td>Physiology 6A-9B-9C</td>
<td>8</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
<tr>
<td>Zoology 2-2</td>
<td>6</td>
</tr>
</tbody>
</table>

Not: A new three-quarter introductory biology sequence is under consideration and may alter these requirements.

The Division of Biological Sciences will issue an announcement in the Class Schedule and Room Directory if this change occurs.

Recommended: Chemistry 5, a course in computer programming.

Depth Subject Matter

Biochemistry 101A-101B or Physiological Sciences 101A-101B: 5-7

Genetics 100                          | 4     |

Restricted Electives                  | 34-35 |

Upper division biological sciences courses to include:

(1) a minimum of 2 units or 6 (quarter) hours of laboratory classes,

(2) at least two courses from each of the three Area Requirements in biology, microbiology, plant biology (see "Course List for Area Requirement" section below following the total units. The lists apply to both the A.B. and B.S. majors), and

(3) at least one course from each of the five Group Requirement lists, (a) through (e) following.

Note: A course that appears on both the Area and Group Requirement lists may be used toward satisfying both requirements. Both halves of sequential courses connected by a hyphen must be taken.

Course List for Area Requirement

A (animal biology): Anatomy 100; Anthropology 151, 152, 153, 154A, 155, 156; Avian Sciences 100; Biological Sciences 120; Entomology 101, 102, 103, 104, 106, 109, 116, 119, 153; Environmental Studies 128; Geology 111A; Human Anatomy 101; Necrology 110; Wildlife and Fisheries Biology 110, 111, 120, 124, 140, 151; Zoology 100, 105, 106, 112, 125, 133, 136, 137, 139, 147, 148, 149, 150.

B (microbiology): Microbiology—all upper division courses (excluding 190-199 courses); Botany 114, 118, 119; Entomology 156; Botany 111B; Medical Microbiology 107; Plant Pathology 130; Veterinary Microbiology 126, 127, 128, 132.


Note: Botany 114, 118, or 119 may be used for either microbiology or plant biology requirements. Microbiology 102 may be taken in place of Microbiology 2 to satisfy the lower division microbiology lecture requirement and simultaneously counts as upper division units in the major and satisfies the Microbiology Area requirement for the B.A. degree and partially satisfies the Microbiology Area requirement for the B.S. degree. Similarly, Microbiology 103, when taken in place of Microbiology 3 satisfies the lower division laboratory requirement and simultaneously counts as upper division laboratory units in both major programs.

Other Upper Division Courses

A list of courses which may be accepted in satisfaction of the upper division major requirement, without petitioning, is available in the Division of Biological Sciences Office.

There is a limitation of variable-unit courses which may be counted toward the major. Of these courses, up to 8 units of 199 courses may be counted, and no units of 197T courses may be counted.

Major Advisers. Contact Division Office for adviser assignments.

Honors and Honors Programs. Students who have met the minimum grade-point average and the units-completed criteria, and who have obtained a sponsoring faculty supervisor may elect to participate in the Biological Sciences Honors Program. The program entails completion of a research project and honors thesis enrollment in course 194H.

The Division of Biological Sciences also confers Citations of Outstanding Performance on undergraduates majoring in Biological Sciences who have demonstrated superior academic performance and individual achievement in research. Students who wish to be considered for a Citation must first meet or exceed a specified grade-point average and participate in an appropriate research project.

The Division additionally recommends students in the Biological Sciences major to the College of Letters and Science for the purpose of awarding High and Highest Honors at graduation. For further details on the above programs and awards, contact the Division Office.

Minor Program Requirements:

The minor in Biological Sciences is designed to acquaint students with the range and variety of modern biology, including work in two of three areas: animal biology, plant biology, and microbiology, and in four of the following five subdisciplines: organismal biology, ecology, evolution, physiology, and biochemistry and cell biology. The list of required courses is restricted to those which are acceptable for the major program in Biological Sciences but which do not require extensive upper division preparatory work; substitutions of more advanced courses can be made, as appropriate, with the approval of an adviser for the minor.

Information on certification of completion of the minor program can be obtained from the Division Office.

Biological Sciences

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genetics 100</td>
<td>4</td>
</tr>
<tr>
<td>Additional upper division units to include</td>
<td>18</td>
</tr>
</tbody>
</table>

Area Requirements

Courses in two areas of three: 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 four of the following five groups:

A (organismal biology): Microbiology 105; Botany 102, 105, 114; Zoology 100, 106, 120, 126, 137.

B (ecology): Anthropology 154A; Botany 101; Environmental Sciences 100; Wildlife and Fisheries Biology 151; Zoology 125.

C (evolution): Anthropology 151; Botany 116, 140; Genetics 103; Geology 148.

D (physiology): Botany 111A, 111B; Physiology 110.

E (biochemistry and cell biology): Biochemistry 101A-101B; Botany 113; Zoology 130; Zoological Sciences 101A-101B; Physiology 100A-100B.

Minor Adviser. Same as for major.

Teaching Credential Subject Representative. Associate Dean (Biological Sciences). See also the Teacher Education Program.
Courses in Biological Sciences

Lower Division Courses

1. Principles of (5) (I) Thornton, Murphy, and Keteleier (Botany); II. Pfeifer (Biological Sciences, Microbiology), Pratt (Microbiology); III. —— (Zoology)

Lecture—4 hours, laboratory—3 hours. Prerequisite: Chemistry 1B (may be taken concurrently). Interdisciplinary course designed for majors in the biological sciences. Emphasis is on the fundamental principles as related to cell structure and function, reproduction, genetics, evolution, and ecology.

10. General Biology (4) (I); II. wheels (Microbiology), Keteleier (Botany)

Lecture—3 hours; discussion—1 hour. Consideration of the main features and principles of biology, with emphasis on biological processes and their role in evolution, reproduction, and the behavior of life. Designed for students not specializing in biology. Not open for credit to those who have completed General Biology credit.

19. Biology of Cancer (3) III. Pfeifer (Biological Sciences, Microbiology)

Lecture—3 hours. Prerequisite: either course 1 or 10, or Genetics 10, or Physiology 10 recommended. Interdisciplinary course offering an introduction to the biological, clinical, and psycho-social aspects of cancer, and emphasizes basic understanding of biological principles and facts about the disease process. Designed for students with little scientific background. Offered in even-numbered years.

98. Directed Group Study (1-5) I, II, III. Staff (Associate Dean in charge)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

Upper Division Courses

115. Problems In Marine Biology (15) III.

Full-time study at Bodega Marine Laboratory. Prerequisite: consent of instructor based on adequate preparation for topic under consideration, i.e., appropriate laboratory courses in invertebrate zoology (normally Zoology 112-112L), microbiology (normally Microbiology 105 or 120), paleontology, geology, or botany.

120. Developmental Biology of Marine Invertebrates (4) III. Clark and Chang (Animal Science)

Lecture—30 hours total; laboratory—30 hours total. Prerequisite: Zoology 100-100L, Biochemistry 101A-101B or Physiological Sciences 101A-101B, and course 123 recommended. Students will develop a unit of biological science invertebrates, which will include collecting, examining, and comparing the development of the marine invertebrates. Emphasis on both modern and classical approaches to understanding gene mutations and their role in development, cell differentiation, morphogenesis, and larval development and metamorphosis. Course offered at Bodega Marine Laboratory (see above description for Bodega Marine Laboratory Program.)

129. Developmental Biology of Marine Invertebrates/Advanced Laboratory Topics (4) III. Clark and Chang (Animal Science)

Lecture—120 hours total. Prerequisite: course 120 concurrently. Students pick a research topic for intensive study. Research will be related to a topic covered in course 120 and will be conducted at the Bodega Marine Laboratory with close supervision of resident faculty. (See above description for Bodega Marine Laboratory Program.)

121. Physiological Adaptation of Marine Organisms (4) III. Clegg and Crowe (Zoology)

Lecture—50 hours total; laboratory—50 hours total. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B, Physics 1A-69-68C, and course 123 (concurrent). Physiological adaptations to the environment among organisms in marine and estuarine habitats. Course offered at Bodega Marine Laboratory. (See above description for Bodega Marine Laboratory Program.)

121P. Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics (4) III. Clegg and Crowe (Zoology)

Laboratory—120 hours total. Prerequisite: course 121 concurrently. Students pick a research topic for intense study. Research will be related to a topic covered in course 121 and will be conducted at the Bodega Marine Laboratory with close supervision of resident faculty. (See above description for Bodega Marine Laboratory Program.)

122. Undergraduate Colloquium In Marine Science (1) III. Clark (Animal Science)

Seminar—1 hour. Prerequisite: enrolled student at the Bodega Marine Laboratory. Series of weekly seminars by recognized authorities in various disciplines of marine science from within and outside the UC system. Includes informal discussion with speaker. Course will be held at Bodega Marine Laboratory. (P/NP grading only.) (See above description for Bodega Marine Laboratory Program.)

182. General Virology (see Microbiology 162)

194A/194B/194HC. Research Honors (3-6) II-III. The Staff (Associate Dean in charge)

Prerequisite: open to majors in Biological Sciences who have completed 135 units and qualify for the honors program as defined by current catalog. Opportunity for Biological Sciences majors to pursue intensive research under the guidance of a faculty adviser. Students are expected to complete the full three-quarter sequence culminating in writing of an honors thesis. (Deferred grading, P/NP grading assigned to course segment only at completion of sequence.)

197T. Tutorial in Biological Sciences (1-3) I, II, III. The Staff (Associate Dean in charge)

Prerequisite: upper division standing; appropriate background in biological sciences or 112C. Students will study topics in Biological Sciences under the direction of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Associate Dean in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

211. Designing Instruction in the Biological Sciences (3) III.

Lecture—1 hour, laboratory—6 hours. Prerequisite: graduate standing. Students will each develop a unit of biological science instruction in their area of specialty (for example, a lecture plan, syllabus, text chapter, audiovisual module). Will consider goals, objectives, selection of appropriate pedagogical strategies, methods, and source materials; organization; development; evaluation.

298. Group Study (1-5) I, II, III. The Staff (Associate Dean in charge)

Prerequisite: consent of instructor. Division of Biological Sciences staff members may offer group study courses under this number.

Professional Course

310. Effective Teaching of College Biology (2) III. Thornton (Botany)

Informal lecture-discussion—2 hours. Teaching function of an academic career; objectives, nature, and methods of effective teaching; design of curricula and courses; lecturing and leading discussion; grading; evaluation; counseling;6 instruction. (SU grading only.)

Biomedical Engineering (A Graduate Group)

David F. Katz, Ph.D., Chairperson of the Group (752-1135 or 752-2504)

Group Office, 3078 Bainer Hall (Chemical Engineering), (752-2504-0400)

NOTE: FOR key to footnote symbols, see page 131.

Faculty

Includes faculty members from the three colleges, and the Schools of Veterinary and Human Medicine. Those listed below are members of the Group Executive Committee or are faculty advisers.

Fitz-Roy E. Cuny, Ph.D., Professor (Human Physiology)
Mont Hubbard, Ph.D., Professor (Mechanical Engineering)
Maury L. Hull, Ph.D., Associate Professor (Mechanical Engineering)
David Katz, Ph.D., Professor (Obstetrics and Gynecology/Obstetrics and Gynecology)
R. Bruce Martin, M.D. Professor in Residence (Orthopaedic Surgery)
James F. Shackelford, Ph.D., Professor (Materials Science and Engineering)
Keith R. Williams, Ph.D., Assistant Professor (Physical Education)

Graduate Study. The Graduate Group in Biomedical Engineering offers programs of study and research leading to the M.S. and Ph.D. degrees. The programs of study are intended to prepare students for professional work in the effective integration of engineering and biology and medical sciences, including modeling of biological systems and the design of devices and procedures used in medical and veterinary medicine. It is a broad interdepartmental program which is best suited for students who are capable and comfortable with considerable independence. Each student holds a specific course of study suited to individual goals.

Preparation. The Group regards strong competence in mathematics and engineering as necessary for successful completion of study. Prior course work in these areas is emphasized in the evaluation of applications. Some such training can in principle be acquired after admission to the Group, but it generally necessitates one or more additional years of study.


Graduate Courses

200. Introduction to Biomedical Engineering (4) I. Katz

Lecture—4 hours. Introduction to application of and interaction between engineering technology and the biological and medical sciences and demonstration of some clinical applications.

210. Introduction to Biomaterials (4) II. Shackelford

Lecture—4 hours. Prerequisite: Engineering 45 or consent of instructor. Mechanical and atomic properties of metallic, ceramic, and polymeric implant materials; corrosion, degradation, and failure of implants; inflammation, wound and fracture healing, blood compatibility of prostheses, and bone and blood vessels; biocompatibility of orthopedic and cardiovascular materials.

227. Research Techniques in Biomechanics (3) II. Williams

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor; Physical Education 115 recommended. Experimental techniques for biomechanical analysis of human movement are examined. Topics include the use of body segment data collection and analysis by computer, force platform analysis, strength assessment, planar and three-dimensional cinematography, data reduction and smoothing, body segment parameter determination; electromyography; biomechanical modeling. (Same as Physical Education 227.)

252. Advanced Information Systems (3) II. Wallers

Lecture—2 hours; laboratory—3 hours. Prerequisite: experience in initial phases of data preparation, editing and sorting; Computer Science Engineering 168 or the equivalent; must be able to perform at graduate level. To increase through
examples, projects and discussions, understanding of the composition of living systems, including biochemistry, molecular biology, genetics, and other disciplines.

Graduate Study: The Graduate Program in Biophysics offers programs of study leading to M.S. and Ph.D. degrees. Biophysics is a broad interdisciplinary program that is ideal for students who are comfortable with considerable independence. The emphasis is on molecular biophysics. The curriculum consists of several core courses in biology, chemistry, and physics, followed by specialty courses related to research interests. Specific program requirements are decided upon by a committee consisting of a research supervisor, the graduate advisor, and a group member. The committee meets to consider individual educational needs with the student.

Graduate Adviser: Y. Yeh (Applied Science Engineering).

Graduate Courses

200. Current Techniques in Biophysics (2) II, III. McNamee Lecture—2 hours. Prerequisite: graduate standing; Biochemistry IA, Biology IA, or equivalent. Current techniques in biophysics research including diffusion, magnetic resonance spectroscopy, calorimetry, optical spectroscopy, and electron microscopy. (1 SU grading only.)

200LA. Biophysics Laboratory (2) I, II, III. The Staff (Chairperson in charge) Laboratory—18 hours (6 weeks). Prerequisite: course 200 (may be taken concurrently). Laboratory assignment in the research laboratory of a Biophysics Graduate student faculty member(s). Individual research problems with emphasis on theoretical/computational experience and experimental design. (1 SU grading only.)

200LB. Biophysics Laboratory (2) I, II, III. The Staff (Chairperson in charge) Laboratory—18 hours (6 weeks each). Prerequisite: course 200 (may be taken concurrently). Two-week research assignments in the research laboratories of Biophysics Graduate faculty members. Individual research problems with emphasis on methodologies/techniques and experimental design.

290C. Research Conference in Biophysics (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: graduate standing in biophysics and/or consent of instructor; course 399 concurrently. Presentation and discussion of faculty and graduate student research in biophysics. May be repeated for credit. (1 SU grading only.)

290G. Group Study (1-2) I, II, III. The Staff (Chairperson in charge) (5 SU grading only.)

299A. Research (1-2) I, II, III. The Staff (Chairperson in charge) (5 SU grading only.)

Botany (College of Letters and Science)

Teresa E. Murphy, Ph.D., Chairperson of the Department
Department Office, 143 Robbins Hall (752-0617)

Faculty

Frederick T. Addicott, Ph.D., Professor Emeritus
Lars Anderson, Ph.D., Lecturer
Floyd M. Ashton, Ph.D., Professor Emeritus
David A. Axelrod, Ph.D., Professor Emeritus
Malcolm F. Barbour, Ph.D., Professor
David E. Bayer, Ph.D., Professor
Bruce A. Bonner, Ph.D., Associate Professor
Paul A. Castelfranco, Ph.D., Professor
Alden S. Crafts, Ph.D., LL.D., Professor Emeritus
Herbert B. Currier, Ph.D., Professor Emeritus
James A. Doyle, Ph.D., Professor (Botany, Geology)
D. Clyde Elmore, Ph.D., Lecturer
Emanuel Epstein, Ph.D., Professor Emeritus (Botany, Land, Air, and Water Resources)
Richard H. Egan, Ph.D., Professor
Ernest M. Gilford, Jr., Ph.D., Professor Emeritus
John J. Harada, Ph.D., Assistant Professor
Hendrik J. Ketelapper, Ph.D., Professor
Donald W. Kuo, Ph.D., Professor
Norma J. Lang, Ph.D., Professor
W. Thomas Lanini, Ph.D., Lecturer
William J. Lusea, Ph.D., Professor
Jack Major, Ph.D., Professor Emeritus
W.B. (Jim) McHenry, Lecturer
Larry Milich, Ph.D., Lecturer
Terence M. Murphy, Ph.D., Professor Emeritus
Robert F. Norris, Ph.D., Associate Professor
Robert W. Peary, Ph.D., Professor
Marcus Remanek, Ph.D., Assistant Professor
Thomas R. Scudder, Ph.D., Lecturer
Maureen L. Stanton, Ph.D., Associate Professor
Alan J. Steniker, Ph.D., Professor
C. Ralph Stocking, Ph.D., Professor Emeritus
Steven M. Thrall, Ph.D., Assistant Professor
Robert M. Thomas, Ph.D., Senior Lecturer
John M. Tucker, Ph.D., Professor Emeritus
Larry Vanderhoff, Ph.D., Professor
Grady L. Webster, Ph.D., Professor
T. Elliott Weir, Ph.D., Professor Emeritus
Kenneth Wells, Ph.D., Professor

The Major Programs

Study leading to the Bachelor of Arts or Bachelor of Science degrees in botany involves several basic sciences, including mathematics, chemistry, physics, biochemistry, and genetics, as well as intensive consideration of several specialized areas of plant biology: anatomy, cell and molecular biology, morphology, systematic, and plant evolution, physiology, ecology, and mycology, and weed science.

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 the upper division courses in the subject at UC Davis.

NOTE: For key to footnote symbols, see page 131.

Choice of College. The Bachelor of Arts degree is offered only in the College of Letters and Science and should be selected by those interested in a less intensive program in science, but one which permits a basic introduction to plant biology. The Bachelor of Science degree is offered in both the College of Letters and Science and the College of Agricultural and Environmental Sciences and should be selected by those with a greater background in the fundamental sciences and in botany. There are two academic plans offered within the B.S. program.

Graduate Study. The Department is a nationally recognized center for research and graduate study in many areas of plant biology, including ecology and systematics, cell and developmental botany, and biophysics of plant functions. It is also a center for the study of weed science (weed biology, weed control, and herbicide physiology). Graduate students study with faculty in the Department under the auspices of the following Graduate Groups: Botany, Plant Physiology, Genetics, Cell and Developmental Biology, Biochemistry, Biophysics, Ecology, and Microbiology. Refer to specific graduate groups in this section of the catalog.

Botany

A.B. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences</td>
<td>5</td>
</tr>
<tr>
<td>Botany</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 1C</td>
<td>16</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4-6</td>
</tr>
<tr>
<td>Zoology 2-25, or Microbiology 2 or 102, 3</td>
<td>8-9</td>
</tr>
</tbody>
</table>

Total Units for the Major: 75-78

Recommended

Botany 100, 118, 119; Chemistry 1C.

For students with interests in specialized areas of botany (e.g., agricultural botany, ecology, systematics and evolution, morphological plant physiology), certain substitutions, including courses in other departments, may be allowed on prior consultation with a botany major advisor.

Botany

B.S. Major Requirements:

Option 1: For those who plan (a) advanced study in some areas of botany or a related discipline, (b) to obtain a general secondary teaching credential, or (c) training for a position requiring a detailed knowledge of plants.

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences</td>
<td>5-64</td>
</tr>
<tr>
<td>Botany 100, 101B</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 1C</td>
<td>15</td>
</tr>
<tr>
<td>Physics 6A-68B or 128A-128B</td>
<td>6</td>
</tr>
<tr>
<td>Physics 6A, 6B, 6C</td>
<td>12</td>
</tr>
<tr>
<td>Mathematics 16A, 16B</td>
<td>6</td>
</tr>
<tr>
<td>Zoology 2-25, or Microbiology 2 or 102, 3</td>
<td>4-6</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Units for the Major: 104-111

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, morphological plant physiology, etc.), certain substitutions, including courses in other departments, may be allowed on prior consultation with a botany major advisor.
Botany

Option Il: For those who plan advanced study in physiology and/or biochemistry of plants.

Preparatory Subject Matter

UNITS

Recommended

56-68

Biological Sciences 1

5

Biology 101, 102

Chemistry 1A-1B 1C-5 or 4A-4B-4C

15-19

Chemistry 8A-8B or 128A-128B-128C-129

8-11

Mathematics 16A-16B-16C or 21A-21B-21C

9-12

Physiology 8A-8B-8C or 8A-8B-8C

12

Statistics 13 or 192

4

Depth Subject Matter

50-53

Biology 101A, 101B, 102, 125

15

Botany 105, 111A, 111B, 111L

14

Genetics 100

4

Chemistry 120A, 120B, 120C, 121

6

One course each in three of the following four areas

12-15

(a) Taxonomy and Evolution: Botany 102, 108, 114

(b) Morphology and cytology: Botany 116, 130, 140

(c) Physiological and ecological botany: Botany 114, 118, 119

(d) Botany 117

Total Units for the Major

106-121

Botany 196 (3-5 units); German, French, or Russian; Engineering of Computer Science Engineering 30.

Certain laboratories, including courses in other departments, may be allowed on prior consultation with the major advisor.

Breadth Subject Matter

Collaborative and environmental sciences (24)

5

English and/or rhetoric

8

Social sciences and/or humanities

18

See the College section for additional requirements.

College of Letters and Sciences students: Refer to the College section for a description of the work that must be completed in addition to the major.

Major Advisers: R.M. Thornton (Master Adviser); K. Wells (for A.B. and B.S., Option I); J.J. Harada (B.S., Option II).

Minor Program Requirements:

Botany 104, 105, 114, 116, 118, 119, 130

18

(a) Botanical and Evolutionary botany 105, 114, 116, 118, 119, 130

(b) Ecological botany: Botany 101A, 117

16

(c) Systems and evolution: Botany 102, 114, 116, 118, 119, 140

(d) Botany 114, 116, 118 and 119 may be offered toward satisfaction of either group (a) or (b) above. However, a single course may not satisfy both groups' requirements.

Minor Adviser. Same as for Major above.

Honors and Honors Program. Students on the honors list may elect to substitute a maximum of 5 units of 105A and 105B in units of the regular major; however, recommendations for high honors and highest honors at graduation are not dependent on the completion of 144 units. Refer to the Academic Information and the appropriate College section for Dean's Honors List information.

Teaching Credential Subject Representative. R. M. Thornton. See also the Teacher Education Program.

Graduate Study. Graduate programs leading to M.S. and Ph.D. degrees are offered in cytology, plant physiology, molecular biology, anatomy, morphology, taxonomy, ecology, physiology, phy-
and gene structure and their influence on growth and differentiation of higher plant tissues.

130. Survey of Cell Biology (4) I. Leslie, Fall. II. They Lecture—3 hours; discussion—1 hour. Prerequisite: Chem- istry 83 or 101, introductory in biochemistry strongly recommended. Survey of cell biology presenting the structure and function of the major cellular organelles. Topics discussed include cell division, cell polarity, gene expression, and membranes. Currently popular methodologies used in cell biology will be presented in a discussion section. Not open to seniors. Offered, trimester-number years.

243. Palaeobotany (4) I. Doyle Lecture—2 hours; laboratory—6 hours. Prerequisite: course 108, 116, or 140. Morphology of spores and pollen grains and their use in stratigraphic correlation, evolutionary, and paleoecological phases. Techniques for studying modern spores and pollen and extraction and identification of fossil paly- norophytes from sediments of Paleozoic to Quaternary age. Offered in odd-numbered years.

255. Principles of Plant Taxonomy (4) I. They Lecture—2 hours; laboratory—6 hours. Prerequisite: course 106, 117, or Genetics 103 recommended. Application of experimental techniques to the elucidation of taxonomic principles of plant phyla. Phylogenetic vs. phenotypic classification; examples of the way in which various disciplines—anthropology, embryology, biochemistry, etc.—affect our concepts of plant relationships, mainly of genera and higher categories.

256. Experimental Plant Taxonomy (2) II. Kyhos Lecture—1 hour; laboratory—3 hours. Prerequisite: course 106, 117, or Genetics 103 recommended. Application of experimental techniques to the elucidation of taxonomic principles of plant phyla. Phylogenetic vs. phenotypic classification; examples of the way in which various disciplines—anthropology, embryology, biochemistry, etc.—affect our concepts of plant relationships, mainly of genera and higher categories.

Botany (A Graduate Group) (163)

Lawrence Rappaport, Ph.D., Chairperson of the Group

Grouppr, 152 Robbins Hall (752-7094)

Faculty. Includes 84 faculty members from ten departments in the field of plant biology.

Graduate Study. The Graduate Group in Botany serves to direct and coordinate graduate studies for students in A. S. and Ph.D. degree programs in botany and in the physical sciences. Specific program specializations include anatomy, biochemistry, cell biology, ecology, ge-
notice, molecular biology, morphology, mycology, paleobotany, physiology, systematics, and weed science. Studies in these specialized fields are designed to prepare students for careers in teaching and research in botany at the college or university level or in research in basic or applied botany in government, or industrial laboratories.

Preparation. Applicants are expected to hold a bachelor's degree in botany, biology, or a related discipline. Courses in the following areas are considered to be prerequisite to the advanced degrees in botany: plant morphology (including courses treating algae and/or fungi), anatomy, systematics, ecology, physiology, genetics, general chemistry, organic chemistry, biochemistry, general physics, calculus, and statistics. To some extent, deficiencies in these areas can be made up after admission into the graduate program. The Graduate Adviser and major professor will design, in consultation with the student, a program of advanced courses to meet individual academic needs.

Cantonese
See Asian American Studies

Cell and Developmental Biology (A Graduate Group)
David W. Deamer, Ph.D., Chairperson of the Group (752-2779)
Group Office, 2320 Storer Hall (752-7468)

Faculty. The group includes 30 faculty members from thirteen departments in the College of Agricultural and Environmental Sciences, College of Letters and Science, and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The Graduate Group in Cell and Developmental Biology offers programs of study leading to the Ph.D. degree. Cell and Developmental Biology is a broad interdisciplinary program. The curriculum consists of core courses in cell biology or developmental biology. Specific programs of study are decided upon by an advisory committee chaired by the student's research adviser, and the choice of major core courses will reflect the student's primary research interest.

Preparation. Appropriate preparation is an undergraduate degree in a biological or physical science. Preparation should include a year of calculus, physics, general chemistry and organic chemistry, and introductory courses in statistics, biochemistry, genetics, and cell biology.

Graduate Advisers. C.A. Erickson (Zoology), S. Meisel (Human Anatomy).

Courses in Cell and Developmental Biology

Graduate Courses

200. Current Techniques in Cell Biology (2) [2. Nucicleti](Lecture--2 hours. Current techniques used in cell biology research including microscopy, spectrosocopy, electrophysiology, immunocytochemistry, histology, organelle isolation, electron microscopy, tissue culture and gel electrophoresis. Lectures are presented by experts on each technique, with emphasis on pitfalls to avoid when using the technique. (S/U grading only.) (Same course as Zoology 200).

200A. Cell and Developmental Biology Laboratory (3) [2, 3, 4]. The Staff (Chairperson in charge). Laboratory--8 hours (one-week assignment). Prerequisite: course 200 (may be taken concurrently). Assignment in research laboratory of a Cell and Developmental Biology graduate group member. Individual research problems with emphasis on experimental design and experimental design. (Same course as Zoology 200A).

200B. Cell and Developmental Biology Laboratory (2) [3, 4]. III. The Staff (Chairperson in charge). Laboratory--9 hours (one-week assignment). Prerequisites: course 200 (may be taken concurrently). Assignments in research laboratories of Cell and Developmental Biology graduate group members. Individual research problems with emphasis on experimental design and experimental design. (Same course as Zoology 200B).

205. Cell Biology of the Cytokinesis [2]. III. Tablin, Appleguter Lecture--1 hour and discussion 1/2 hour (course hours entered to run sequentially); student presents critical analysis of current journal article and submits written outline and reference list for that publication. General organization of the cytokinesis; introduction to cytokinesis; proteins, actin, tubulin, intermediate filaments, myosin, and other associated proteins. Presentation of current problems related to specialized cytokinesis systems. Topics vary. (S/U grading only.) Even-numbered years only.

280. Current Topics in Cell and Developmental Biology (1) [2, 3]. III, III. The Staff (Chairperson in charge). Seminar--1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by guest lecturers describing their research activities. May be repeated for credit. (S/U grading only.)

290. Research Conference in Cell and Developmental Biology (1) [1, 2]. III, III. The Staff (Chairperson in charge). Discussion--1 hour. Prerequisite: graduate standing in Cell and Developmental Biology and/or consent of instructor; course 299 concurrently. Presentation and discussion of faculty and graduate student research in cell and developmental biology. May be repeated for credit. (S/U grading only.)

299. Group Study (1-3) [1, 2]. II, III. The Staff (Chairperson in charge) (S/U grading only)

Chemistry

(College of Letters and Science)
R. Bryan Miller, Ph.D., Chairperson of the Department
William H. Fink, Ph.D., Vice-Chairperson of the Department

Department Office, 108 Chemistry Building (752-3955/3956)

Faculty
Thomas L. Allen, Ph.D., Professor
Lawrence J. Andrews, Ph.D., Professor Emeritus
Alan L. Balch, Ph.D., Professor
Albert T. Bottini, Ph.D., Professor
Robert K. Brinton, Ph.D., Professor Emeritus
Joyce T. Doli, Ph.D., Associate Adjunct Professor
Timothy C. Donnelly, Ph.D., Lecturer
W. Ronald Fink, Ph.D., Professor
*William H. Fink, Ph.D., Professor
Edwin C. Friedrich, Ph.D., Professor
Savvik S. Friedman, Ph.D., Lecturer
Hakan Hoge, Grad. Fellow, Professor
William R. Jackson, Ph.D., Professor
Susan M. Kauzlarich, Ph.D., Assistant Professor
Raymond M. Keeler, Ph.D., Professor
Leslie K. Kerber, Ph.D., Professor
Peter B. Kelly, Ph.D., Assistant Professor
Richard E. Kepner, Ph.D., Professor Emeritus
Mark J. Kurth, Ph.D., Associate Professor
Gand N. Lai-Mey, Ph.D., Professor
Carlitto B. Lebrilla, Ph.D., Assistant Professor
August H. Maki, Ph.D., Professor
Donald A. McCusker, Ph.D., Professor
Claude F. Mears, Ph.D., Professor
R. Bryan Miller, Ph.D., Professor

Tadeusz F. Molinski, Ph.D., Assistant Professor
W. Konrad Musker, Ph.D., Professor
Krishnan P. Nambiar, Ph.D., Assistant Professor
Michael H. Nantz, Ph.D., Assistant Professor
Charles P. Nash, Ph.D., Professor
Edgar P. Painter, Ph.D., Professor Emeritus
Philip P. Power, Ph.D., Professor
Peter A. Rock, Ph.D., Professor
Robert N. Rosenfeld, Ph.D., Associate Professor
Carl W. Smidt, Ph.D., Professor
Neil E. Scione, Ph.D., Professor
Kevin M. Smith, Ph.D., Professor
Leo H. Sommer, Ph.D., Professor Emeritus
James H. Swainhart, Ph.D., Professor
Dino S. Tinti, Ph.D., Professor
Nancy S. True, Ph.D., Associate Professor
David H. Volman, Ph.D., Professor Emeritus
Fred E. Wood, 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 for the B.S. degree offers a less intensive program in chemistry and is appropriate for a student with a strong interest in chemistry, but who also has another goal such as 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 reading 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 photographic industry. An advanced degree is usually required for a career in research or education.

Chemistry

A.B. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
<th>Chemistry 1A-1B</th>
<th>5-6</th>
<th>Physics 1A-1B</th>
<th>5-6</th>
</tr>
</thead>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
<th>Chemistry 110A, 110B, 110C, 124A, 124B</th>
<th>25</th>
</tr>
</thead>
</table>

At least 11 additional upper division units in chemistry (except Chemistry 107A or 107B), biochemistry, or physics

Total Units for the Major

72-79

Chemistry

B.S. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
<th>Chemistry 1A-1B</th>
<th>5-6</th>
<th>Chemistry 1A-1B</th>
<th>5-6</th>
</tr>
</thead>
</table>

Total Units for the Major

49-54
Physics 8A, 8B, 8C, 8D, 16
Mathematics 21A, 21B, 21C, 22A; 52A or 52C, 18

Depth Subject Matter

47 Chemistry

A least one additional upper division unit in chemistry (except Chemistry 107A, 107B), including one course with laboratory work ........... 9

Total Units for the Major

96-100


Honors and Honors Program. The honors program comprises 6 units of course 194H.

Graduate Study. The Department of Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Chemistry. See also the Graduate Division section in this catalog.

Courses in Chemistry

Lower Division Courses

1A. General Chemistry (5) L. Rock, Wood, S. Friedrich; II. Lamar, McQuarrie; Lecture—3 hours; discussion—1 hour; laboratory—3 hours.

Chemistry and physics of good facility in algebra and geometry including logarithms and exponents recommended. Fundamental principles of chemistry, properties of solutions, periodic table, stoichiometry, gases, thermodynamics, atomic and molecular structure. General Education credit for non-GE course sequence—1B which will satisfy one GE course: Nature and Environment/Introductory. (CAN Chem Seq A)

1B. General Chemistry (5) II. Allen, Donnelly, Rock; III. McQuarrie; Lecture—3 hours; discussion—1 hour; laboratory—3 hours.

Prerequisite: course 1A or 4A. Continuation of course 1A.

1C. General Chemistry (5) I. Donnelly; II. III, Kaudlisch; Lecture—3 hours; discussion—1 hour; laboratory—3 hours.

Prerequisite: course 1B or 4B. Continuation of course 1B.

4A. General Chemistry (5) I. Tinti; Lecture—3 hours; discussion—1 hour; laboratory—3 hours.

Prerequisite: Mathematics 21A (may be taken concurrently); highly recommended for engineering and physics. Biochemistry, the periodic table, chemical reactions and equations, physical properties and kinetic theory of gases and atomic structure and chemical bonding. Intended for students majoring in the physical sciences or engineering. Course sequence 4A-4B-4C is equivalent to sequence 1A-1B-1C-5.

4B. General Chemistry (5) I. Wood; Lecture—3 hours; laboratory—6 hours.

Prerequisite: course 4A. Continuation of course 4A. Chemical thermodynamics; the properties of liquids and solutions; quantitative treatment of chemical equilibria with applications to precipitation reactions; acid-base reactions, and oxidation-reduction reactions; electrochemistry. Laboratory. Will emphasize quantitative wet-chemical techniques.

4C. General Chemistry (5) I. Nash; Lecture—3 hours; laboratory—6 hours.

Prerequisite: course 4B. Continuation of course 4B.

8A. Organic Chemistry; Brief Course (3) I. Bottini; II. Smith; III. Doi.

Lecture—3 hours. Prerequisite: course 1B with a grade of C- or higher. Introduction to the nature, structure, chemistry, and reaction mechanisms of organic compounds. Intended for students majoring in areas other than chemistry.

8B. Organic Chemistry; Brief Course (5) L. Doi; II. S. Friedrich; III. Musker; Lecture—2 hours; laboratory—3 hours.

Prerequisite: course 8A. Continuation of course 1B with a grade of C- or higher. Introduction to the nature, structure, chemistry, and reaction mechanisms of organic compounds primarily with the study of the properties and chemistry of the common classes of organic compounds.

8C. Concepts of Chemistry (4) I. Sweeney; Lecture—4 hours. Survey of basic concepts and contemporary applications of chemistry. Designed for non-science majors and not as preparation for Chemistry 1A. Course not open to students who have taken Chemistry 1A but students with a grade of C- or higher may take with credit 10 course may take Chemistry 1A for full credit. General Education credit: Nature and Environment/Introductory.

98. Directed Group Study (1-9) L, II, III. The Staff (Chairperson in charge) Consent of instructor. Prerequisite: for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-9) L, II, III. The Staff (Chairperson in charge) Consent of instructor. (P/NP grading only.)

Upper Division Courses

107A. Physical Chemistry for the Life Sciences (3) I. The Staff; Lecture—3 hours. Prerequisite: course 4C or 5C or consent of instructor. Mathematics 16C or 21C; one year college level physics. A basic course in physical chemistry intended for majors in the life sciences area. Introductory development of classical and statistical thermodynamics including equilibrium and reaction rates, principles of kinetics, theory of gases and liquids. Transport processes in liquids and solutions.

107B. Physical Chemistry for the Life Sciences (3) II. Schmidt; Lecture—3 hours. Prerequisite: course 107A or 110A. Continuation of course 107A. Electrochemistry and the thermodynamics of simple electrolyte solutions. Chemical rate processes, surface phenomena, atomic and molecular structure, x-ray crystallography, radiation and nuclear chemistry, and to surface chemistry and colloidal systems. Consideration of polymerization and structural aspects of biological systems.

108. Physical Chemistry of Macromolecules (3) III. Meares; Lecture—3 hours. Prerequisite: course 107B or 110C. Physical properties and characterization of macromolecules with emphasis upon those of biological interest. Structural thermodynamics, optical and transport properties of polymers in bulk and in solution. Physical characterization methods. Special topics on the properties of polyelectrolyte systems.

110A. Physical Chemistry; Thermodynamics (3) I. Nash; II. III, Rock; Lecture—3 hours. Prerequisite: course 5 or 4C. Mathematics 21C or 16C; one year college physics. Development and application of the principles of chemical thermodynamics.

110B. Physical Chemistry; Quantum Mechanics (3) I. Kelly; II. Kelso; Lecture—3 hours. Prerequisite: course 110A. Atomic and molecular structure and spectra.

110C. Physical Chemistry; Kinetics (3) II. Nash; III. Jackson; Lecture—3 hours. Prerequisite: course 110B. Statistical thermodynamics, kinetic theory of gases, and chemical kinetics.

111. Physical Chemistry; Methods and Applications (4) I. — III, Tinti; Lecture—2 hours; laboratory—6 hours. Prerequisite: course 110C. May be taken concurrently. Consent of instructor. Introduction to the use of classical theoretical methods and applications of physical chemistry. Laboratory experiments illustrating the use of thermodynamics, chemical equilibrium, kinetic and mass transfer processes, fluid mechanics, and thermodynamic properties of solutions and gases.

112. Physical Chemistry Laboratory; Advanced Methods (3) II. Hope, Tinti; Lecture—1 hour; laboratory—6 hours. Prerequisite: course 111 or 115. Time, energy, and matter; data collection and data analysis using laboratory computers. Experiments are chosen from form areas such as computers in chemistry, physical measurements on macromolecules, surface chemistry and heterogeneous catalysis. All students will be trained in scientific writeup of results.

121. Introduction to Molecular Structure and Spectra (4) III. True; Lecture—4 hours. Prerequisite: course 110B. Modern theoretical and experimental methods of investigating the structure of molecules of structure and bonding; emphasis on spectroscopic techniques.

124A, Inorganic Chemistry; Fundamentals (3) I. Kauczok; Lecture—3 hours. Prerequisite: course 110C. Molecular geometry and structure, molecular orbital theory of bonding (polyatomic molecules and transition metals), solid state chemistry, energetics and spectroscopy of inorganic compounds.

124B. Inorganic Chemistry; Main Group Elements (3) II. Elson; Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of inorganic and heterocyclic molecules containing the main group elements.

124C. Inorganic Chemistry; d and f Block Elements (3) III. Balth; Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of transition metal complexes, organoruthenium and boronorganic chemistry, the lanthanides and actinides.

126. Nuclear and Radiochemistry (3) I. Lecture—3 hours. Prerequisite: course 124B may be taken concurrently. Introduction to theory and experimental methods in nuclear and radiochemistry including nuclear properties, radioactive decay, isotopic effects, nuclear thermodynamics, radiation effects, and short-lived radionuclides in mechanistic, and physical chemistry studies.

128A. Organic Chemistry (3) I. Molinik; II. Musker; III. E. Friedrich; Lecture—3 hours; laboratory—6 hours. Prerequisite: course 128B or consent of instructor; course 128A strongly recommended; chemistry majors should enroll in chemistry 128A concurrently. Continuation of course 128B with emphasis on aromatic and aliphatic substitution reactions, elimination reactions, and the chemistry of carbonyl compounds. Introduction to the application of spectroscopic methods to organic chemistry.

128C. Organic Chemistry (3) I. Nantz; II. Schone; Lecture—3 hours. Prerequisite: course 128B, chemistry majors should enroll in chemistry 128C concurrently. Continuation of course 128B with emphasis on enolate condensations and the chemistry of amines, phenols, and sugars; selected biologically important compounds will be studied.

129C. Organic Chemistry Laboratory (2) I, II, III. The Staff; Lecture—1 hour; laboratory—3 hours. Prerequisite: course 128C or 4C with a grade of C or higher; 128A may be taken concurrently. Introduction to laboratory techniques of organic chemistry. Emphasis is on methods used for separation and identification of organic compounds. Only one unit credit allowed students having had course 88.

129B. Organic Chemistry Laboratory (2) I, II, III. The Staff; Laboratory—6 hours. Prerequisite: courses 129A and 129B, may be taken concurrently and 129B. Continuation of course 129A.

129C. Organic Chemistry Laboratory (2) I, II, III. The Staff; Laboratory—6 hours. Prerequisite: courses 129B (may be taken concurrently) and 129B. Continuation of course 129B.

130. Qualitative Organic Chemistry (4) III. Miller; Lecture—1 hour; laboratory—9 hours. Prerequisite: courses 5 or 129C. Application of physical and chemical techniques to the qualitative identification of organic compounds.

131. Modern Methods of Organic Synthesis (3) II. Zwefel; Lecture—3 hours. Prerequisite: course 129C. Introduction to modern synthetic methods involving the use of spectroscopic techniques and reaction mechanisms. Emphasis will be placed on synthetic applications in the preparation of organic compounds.

140. Synthetic Chemistry (4) IV. Wood; Lecture—1 hour; laboratory—9 hours. Prerequisite: courses 124A, 124B, 129C. Integrated inorganic-organic course in the design, preparation, purification and characterization of multifunctional organic, organometallic and transition metal compounds using a wide range of methods.

158. Chemistry of Natural Products (3) I. Smith; Lecture—3 hours. Prerequisite: course 128C. Chemistry of
terpenes, steroids, acetylcholines, and alkaloids; isolation, structure, and determination of spin, optical, physical, and chemical properties, and total synthesis.

194. Undergraduate Research (2-6) I, II, III. The Staff (Chairperson in charge)

Prerequisites: consent of instructor. 110C may be taken concurrently) and honors status. Original research and a written report of the investigation. Unit value to be determined by instructor upon approval of the research. (P/NP grading only)

197. Projects in Chemical Education (1-4) I, II, III. The Staff (Chairperson in charge)

Discussion and/or laboratory. Prerequisite: consent of instructor. Permits development of laboratory experiments, lecture demonstration, autotutorial modules or seminars in laboratory techniques. May be repeated for a total of 12 units. (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 upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only)

Graduate Courses

201. Basic Chemical Uses of Symmetry and Group Theory (3) [G. C. Lecchini]

Lecture—2 hours. Prerequisite: graduate standing in chemistry. Symmetry elements, operations and point groups, molecular symmetry and group representations. R. Applications to molecular orbitals and molecular vibrations.

205. Symmetry, Spectroscopy, and Structure (3) I. K. Kelly

Lecture—3 hours. Prerequisite: course 201 or the equivalent. Vibrational and rotational spectra; electronic spectra; photoelectron spectroscopy; magnetics; electron spin and nuclear quadrupole resonance spectroscopy; nuclear magnetic resonance spectroscopy; other spectroscopic methods.

210A. Quantum Chemistry: Introduction and Stationary-State Properties (3) II. T. Trud

Lecture—3 hours. Prerequisite: course 110B and 110C or consent of instructor. Stationary-state quantum chemistry, postulates of quantum mechanics, simple solutions, crystal-field problems and angular momenta, hydrogen atom, perturbation theory, atoms and molecules.

210B. Quantum Chemistry: Time-Dependent Systems (3) III. Naka

Lecture—3 hours. Prerequisite: course 210A. Matrix mechanics and time-dependent quantum chemistry; Matrix formulation of quantum mechanics, Heisenberg representation, time-dependent perturbation theory, selection rules, density matrix, and miscellaneous molecular properties.

210C. Quantum Chemistry: Molecular Spectroscopy (3) I. Trud

Lecture—3 hours. Prerequisite: course 210B. Molecular spectra and spectral properties; electronic powder patterns, infrared, and electronic spectra, spin systems, and molecular photochemistry.

211A. Advanced Physical Chemistry: Statistical Thermodynamics (3) I. McQuarrie

Lecture—3 hours. Prerequisite: consent of instructor. Principles and applications of statistical mechanics; ensemble theory; statistical thermodynamics of gases, solids, liquids, electrolyte solutions and polyelectrolytes; chemical equilibrium.

211B. Statistical Mechanics (3) III. Kelzer, McQuarrie

Lecture—3 hours. Prerequisite: course 211A. Statistical mechanics of non-equilibrium systems, including the rigorous kinetic theory of gases, continuum mechanics transport in dense gases, and the Boltzmann equation and linear response theory. Offered in odd-numbered years.

212. Chemical Dynamics (3) II. Rosenfeld, Jackson

Lecture—3 hours. Prerequisite: consent of instructor. Introduction to modern concepts in chemical reaction dynamics for graduate students in chemistry. Emphasis will be placed on experimental techniques as well as emerging physical models of reaction dynamics at a microscopic level. Offered in even-numbered years.

215. Theoretical and Computational Chemistry (3) III. Kelzer, McQuarrie, Firk

Lecture—3 hours. Prerequisite: courses 211A and 210B or consent of instructor. Mathematics of wide utility in chemistry, computational methods for guidance or alternative to experiment. Modern applications of chemical theory. Emphasis will vary in successive years. May be repeated for credit when topics differ. Offered in even-numbered years.

216. Magnetic Resonance Spectroscopy (3) II. Masi, LeMar

Lecture—3 hours. Prerequisites: courses 210A, 210B (may be taken concurrently). Quantum mechanics of spin

217. X-Ray Structure Determination (3) III. Hope

Lecture—4 hours. Prerequisite: consent of instructor. Introduction to x-ray structure determination; crystals, symmetry, diffraction geometry, sample preparation and handling, data reduction and data collection. Techniques of structure solution and refinement, presentation of results, text and tables, and graphics, crystallographic literature.

218. Physical Principles of Macromolecular Structure (3) III. The Staff

Lecture—3 hours. Prerequisite: course 211A or the equivalent. Relationship of higher order macromolecular structure to subunit composition; equilibrium properties and macromolecular dynamics in the interpretation of macromolecular structure. Offered in even-numbered years.

219. Spectroscopy of Organic Compounds (3) I. Kurth

Lecture—3 hours. Prerequisite: course 212B or the equivalent. Identification of organic compounds and investigation of stereochemical and reaction mechanism phenomena using spectroscopic methods—principally NMR, IR, and MS.

221A-H. Special Topics in Organic Chemistry (3) I, II, III, The Staff

Lecture—4 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered.

226. Principles of Transition Metal Chemistry (3) I. Power

Lecture—3 hours. Prerequisite: course 212A or the equivalent. Electronic structures, bonding, and reactivity of transition metal compounds.

227A-F. Special Topics in Inorganic Chemistry (3) III, II, I. The Staff

Lecture—4 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented special-topics courses in inorganic chemistry.

228. Bioinorganic Chemistry (3) III. Sillen

Lecture—4 hours. Prerequisite: course 227B or consent of instructor. Role of inorganic chemistry in the functioning of biological systems by identifying the functions of metal ions and trace elements in biological systems and considering the chemistry of the model and isolated biological compounds. Offered every third year (next offering Spring 1991).

228P. Main Group Chemistry (3) I. Power

Lecture—3 hours. Prerequisites: course 212A and consent of instructor. Synthesis, physical properties, reactions and bonding of main group compounds. Discussions of concepts of electron deficiency, hypervalency, and non-classical bonding. Chemistry of the main group elements will be treated systematically. Offered every third year (next offering Spring 1990).

228C. Solid-State Chemistry (3) III. Kauzlarich

Lecture—3 hours. Prerequisites: courses 124A, 110B, 226, or the equivalent. Design and synthesis, structure and bonding of solid-state compounds. Physical properties and characterization of solids; topics of current interest such as low-dimensional materials, inorganic polymers, materials for catalysis. Offered non-repetitively during Spring 1990.

230A-J. Special Topics in Physical Chemistry (3) II, III, I. The Staff

Lecture—4 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. Organic Synthesis: Methods and Strategies (3) III. Nantz

Lecture—4 hours. Prerequisite: course 131 or the equivalent. Provides a broadly based discussion of current strategies in synthetic organic chemistry. Focus on methods for constructing carbon frameworks, controlling relative stereochemistry, and controlling absolute stereochemistry. Retrosynthetic strategy and thorough understanding of the literature. Offered annually.

232. Physical-Organic Chemistry (3) II. Boitini

Lecture—4 hours. Prerequisites: courses 128A-128B-128C and 110A-110B-110C or the equivalent. Introduction to elementary concepts of organic-physical chemistry including the application of simple numerical techniques in characterizing and modeling organic reactions.

235. Organometallic Chemistry in Organic Synthesis (3) III. Schone, Zewail

Lecture—3 hours. Prerequisite: course 128C. Current trends in use of organometallics for organic synthesis; preparations, properties, and applications of organometallics. Reagents derived from transition and main group metals.

236. Chemistry of Natural Products (3) II. Molinski

Lecture—4 hours. Prerequisite: course 128C or the equivalent. Advanced treatment of chemistry of naturally occurring compounds isolated from a variety of sources. Topics will include isolation, structure determination, chemical transformations, total synthesis, biosynthetic studies, and historical development of organic synthesis. Biosynthetic origin will be used as a unifying theme.

237. Biogeochemical Chemistry (3) I. Nambiar

Lecture—3 hours. Prerequisite: course 128C or the equivalent. Structure and function of biomolecules; molecular recognition; enzyme reaction mechanisms; design of suicide substrates for enzymes; enzyme engineering; design of artificial enzymes and artificial enzymes in synthetic processes. Offered in odd-numbered years.

240. Advanced Analytical Chemistry (3) I. Fawcett

Lecture—3 hours. Prerequisites: courses 110A and 115 or the equivalent. Numerical treatment of experimental data; thermodynamics of electrolyte and non-electrolyte solutions; complex equilibria in aqueous and non-aqueous solutions; potentiometry and specific ion electrodes; mass transfer in liquid solutions; fundamentals of separation science, including column, gas and liquid chromatography. 241A-D. Special Topics in Analytical Chemistry (3) III. The Staff

Lecture—3 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented, special-topics courses in analytical chemistry. Topics will vary each time course is offered.

270. Seminar (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: consent of instructor. (SU grading only)

273. Introduction to Chemistry Research (1) I. The Staff (Miller in charge)

Discussion—2 hours. Designed for incoming graduate students for higher degrees. Group and individual discussion of research activities in the Department and research topic selection. (SU grading only)

276. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

279. Research (1-12) I, II, III. The 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)

Professional Course

290. Methods of Teaching Chemistry (3) I, II, III. The Staff (Chairperson in charge)

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: graduate student standing in Chemistry; consent of instructor. Practical experience in methods and problems of teaching chemistry. Includes analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting of discussion sessions and observing and guiding student laboratory work. Participation in the technical support required. (PH-302) Chemistry. May be repeated for credit. (SU grading only)

Chicano Studies

(College of Letters and Science)

Adalijza Sosa-Riddell, Ph.D., Program Director Jesús Leyba, Program Coordinator

Program Office, Temporary Buildings 101/115 (752-2421/2492)

Committee In Charge

Angie C. Chabram, Ph.D. (Chicano Studies, Spanish)

Richard A. Fagaroa, Ph.D. (Education)

Barbara J. Merino, Ph.D. (Education)

Beatriz Pesquera, Ph.D. (Chicano Studies, Sociology)

Vilma L. Ruiz, Ph.D. (History)

Fabían A. Samaniego, M.A. (Spanish)

Adalijza Sosa-Riddell, Ph.D. (Chicano Studies)

Faculty

Angie C. Chabram, Ph.D., Assistant Professor (Chicano Studies, Spanish)

Beatriz Pesquera, Ph.D., Assistant Professor (Chicano Studies, Sociology)

Adalijza Sosa-Riddell, Ph.D., Lecturer S.O.E.
The Major Program

The interdepartmental major now allows for two emphases, one in humanities and the other in sociology. The humanities track introduces the student to Chicano/Mexican history and social sciences, but stresses in-depth knowledge of the Spanish language, linguistics, Chicano/Mexican culture and literature. This curriculum is flexible enough to accommodate primary professional interests in bilingual education, community or social service, or advanced graduate and/or professional preparation. The sociology track combines traditional courses in sociology with substantive area courses that deal intensively with the Chicano/Mexican experience. The sociology emphasis promises a greater understanding of the social, political, and cultural life of Chicano/Mexican people, and it provides a solid basis of knowledge for those who wish to work in a bi-cultural setting. It is designed for students interested in public service careers such as law school, graduate school, public administration, or community groups.

Students who have demonstrated language fluency in Spanish through the placement examination can accelerate their program considerably; thus the language placement examination is strongly recommended to all students entering the program.

Chicano (Mexican-American) Studies

A.B. Major Requirements:

Humanities Emphasis

Preparatory Subject Matter .................................................. 12-42
Chicano Studies 10 ................................................................. 4
Chicano Studies 20 ................................................................. 4
Linguistics 1 ............................................................................. 4
Spanish 1, 2, 3 or the equivalent ........................................... 0-18
Spanish 4 or 7A, 5 or 7B, 28 .................................................. 0-12

Depth Subject Matter ............................................................. 38-40
History 169A, 169B, 169C or 169D .................................... 12
Political Science 126 ............................................................... 4
Sociology 110 or Spanish 124 ................................................. 4
Spanish 126, 128, 129 ............................................................. 12
One course from Linguistics 116, 118 or Education 151 ............ 3-4
One course from Spanish 131, 132, 133 .................................. 3-4

Total Units for the Major ......................................................... 50-82

Recommended American Studies 45, 101, Anthropology 134, 140B, 141A; Linguistics 115 and 150 (above); Sociology 124, 126; Spanish 8A, 8B, 9 (for non-native speakers of Spanish); Spanish 108B, 132 and 133 (above), 300.

Sociology Emphasis

Preparatory Subject Matter .................................................. 25-37
Chicano Studies 10 ................................................................. 4
Chicano Studies 20 ................................................................. 4
Linguistics 1 ............................................................................. 4
Sociology 1, 45A, 46B ............................................................... 13
Spanish 4 or 7A, 5 or 7B, 28 .................................................. 0-12

Depth Subject Matter ............................................................. 43
Chicano Studies 102 ................................................................. 4
History 169A ......................................................................... 4
Linguistics 1 ............................................................................. 3
Political Science 126 ............................................................... 4
Sociology 110, 140, 165A, 169 ............................................. 10
Electives, a maximum of 12 units chosen from any of the courses with no more than 2 courses from any one group .......................................................... 12
Group 1: History 169A, 169B, or 169D ................................ 12
Group 2: Linguistics 115, 126 ................................................. 12
Group 3: Sociology 118, Agricultural Economics 110 ................. 10
Group 4: Anthropological Sciences 175, 176, Chicano Studies 101 ............... 10

Total Units for the Major ......................................................... 68-80


Further Study: If you are contemplating studies in a graduate or professional school you can, with the aid of an advisor, build a program around an academic 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.

Minor Program Requirements:

This interdepartmental minor provides the student with a general overview of Chicano/Mexicanos in terms of the history, culture, political involvement and role in the society of the Southwest United States.

Chicano (Mexican-American) Studies .................................. 33-24
Chicano Studies 10 or 20 .................................................... 4
History 169A or 169B ............................................................. 4
Political Science 126 ............................................................... 4
Sociology 110 or Spanish 124 ................................................. 4
Two elective courses to be chosen from Chicano Studies 101, 102, Education 151, History 169A or 169B (not to duplicate one of the above), Linguistics 115, Sociology 169, Spanish 126 .................................................. 7-8

Courses in Chicano Studies

Lower Division Courses

10. Introduction to Chicano Studies (4) L. Sosa-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.

20. Development of Chicano Culture and Literature (4) L. Chabram Lecture—3 hours; discussion—1 hour. Knowledge of Spanish material in relation to panoramic view of the development of Chicano culture and literary forms from the 1400's to the present. Course explores how Chicano literary texts and other artistic forms reflect social, political, and cultural transformations.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

101. Political Economy of Chicano Communities (4) L. Sosa-Riddell Lecture-discussion—4 hours. Prerequisite: upper division standing; a lower division Chicano Studies course recommended. Historical and contemporary study of political and economic forces which define and influence the development of Chicano communities, includes critiques of traditional Marxian theory and concepts applicable to Chicano communities, case studies of Chicano communities, especially in California and Texas. General Education credit: Concentratory Societies/Non-Introductory. Recommended GE preparation: Political Science 1 or 2.

102. Chicanas in Contemporary Society (4) L. Peaquet Lecture—3 hours; term paper. Prerequisite: course 10 or Spanish 124 or History 169B. Analysis of the role and status of Chicana 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.

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: upper division standing and consent of Program Chairperson. (P/NP 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 Program Chairperson. (P/NP grading only.)

NOTE: For key to footnote symbols, see page 131.

Child Development

(A Graduate Group)

Rosemarie Kraft, Ph.D., Chairperson of the Group

Group Office, 103 Academic Office Building, 4 (752-4380)

Faculty includes faculty members from the departments of Applied Behavioral Sciences, Anthropology, Behavioral Biology, Education, Psychology, and the School of Law and Medicine.

Graduate Study: The Graduate Group in Child Development offers a multidisciplinary program leading to a master of science degree. The program is to provide students with an opportunity to pursue a coordinated course of postgraduate study in the field of child development which cuts across departmental boundaries. Opportunities are provided to work with children and adults in the community including the University's Early Childhood Laboratory (ECL). Recipients of the degree gain sufficient background in the biological and social sciences to engage in professions dealing with children, obtain positions in teaching or research settings, or pursue further study leading to a doctorate in child development or related fields.

Graduate Adviser, J.N. Welker (Human Development).

Chinese

See Asian American Studies; Chinese and Japanese (below); and East Asian Studies.

Chinese and Japanese

(College of Letters and Science)

Robert Borgen, Ph.D., Program Director

Program Office (Anthropology), 330 Young Hall (752-0745)

Committee in Charge

Robert Borgen, Ph.D. (Chinese and Japanese)
Chi-ning Chang, Ph.D. (Chinese and Japanese)
Donald Gibbs, Ph.D. (Chinese and Japanese)
Susan Griswold, Ph.D. (Chinese and Japanese)
Earl H. Kinmonth, Ph.D. (History)
Mau-sang Ng, Ph.D. (Chinese and Japanese)
Don C. Price, Ph.D. (History), Chairperson
Janet S. Shiba, Ph.D. (Chinese and Japanese, Anthropology)
Benjamin W. Wallacker, Ph.D. (Chinese and Japanese)
Michelle Yeh, Ph.D. (Chinese and Japanese)

Faculty

Robert Borgen, Ph.D., Associate Professor
Chi-ning Chang, Ph.D., Assistant Professor
Donald Gibbs, Ph.D., Associate Professor
Susan Griswold, Ph.D., Assistant Professor
Jong S. Kim, B.A., Lecturer
Key H. Kim, Ph.D., Professor Emeritus
Yun-chan Li, M.A., Lecturer
Mau-sang Ng, Ph.D., Assistant Professor
Benjamin W. Wallacker, Ph.D., Professor
Michelle Yeh, Ph.D., Assistant Professor

NOTE: For key to footnote symbols, see page 131.
Courses in Chinese

Lower Division Courses

1. Elementary Chinese (5) (I). Lecture-discussion—5 hours. Introduction to Chinese grammar and development of all language skills in a cultural context with special emphasis on communication. (Students who have completed Chinese 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 is required, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Intermediate Chinese (5) (II). Lecture—3 hours; discussion—2 hours. Combines the work of courses 1 and 2 into a single quarter. Those who complete this course may go on to course 3.

3. Elementary Modern Chinese (5) (III). Lecture-discussion—5 hours. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and basic language skills.

4. Intermediate Modern Chinese (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 3 or consent of instructor. Continuation of course 3.

5. Intermediate Modern Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 4 or consent of instructor. Shift gradually from written/ oral drill to a variety of longer sentence activities in both written and oral drills. Emphasis upon communication and cultural studies. Required of all students for a major in Chinese.

6. Intermediate Modern Chinese (4) (III). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 5 or consent of instructor. Completion of course 5, with emphasis on the reading of film scripts and the viewing of selected historical films. Required of all students for a major in Chinese.

7. Introduction to Chinese Literature: The Classics (4) (IV). The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Introduction to key works of ancient Chinese literature, including Confucian classics and other important works.

8. Chinese Culture (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 2. Analysis of Chinese culture and history, with emphasis on the role of tradition and change.

9. Modern Chinese Literature (4) (IV). The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. The study of modern Chinese literature, including major works and literary movements.

10. Chinese History (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 2. Introduction to Chinese history, including political, social, and cultural developments.

11. Middle Eastern Studies (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 3 or consent of instructor. Introduction to the region and its cultures, focusing on key historical and contemporary issues.

12. Modern Chinese Films (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Analysis of contemporary Chinese cinema, including key directors and genres.

13. Chinese Cultural Studies (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 2. Examination of Chinese cultural contexts, including art, literature, and society.

14. Advanced Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese language and culture, with focus on historical and cultural contexts.

15. Intermediate Modern Chinese: Ancient Chinese (4) (II). The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Introduction to ancient Chinese culture and language, focusing on key works and historical contexts.

16. Introduction to Classical Chinese (4) (IV). The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Introduction to the classical Chinese language, including key works and historical contexts.

17. Intermediate Classical Chinese: Poetry (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese poetry, with focus on historical and cultural contexts.

18. Intermediate Classical Chinese: Prose (4) (IV). The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Advanced study of Chinese prose, with focus on historical and cultural contexts.

19. Intermediate Classical Chinese: History (4) (IV). The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Advanced study of Chinese history, with focus on key historical periods and cultural contexts.

20. Modern Chinese Language and Culture (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Advanced study of modern Chinese language and culture, with focus on contemporary issues.

21. Advanced Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese language and culture, with focus on key historical periods and cultural contexts.

22. Modern Chinese Films (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Analysis of contemporary Chinese cinema, including key directors and genres.

23. Chinese Cultural Studies (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 2. Examination of Chinese cultural contexts, including art, literature, and society.

24. Advanced Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese language and culture, with focus on historical and cultural contexts.

25. Intermediate Modern Chinese: Ancient Chinese (4) (II). The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Introduction to ancient Chinese culture and language, focusing on key works and historical contexts.

26. Introduction to Classical Chinese (4) (IV). The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Introduction to the classical Chinese language, including key works and historical contexts.

27. Intermediate Classical Chinese: Poetry (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese poetry, with focus on historical and cultural contexts.

28. Intermediate Classical Chinese: Prose (4) (IV). The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Advanced study of Chinese prose, with focus on historical and cultural contexts.

29. Intermediate Classical Chinese: History (4) (IV). The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Advanced study of Chinese history, with focus on key historical periods and cultural contexts.

30. Modern Chinese Language and Culture (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Advanced study of modern Chinese language and culture, with focus on contemporary issues.

31. Advanced Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese language and culture, with focus on historical and cultural contexts.

32. Modern Chinese Films (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Analysis of contemporary Chinese cinema, including key directors and genres.

33. Chinese Cultural Studies (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 2. Examination of Chinese cultural contexts, including art, literature, and society.

34. Advanced Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese language and culture, with focus on historical and cultural contexts.

35. Modern Chinese Language and Culture (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Advanced study of modern Chinese language and culture, with focus on contemporary issues.

36. Advanced Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese language and culture, with focus on historical and cultural contexts.

37. Modern Chinese Films (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Analysis of contemporary Chinese cinema, including key directors and genres.

38. Chinese Cultural Studies (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 2. Examination of Chinese cultural contexts, including art, literature, and society.

39. Advanced Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese language and culture, with focus on historical and cultural contexts.

40. Modern Chinese Language and Culture (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Advanced study of modern Chinese language and culture, with focus on contemporary issues.

41. Advanced Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese language and culture, with focus on historical and cultural contexts.

42. Modern Chinese Films (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Analysis of contemporary Chinese cinema, including key directors and genres.

43. Chinese Cultural Studies (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 2. Examination of Chinese cultural contexts, including art, literature, and society.

44. Advanced Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese language and culture, with focus on historical and cultural contexts.

45. Modern Chinese Language and Culture (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Advanced study of modern Chinese language and culture, with focus on contemporary issues.

46. Advanced Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese language and culture, with focus on historical and cultural contexts.

47. Modern Chinese Films (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Analysis of contemporary Chinese cinema, including key directors and genres.

48. Chinese Cultural Studies (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 2. Examination of Chinese cultural contexts, including art, literature, and society.

49. Advanced Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese language and culture, with focus on historical and cultural contexts.

50. Modern Chinese Language and Culture (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Advanced study of modern Chinese language and culture, with focus on contemporary issues.

51. Advanced Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese language and culture, with focus on historical and cultural contexts.

52. Modern Chinese Films (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Analysis of contemporary Chinese cinema, including key directors and genres.

53. Chinese Cultural Studies (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 2. Examination of Chinese cultural contexts, including art, literature, and society.

54. Advanced Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese language and culture, with focus on historical and cultural contexts.

55. Modern Chinese Language and Culture (4) (IV). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Advanced study of modern Chinese language and culture, with focus on contemporary issues.

56. Advanced Chinese (4) (II). The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: course 9 or consent of instructor. Advanced study of Chinese language and culture, with focus on historical and cultural contexts.
3 or the equivalent. First of three sequential courses in intermediate modern Japanese and places equal emphasis on reading, speaking, and writing. Approximately 200 new kanji will be introduced, in addition to those taught in courses 2, 3, and 3.

5. Intermediate Modern Japanese (4) II. The Staff Lecture—3 hours; recitation—2 hours. Prerequisite: course 4 or the equivalent. Second of three sequential courses in intermediate modern Japanese and places equal emphasis on reading, speaking, and writing. Approximately 200 new kanji will be introduced, in addition to those taught in courses 1 through 4.

6. Intermediate Modern Japanese (4) III. The Staff Lecture—3 hours; recitation—2 hours. Prerequisite: course 5 or the equivalent. Third of three sequential courses in intermediate modern Japanese and places equal emphasis on reading, speaking, and writing. Approximately 200 new kanji will be introduced, in addition to those taught in courses 1 through 5.

7. Masterworks of Japanese Literature (In English) (3) H. Borger Lecture—2 hours; discussion—1 hour. Readings in English translation of the most influential Japanese literary works from earliest times to the modern period.

25. Japanese Language and Culture (In English) (4) II. Shimamoto Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Linguistics 1 or Anthropology 4 recommended. Classification and communication of experience in Japanese culture and society. Use in Japanese society. Speech level and honofonic language; language and gender, minority languages, literary, Role of Japanese in artificial intelligence and computer science, Offered in odd-numbered years.

89. Directed Study Group (1-6) I, II, III. The Staff (Chairperson in charge) (P/NP grading only).

89. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only).

Upper Division Courses

101. Japanese Literature in Translation: The Early Period (4) I. The Staff Lecture—3 hours; discussion—1 hour. Early Japanese literature from the Nara to the end of the Heian period through a broad survey of the major literary genres such as lyric poetry, court diaries, prose narratives, poem-tales, and classical Chinese writings.

102. Japanese Literature in Translation: The Middle Period (4) II. The Staff Lecture—3 hours; discussion—1 hour. The major literary genres from the heighth century to the second half of the nineteenth century including poetry, every, military chronicles, No drama, Buddhist literature, Hakku, Hadami, Kabuki, bunraku, and Edokoro narrative forms.


111. Japanese Composition (2) I. The Staff Lecture—2 hours; term paper. Prerequisite: course 6 or consent of instructor. Development of skills in the techniques of writing Japanese. Practice in short essay writing with an aim toward mastery of the vocabulary and syntax of written style Japanese.

121. Modern Japanese: Reading and Discussion (4) I. Growold Lecture—3 hours; discussion—1 hour. Prerequisite: course 8. Readings in modern Japanese short stories, newspaper articles, and essays, based on reading skills developed in courses 1 through 6. Television programs selected to complement readings will be used to provide practice relating language to social situations.

122. Modern Japanese: Reading and Discussion (4) II. Growold Lecture—3 hours; discussion—1 hour. Prerequisite: course 122. Readings in modern Japanese short stories, newspaper articles and essays, based on reading skills developed in courses 1 through 122. Television programs selected to coordinate with readings will be used to provide practice relating language to social situations.

124. Spoken Japanese (2) II. The Staff Lecture—2 hours. Prerequisite: course 124 or the equivalent. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.)

128. Spoken Japanese (2) II. The Staff Lecture—2 hours. Prerequisite: course 128 or the equivalent. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.)

131. Readings in Modern Japanese Literature: 1920-1945 (4) I, Chang Lecture—3 hours; discussion—1 hour. Prerequisite: course 123 or the equivalent. Fourth-year level reading of representative works of modern Japanese literature including short stories, novels, diaries, memoirs, poetry and excerpts from novels and plays from 1920 through the militaristic era, to the end of the war years in 1945.

132. Readings in Modern Japanese Literature: 1945-1970 (4) II, Chang Lecture—3 hours; discussion—1 hour. Prerequisite: course 123 or the equivalent. Fourth-year level reading of authentic prewar writing. Works of prewar Japan including history, society, religion, politics, aesthetics and competitive culture by prominent critics, scholars and intellectuals. Offered in even-numbered years.

135. Readings in the Humanities: The Post-1945 Period (4) I, Chang Lecture—3 hours; discussion—1 hour. Prerequisite: course 123 or the equivalent. Fourth-year level reading of authentic postwar writings on Japanese culture, history, philosophy, society, religion, politics, aesthetics and competitive culture by prominent critics, scholars and intellectuals. Offered in even-numbered years.

136. Readings in Newspapers and Magazines (4) III. Growold Lecture—3 hours; discussion—1 hour. Prerequisite: course 123 or the equivalent. Fourth-year level reading of newspaper and magazine reports, articles and editorials on domestic and international events in contemporary Japan. Offered in even-numbered years.


192. Japanese Internship (1-12) II, III. The Staff Internship—9 to 36 hours to be arranged. Prerequisite: upper division standing and consent of instructor. Work experience in Japanese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.)

197. Tutoring in Japanese (1-5) I, II, III. The Staff Tutoring—1 hour. Prerequisite: consent of Program chairperson. Leading of small voluntary discussion groups affiliated with one of the Program's regular courses. May be repeated for credit, but only 2 units may be applied to the minor. (P/NP grading only.)

198. Directed Group Study (1-6) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

209. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

201. Introduction to Classical Japanese (4) I. Borgen Lecture—3 hours; discussion—1 hour. Prerequisite: course 120 or the equivalent. Introduction to essential grammatical structure of classical Japanese using selections from classical Japanese prose and poetry.


203. Introduction to Classical Japanese (4) III. Griewold Lecture—3 hours; discussion—1 hour. Prerequisite: course 201. Readings of classical Japanese prose and poetry beginning with late Heian works and proceeding to Kamakura, Muromachi and later periods. Readings include Haikai, Haiku, Go Santo, narratives, classical Chinese text and early Meiji writings.

291. Seminar in Modern Japanese Literature: Major Writers (4) III. Chang Lecture—4 hours. Prerequisite: any course from 131, 132, 133, 134, 135, or the equivalent. In-depth reading and criticism of major works by and critical literature on one or more major modern Japanese writers such as Natsume Soseki, Mori Oehi, Shimazuki Tez6, Akutagawa Ryunosuke, Tanizaki Junichiro, Abe Kobo and De Kenzaburo. Offered in even-numbered years.

299. Research (1-12) I, II, III, The Staff (SU grading only.)
The Minor Program

The Department offers minors in Greek and Latin for those wishing to follow a shorter but still formally recognized program of study in classics.

Minor Program Requirements:

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<tr>
<th>Greek</th>
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<table>
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<th>Latin</th>
<th>UNITS</th>
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<tr>
<td>3</td>
<td>21</td>
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<td>5</td>
<td>16</td>
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</table>

Graduate Program

The Department offers a master's degree in Classics with emphasis on either Greek or Latin. The program is suitable for high school teachers seeking to improve their qualifications and for students wishing to prepare themselves for admission to one of the more competitive doctoral programs in Classics.

Teaching Credential Subject Representative. R. E. Grimm. See also the Teacher Education Program.

Graduate Study. A program of study and research leading to the M.A. degree in Classics is offered. Detailed information regarding graduate study may be obtained from the Graduate Adviser.

Graduate Adviser. D.A. Traill.

Courses in Classics

Lower Division Courses

4A. Classical Civilization (3) I, III. The Staff

Lecture—3 hours. Introduction to the literature, art, and institutions of classical Greece. General Education credit: Civilization and Culture/Introductory.

15. Greek and Roman Mythology (3) II. The Staff

Lecture—3 hours. Origin and development of myths and legends, their place in the religion, literature, and art of Greece and Rome.

17A. Mediterranean Bronze Age Archaeology (3) I. Roll

Lecture—3 hours. Archaeological monuments of the Ancient Near East, including Egypt and Mesopotamia, and of Greece and Crete during the Bronze Age. Special emphasis on the Minoan and Mycenaean civilizations. General Education credit: Civilization and Culture/Introductory.

17B. Greek Archaeology (3) II. Roll


17C. Later Greek and Roman Archaeology (3) III. Roll

Lecture—3 hours. Archaeological monuments of the Greek world after the conquests of Alexander the Great, and the monuments of Rome and the Roman Empire. General Education credit: Civilization and Culture/Introductory.

20. Pompeii and Herculaneum (3) III. Traill

Lecture—3 hours. Roman life in an urban community at the time of the eruption of Vesuvius. Slide presentations of the archeological evidence will be supplemented by selected readings from Petronius' Satyricon and other ancient authors. General Education credit: Civilization and Culture/Introductory.

30. Greek and Latin Elements in English Vocabulary (3) III. The Staff

Lecture—3 hours. Knowledge of Greek and Latin not required. Elements of Greek and Latin vocabulary for increased understanding of English word formation and improved ability to understand and retain unfamiliar words. Emphasis on Greek and Latin elements but other languages not neglected.

31. Greek and Latin Elements in Technical Vocabulary (3) III. The Staff

Lecture—3 hours. Knowledge of Greek and Latin not required. Elements of Greek and Latin vocabulary for increased understanding of English word formation in medical, scientific and technical terminology and improved ability to understand and retain unfamiliar terms.

Upper Division Courses

140. Homer and Ancient Epic (4) II. Traill

Lecture—2 hours; term paper. Prerequisite: course 4A or 10 or Comparative Literature 1. Reading of Iliad, Odyssey, and Aeneid. Includes Homer's and Vergil's techniques of composition, the clashes and values of their respective societies and the influence of Homer on Vergil. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Classics 4A or 10.

141. Greek and Roman Comedy (4) III. Grimm


142. Greek and Roman Novel (4) I. Traill

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.

143. Greek Tragedy (4) I. The Staff

Lecture—3 hours; term paper. Prerequisite: course 4A or 10. Reading in English of selected plays of Aeschylus, Sophocles and Euripides. Lectures on the development and influence of Athenian tragedy. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Classics 4A or 10.

174. Ancient Greek Sacral Sculpture (4) III. Roll

Lecture-discussion—4 hours. Prerequisites: course 17A or 17B 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 on the relating of documentary to excavation evidence. Offered in odd-numbered years.

177C. Community Tutoring in Classical Languages (1-9) I, II, III. Grimm

Tutoring—1-5 hours. Prerequisite: 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 on the relating of documentary to excavation evidence. Offered in odd-numbered years.

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.

202. Homer (4) II. The Staff

Seminar—3 hours. Readings in the Iliad and Odyssey; the origins and transmission of the poems.

203. Vergil (4) II. Grimm

Seminar—3 hours. Reading of selected books of the Eclogues. Georgics, and Aeneid. Emphasis will be placed on the study of Vergil's poetic language.

204. Greek and Roman Comedy (4) II. Grimm

Seminar—3 hours. Examination of the ancient Greek romances and their development into the grotesque realism of Petronius or of New Comedy. May be repeated for credit.

205. Latin Lyric and Elegy (4) I. Traill

Seminar—3 hours. Critical examination of the works of Catullus, Horace, or Propertius. May be repeated for credit.

206. Greek Historiography (4) III. Thompson

Seminar—3 hours. Development of historical writing in Greece. May be repeated for credit.

207. Greek Drama (4) II. Grimm

Seminar—3 hours. Literary and analytical study of the plays of Euripides, Sophocles, or Aeschylus. May be repeated for credit.

209. Research (1-12) I, II, III. The Staff

Prerequisite: consent of instructor. (S/U grading only.)

Greek Lower Division Courses

Jasper, Menander, Plautus, and others in their contribution to the Greek theatre, biography of Greek and Latin authors. (Students who have successfully completed Greek 2 or 3 in the 10th or higher grade in high school may receive 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.)
Clinical Pathology
(School of Veterinary Medicine)
Donald E. Jasper, D.V.M., Ph.D., Chairperson of the Department
Department Office, 1319 Haring Hall (752-0153)
Faculty
James S. Cullor, B.S., Assistant Professor
Bernard F. Feldman, D.V.M., Ph.D., Professor
Nemri C. Jain, M.V.Sc., Ph.D., Professor
Donald E. Jasper, D.V.M., Ph.D., Professor
Jiro K. Kaneko, D.V.M., Ph.D., Professor
Joseph G. Zinkl, D.V.M., Ph.D., Professor

Part-Time Clinical Faculty
Robert M. DuFort, D.V.M., Assistant Clinical Professor
John W. Switzer, D.V.M., Associate Clinical Professor

Courses in Clinical Pathology
Upper Division Courses
101. Comparative Hematology (2) II. Kaneko, Zinkl, Jain, Feldman
Lecture—2 hours. Prerequisite: Biological Sciences 1, Physiology 110, Biochemistry 101A-101B or Physiological Sciences 101A-101B or consent of instructor. Principles, interpretation and applications of clinical hematology; comparative blood cellular morphology and function.

NOTE: For key to footnote symbols, see page 131.

Community Development (A Graduate Group)
101. Comparative Hematology Laboratory (2) II. Kaneko, Zinkl, 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.

102. Clinical Biochemistry (4) II. Kaneko
Lecture—3 hours; laboratory—2 hours. Prerequisite: Physiology 110, 113; Physiological Sciences 101A-101B or Biochemistry 101A-101B, or consent of instructor. Principles and methods of clinical biochemistry; determination and interpretation of the biochemical constituents of the blood, urine and other body fluids.

199. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P.N.P. grading only.)

Graduate Courses
204. Normal and Abnormal Bone Marrow Cytology (1) III. Feldman, Zinkl
Lecture—2 hours. Prerequisite: Veterinary Medicine 435 or course 101. Normal maturation 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 (2) III. Jain, MaKenzie (Medicine, Medicine)
Lecture—2 hours. Prerequisite: course 101, Biochemistry 101A-101B, or consent of instructor. Metabolism, ultrastructure, kinetics, homeostasis, cytochemistry, and functions of different leukocytes; physiological, functional, histochemical and morphological changes in leukocytes in diseases; their role in inflammatory and immunologic processes. Offered in even-numbered years.

206. Immunohematology (2) II. Jain, MaKenzie (Medicine, Medicine)
Lecture—2 hours. Prerequisite: course 101, Veterinary Microbiology 126, or consent of instructor. Immunologic aspects of hematology; blood cell antigens and antibodies; autoimmune hematologic diseases; reactions to blood transfusions; transplantation mechanisms. Offered in odd-numbered years.

288. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research in Clinical Pathology (1-12) I, II, III. The Staff (S.U. grading only)

Clinical Psychology
See Medicine, School of

Communication
See Rhetoric and Communication

Community Development (A Graduate Group)
Marc Pilsuk, Ph.D., Chairperson of the Group
Group Office, 103 Academic Office Building 4 (Applied Behavioral Sciences), (752-4630 a.m. only)

Faculty. Includes faculty members from various departments in the area of community development.

Graduate Study. The Graduate Group in Community Development offers a multidisciplinary program of study which leads to the M.S. degree under both master's degree plans, the thesis or the comprehensive examination. The program is designed to
Community Health

See Medicine, School of

Community Nutrition

(College of Agricultural and Environmental Sciences)

The Major Program

Community Nutrition focuses on the behavioral, economic, and sociocultural factors that influence dietary practices and the nutritional status of individuals and groups. The aim of Community Nutrition is the application of this knowledge in the development and implementation of programs to improve the nutritional status in the community. The major is designed for students who seek to combine a foundation in the biological and nutritional sciences with study in the social sciences. All students in the major are required to complete a common core of preparatory and depth subject matter courses. Students select one of three subject matter options emphasizing sociocultural, psychological, or economic aspects of food, diet, and nutrition, and an additional area of concentration in consultation with the advisor.

Community Nutrition

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>
<th>Description</th>
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<tbody>
<tr>
<td>10-48</td>
<td>Preparatory Subject Matter (Microbiology with laboratory (Microbiology 2, 3))</td>
</tr>
<tr>
<td>4</td>
<td>Biology (Biology Sciences 1)</td>
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<tr>
<td>14</td>
<td>Chemistry, general and organic (Chemistry 1A, 1B, 9A, 9B)</td>
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<tr>
<td>16</td>
<td>Computer logic or programming (Agricultural Science and Management 21 or Sociology 40)</td>
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<tr>
<td>3-5</td>
<td>Cultural social science (Anthropology 2, Geography 2, or Sociology 3)</td>
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<tr>
<td>3</td>
<td>Cultural food habits (Nutrition 20)</td>
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<tr>
<td>4</td>
<td>Oral and written expression (see College requirement)</td>
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<tr>
<td>4</td>
<td>Social research methods (Sociology 46A or Psychology 41)</td>
</tr>
</tbody>
</table>

NOTE: For key to footnote symbols, see page 131.

Comparative Literature

(Graduate Division in English)

Graduate Study. For information on graduate study, see the Graduate Division section in this catalog.

Comparative Literature

(College of Letters and Science)

Roland Hoermann, Ph.D., Program Director
Program Office, 922 Squirrel Hall (752-9934)

Committee in Charge

*Samuel G. Armistead, Ph.D. (Comparative Literature, Spanish)
Ruby Cohn, Ph.D. (Comparative Literature, Dramatic Art)
Gail Finney, Ph.D. (Comparative Literature, German)
Michele Hancock, Ph.D. (Comparative Literature, French)
Roland W. Hoermann, Ph.D. (Comparative Literature, German)
Manfred Kusch, Ph.D. (Comparative Literature, French)
Karl Lokie, Ph.D. (Comparative Literature, English)
Robert M. Torrance, Ph.D. (Comparative Literature)
Marian B. Ury, Ph.D. (Comparative Literature)
Karl F. Zender, Ph.D. (English)

Faculty

*Samuel G. Armistead, Ph.D., Professor (Comparative Literature, Spanish)
William E. Baker, Ph.D., Professor (English)
Margaret Breslana, Ph.D., Lecturer
Marc El Blanchard, Agrégé de Lettres, Professor (French)
JoAnn Cannon, Ph.D., Associate Professor (Italian)
Ruby Cohn, Ph.D., Professor (Comparative Literature; Dramatic Art)
Peter A. Dale, Ph.D., Professor (English)
Gail Finney, Ph.D., Professor (Comparative Literature; German)
Michele Hancock, Ph.D., Assistant Professor (Comparative Literature, French)
Roland W. Hoermann, Ph.D., Professor (Comparative Literature, German)
Manfred Kusch, Ph.D., Associate Professor (Comparative Literature, French)
Karl Lokie, Ph.D., Assistant Professor (Comparative Literature, English)
Donna K. Reed, Ph.D., Lecturer
Peter M. Schaeffer, Ph.D., Professor (German)
Robert M. Torrance, Ph.D., Professor
Marian B. Ury, Ph.D., 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, think about, and compare books from different national languages 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...
Honors Program. Candidates for high or highest honors in Comparative Literature must write a senior thesis under the direction of a faculty member approved by the Program Director. For this purpose, in addition to fulfilling all other major requirements, honors candidates must enroll in 6 units of Comparative Literature 194H during the first two quarters of the senior year. Only students who have attained a cumulative GPA of 3.5 in all Comparative Literature courses at the beginning of the junior year will be eligible for the honors program.

Minor Program Requirements:
The minor in Comparative Literature allows students to combine courses in Comparative Literature with courses in one or two natural literatures, including English and foreign literatures in translation. This minor has no foreign language requirement for the minor.

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<th>Comparative Literature</th>
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<td>Comparative Literature 1, 2, or 3</td>
<td>8</td>
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</table>

At least two upper division Comparative Literature courses (Comparative Literature 141 strongly recommended) 8 Three additional upper division courses in one or two national literatures (including English) or in Comparative Literature 12 Course selection for the major program should be chosen in consultation with, and with the approval of, the adviser.

Minor Adviser. Same as Major Adviser.

All Comparative Literature majors and minors must consult with their adviser, individually, at least once at the beginning and once at the end of each academic year.

Teaching Credential Subject Representative. Michele Hannoosh. See also the Teacher Education Program.

Graduate Study. Refer to Comparative Literature (A Graduate Group). See also the Graduate Division section in this catalog.

Courses in Comparative Literature

Lower Division Courses

1. Great Books of Western Civilization: From Myth to Faith (4) I, II, III, Director in Charge Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of Western civilization. St. Paul’s School of Anglican Church to St. Augustine’s Confessions: General Education credit: Civilization and Culture/Introductory.

2. Great Books of Western Civilization: From Faith to Reason (4) I, II, III, Director in Charge Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from Dante’s Inferno to Swift’s Gulliver’s Travels. General Education credit: Civilization and Culture/Introductory.

3. Great Books of Western Civilization: The Modern Crisis (4) I, II, III, Director in Charge Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of modern literature from Beckett’s Waiting for Godot. General Education credit: Civilization and Culture/Introductory.

4. The Short Story and Novella (4) I, II, Urdu Lecture-discussion—2 hours. Term paper. An introduction to shorter forms of prose fiction by major authors of different countries, with especial emphasis on the modern period.

5. Fairy Tales, Fables, and Parables (3) I, II, Urdu Lecture-discussion—4 hours. Fables and fables as recurrent forms and motifs in literature, with readings from such diverse writers as Aesop and Grimm, Chaucer and Shakespeare, Kafka and Borges. General Education credit: Civilization and Culture/Introductory.


7. Literature of Fantasy and the Supernatural (2) II, The Staff Lecture-discussion—3 hours. An inquiry into the interactions between the fantastic and the real in the literature of dream and hallucination, fabulation, fabulistic landscape, grotesque satire, and gothic horror. General Education credit: Civilization and Culture/Introductory.

8. Utopias and Their Transformations (2) I, II, Reed Lecture-discussion—3 hours. An exploration of the literary works from different ages, of visionary and rational variations on the theme of a lost paradise, Golden Age or Atlantis, and of the inhuman nightmares that occasionally result from perversions of the utopian dream. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

16A. M. Author in World Literature (2) II, III, The Staff (Director in charge). Lecture-discussion—1 hour session. Designed primarily to acquaint the non-literature major with a cross-section of world literature using authors, readings in translation. Content alternates among the following segments: A) Gilgamesh, Ramayana, Beowulf, Abenteuer, Genesis; B) Metamorphoses, Decameron, Arabian Nights, Canterbury Tales; C) Chansons de Roland, El Cid, Cicero’s Campaign, Monte Di Arthur; D) Stables, Tristán and Iseult, Aucassin and Nicolette, Gawain and the Green Knight; E) Swift, Rabelais, La Celestina, Simplip Alicia; F) Cervantes, Saatlik, Flashing, Voltaire; G) Michavile, Shakespeare, Lucero, Apulia, Caldeiron, Prometheus; H) Goethe, Byron, Stendhal,Pushkin, Lermontov; I) Hoffmann, Poe, Hawthorne, Balzac, Melville; J) Flaubert, Iwan, Turgenev, Gaitos, Isos; K) Ibsen; Balc, Dostoievski, Tolstoi, Hardy, Shaw, Strindberg; L) Unamuno, Svevo, Conrad, Tige, Kafka and Borges; M) Beckett, Joyce, Woolf, Mann/Corr, Bulagov/Tanzaki, O’Neill/Behlau, Borch, Pirandello; N) Camus/Sartre, Garcia Marquez/Grass, Boccaccio/Errante, Bello/Durango, Durrenmatt. May be repeated for credit in different subject area. Limited enrollment. (P/NP grading only.)

13. Dramatic Literature (3) III, Coh Lecture-discussion—3 hours. Prerequisites: Subject A or the equivalent. Introduction to the major drama of Greece to the modern American theater. Offered in odd-numbered years. General Education credit: Civilization and Culture/Introductory.

15. The Spiritual Quest (3) I, I, Torrance Lecture-discussion—3 hours. An exploration of the unending search to discover—or to create—a transcendent meaning and purpose in human life, as reflected in such works as the Bhagavad Gita, The Quest of the Holy Grail, Dante’s Purgatory, and Melville’s Moby Dick.

20. Man and the Natural World (4) II, The Staff Lecture-discussion—3 hours. An examination of the changing relationship between the individual human being and his "natural" environment, whether cultivated or wild, as reflected in literary works from ancient times to the present by such authors as Hesiod, Virgil, Rousseau, Wordsworth, and Thoreau. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

25. Ethnic Minority Writers in World Literature (4) I. Bedrosian Lecture—2 hours, term paper. Consideration of a broad range of writers who speak from an ethnic perspective different from the nominally or politically dominant culture of their respective countries and who explore the challenges faced by characters significantly affected by their ethnic minority status.

53A. Literature of China and Japan (3) II, I, Ury Lecture—2 hours; discussion—1 hour. Introduction to representative masterpieces of East Asia with readings from such works as The Story of the Stone, The Peach Blossom Fan, Tang and Sung poetic selections, the novels of Lu Xun, Chinese poetry, drama, and travel diaries, and The Tale of Genji.

53B. Literature of India and Southeast Asia (3) II, I, Ury Lecture—2 hours; discussion—1 hour. Introduction to representative masterpieces of South Asia with readings from such works as the Mahabharata and Ramayanas, The Cloud Monkeys, The Taming of the Little Clay Cart, and Sanskrit stories and poems of both ancient and modern India and Southeast Asia.

98. Directed Group Study (1-5) I, II, III, The Staff (Director in charge) Restricted to lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III, The Staff (Director in charge) (P/NP grading only.)

Upper Division Courses

135. Women Writers (4) I, II, Reed Lecture-discussion—3 hours, term paper. An exploration of
women's differing views of self and society as revealed in major works of various times and cultures. Readings, principally of fiction, will include such writers as Lule Munsiki, Mme de Lafayette, and Charlotte Bronte. General Education credit: Civilization and Culture/Non-Introduction. Recommended GE preparation: any course from the GE Literature Preparation List.

164. Thematic and Structural Study of Literature (4) I. Hannah

Lecture-discussion—3 hours; term paper. Interpretation of selected literary works/historical evolution of themes, as well as formal and structural aspects. General Education credit: Civilization and Culture/Non-Introduction. Recommended GE preparation: any course from the GE Literature Preparation List.

165. Critical Reading and Analysis (4) I. Williamson (Director in charge)

Lecture-discussion—3 hours; term paper. Prerequisite: consent of instructor. Close reading of selected texts; scrutiny of very limited amount of material, with attention to the problems of texts in translation.

165A. The Forms of Asian Literature (4) I. Linn

Lecture-discussion—3 hours; term paper. Prerequisite: course 2 recommended. Comparative study of different versions of one or more central myths, with attention to their cultural settings, art forms, and traditional presentation, as well as to their psychological dimensions.

165B. The Modern Drama (4) I. Johnson

Lecture-discussion—3 hours; term paper. Prerequisite: course 2. The changing image of man and his world as seen in plays by such writers as Ibsen, Strindberg, Chekhov, and Pirandello. General Education credit: Civilization and Culture/Non-Introduction. Recommended GE preparation: any course from the GE Literature Preparation List.

165C. Special Topics in Comparative Literature (4) I, II, III. The Staff (Director in charge)

Lecture-discussion—3 hours; term paper. Intensive study of selected subjects: (A) The Play Within the Play; (B) The Lyrical Novel; (C) Women in Literature; (D) The Role of Philosophy in Literature; (E) The Role of Psychology in Literature; (F) Religious Experience in Literature; (G) Literary Attitudes and Judgment. May be repeated for credit in different subject areas. General Education credit: Civilization and Culture/Non-Introduction. Recommended GE preparation: any course from the GE Literature Preparation List.

165D. The Gothic Novel (4) I. Finney

Lecture-discussion—3 hours; term paper. The changing image of man and his world as seen in novels by such writers as Stowe, Booth, and Mann. General Education credit: Civilization and Culture/Non-Introduction. Recommended GE preparation: any course from the GE Literature Preparation List.

165E. The Modern Drama (4) I. Cohn

Lecture-discussion—3 hours; term paper. Readings in major authors such as Strindberg, Chekhov, and Pirandello. General Education credit: Civilization and Culture/Non-Introduction. Recommended GE preparation: any course from the GE Literature Preparation List.

165F. Tragedy (4) I. Cohn

Lecture-discussion—3 hours; term paper. Persistant and changing aspects of the tragic element in literature from ancient times to the present. General Education credit: Civilization and Culture/Non-Introduction. Recommended GE preparation: any course from the GE Literature Preparation List.

166. Advanced Group Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge) (P/N grading only.)

167. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge) (P/N grading only.)

Graduate Courses

201. Introduction to the Graduate Study of Comparative Literature (4) I. Torrance Seminar—3 hours; research paper. Prerequisite: reading knowledge of one foreign language. Introduction to research tools, library resources, and critical concerns of Comparative Literature, with focus on the comparative study of a single work, culminating in a related research project.

202. Theories of Comparative Literature (4) I. Torrance Seminar—3 hours; research paper. Prerequisite: reading knowledge of one foreign language; course 141 the equivalent recommended. An examination of International theories of literature with reference to language, genre, themes, social and historical context.

250A. Research in Comparative Literature (4) I, II, III. The Staff (Director in charge) Individual instruction—1 hour. Prerequisite: course 200. Independent guided research, under the supervision of a faculty member, in a specialized study of an individual author, historical period, or literary genre culminating in a term paper. Required of M.A. and Ph.D. candidates.

250B. Research in Comparative Study of Author, Period, or Genre (4) I, II, III. The Staff (Director in charge) Individual instruction—1 hour. Prerequisite: course 200 and 201. Independently guided research, under the supervision of a faculty member, in a specialized study of an individual author, historical period, or literary genre culminating in a term paper. Required of Ph.D. candidates.

250C. Basic Research for the Dissertation (4) I, II, III. The Staff (Director in charge) Individual instruction—1 hour. Prerequisite: course 200 and 201. Independently guided research, under the supervision of a faculty member, in preparation for the dissertation in Comparative Literature. Required of Ph.D. candidates.

290. Directed Group Study (1-6) I, II, III. Prereq.-satsle: graduate standing. (SU grading only.)

295. Individual Study (1-12) I, II, III. The Staff (Director in charge) (SU grading only.)

299. Special Study for the Doctoral Dissertation (1-12) I, II, III. (SU grading only.)

Professional Courses

351. Teaching Comparative Literature in College (3) I. The Staff Lecture—1 hour; discussion—2 hours. Methods of teaching Comparative Literature with special attention to introductory courses 1, 2, and 3, in relation to major cultural and social developments. Discussion also of ways to teach analytical writing. (SU grading only.)

352. Teaching Internship in Comparative Literature (1) I, II, III. The Staff Discussion—1 hour. Regular consultations between the student intern teaching Comparative Literature courses and a supervisor. In-class evaluation of teaching. May be repeated for credit after consultation with supervisor. (SU grading only.)

Comparative Literature (A Graduate Group) Roland Hoermann, Ph.D., Chairperson of the Group, 752-1033

Group Office, 922 Sproul Hall (752-9934)

Graduate Study. The Comparative Literature Program offers the M.A. and Ph.D. degrees with a strong emphasis on individual research under the supervision of a faculty member. The M.A. degree is awarded after Plan II (see Graduate Division section in this catalog). Candidates for the M.A.

NOTE: For key to footnote symbols, see page 131.
Computer Science (College of Letters and Science)

The Major Program

The Computer Science major is designed to prepare students for careers involving the design of computer systems and their application to science, industry and management. Students taking this major receive solid grounding in fundamentals of languages, operating systems, and the formal mathematical tools required to use the computer in solving complex tasks in today's society. Emphasis in this major is on software, although introductory architecture is included. The program provides opportunities for students to choose electives both in the College of Letters and Science and in the College of Engineering. The program will prepare students for advanced work in computer science or in other disciplines requiring advanced knowledge of the use of computers.

For students interested in the engineering aspects of computer science, see Engineering: Computer Science.

Computer Science

B.S. Major Requirements:

Preparatory Subject Matter

Computer Science Engineering 30 or 30H, 40 or 40H

Electrical and Computer Science Engineering 70

Mathematics 2A-2B-2C1, 22A-22B

Statistics 32

One series from the following four

(a) Chemistry 1A-1B-1C
(b) Chemistry 1A-1B and Biological Science
(c) Chemistry 4A-4B-4C
(d) Physics 8A-8B-8C and Mathematics 22C

Depth Subject Matter

Computer science, core courses

Computer Science Engineering 100, 110, 120, 130, 140, 150,
Electrical and Computer Science Engineering 171

Computer science electives

Minimum of 14 units from Computer Science Engineering 142, 160, 165, 168, 170, 175, Electrical and Computer Science Engineering 176, 177, 182A-182B

Upper division mathematics

Minimum of 15 units of upper division courses in mathematics and/or statistics. Any upper division course in mathematics or statistics is approved for this requirement except the following:

Mathematics 108 and any mathematics course numbered above 198

Any statistics course numbered below 131 or above 198

Total Units for the Major

102

Major Advisers.

M. Archer and G. Fisher (Computer Science).

Graduate Study. See the Graduate Division section in this catalog.

NOTE: For key to footnote symbols, see page 131.
Consumer Food Science

(Preparatory Subject Matter) 60-61
Biochemistry (Biochemistry 101A-101B or
Physiological Sciences 102A-102B) 8
Histology with laboratory (Biology Sciences 110) 5
Chemistry, general and organic (Chemistry 1A-
1B, 1C, 8A) 21
Mathematics and physics (Physics 10) 4
Computer logic or programming (Agricultural
Science 150) 4
Microbiology laboratory (Microbiology 2.3) 4
Physiology (Physiology 110) 5
General Animal Science 150 4

Consumer Food Science

B.S. Major Requirements:

For convenience in program planning the usual
ENROLLMENT 48
Food and Nutrition (Nutrition 118) 3
Consumer economics (Agricultural
Economics 111) 4
Food and Science Technology including 100A,
100B, 101A, 101B, 107, Nutrition 20 or 120,
and one additional course each in food
food toxicology, food microbiology, and food
processing (Food Science and Technology
104, 111, 128) 28
Human nutrition with laboratory (Nutrition 110,
111, 112 or 113) 10
Consumer Science 136 3

Breath Subject Matter 22
Principles of economics (Economics 1A-1B) 10
Consumer behavior (Consumer Science 100) 3
Agricultural Economics 112 4
At least one course from two different areas:
agricultural economics, applied behavioral
sciences, cultural anthropology, psychology,
or sociology. Remainder in social sciences
and humanities electives 12

Restrictions for Electives 20
Food and consumer related courses
selected in accordance with student's
educational goal with approval of
adviser.

Unrestricted Electives 22-23

Total Units for the Major 180

Recommended
It is recommended that students interested in graduate work take Chemistry 2, English 194, Mathematics 16A-16B-16C
and Physics 6A-6B-6C.

Major Adviser: H. G. Schulte (Textiles and Clothing).

Advising Center for the major is located in 128
Cruess Hall (752-1468).

Graduate Study. Related graduate study and re-
search leading to the M.S. degree in Food Science
or Nutrition is available. See also the Graduate
Division section in this catalog.

Consumer Science

(Preparatory Subject Matter) 60-61
Biochemistry (Biochemistry 101A-101B or
Physiological Sciences 102A-102B) 8
Histology with laboratory (Biology Sciences 110) 5
Chemistry, general and organic (Chemistry 1A-
1B, 1C, 8A) 21
Mathematics and physics (Physics 10) 4
Computer logic or programming (Agricultural
Science 150) 4
Microbiology laboratory (Microbiology 2.3) 4
Physiology (Physiology 110) 5
General Animal Science 150 4

Consumer Food Science

Lower Division Courses

47. Food Product Development Field Study (1)
Ill. Schutz
Discussion—three 2-hour sessions; field trip—2 days. To
observe commercial aspects of the large-scale development,
distribution and evaluation of food products intended for
human consumption. Course given between Winter and
Spring Quarters. Assign enrollment with instructor required
Winter quarter. (P/NP grading only.)

92. Internship in Consumer Science (1-12) I, II, III.
Schulte
Prerequisite: consent of instructor.

Upper Division Courses

100. Consumer Behavior (3) I. Schutz
Lecture—3 hours. Prerequisites: preparation in areas of psy-
chology or sociology and economics recommended. Provides
a behavior of conceptual and theoretical analysis in under-
standing consumer behavior on the part of the individual,
business, and social organizations. The psychological
model to help guide and understand consumer research will be
presented. (P/NP grading only)

135. Principles of Food Product Development (3) I.
Schutz
Prerequisite: one course in introductory food
science. Presents basic concepts of product research
and development. Organization, activities, new product
development, project management. Role of food regulations,
consumerism, marketing, advertising, consumer research.

190. Current Topics in Consumer Research (1-3) I.
Sommer
Seminar—90 minutes; term paper. Prerequisite: upper division
standards. . Choose topics presented, including time for
questions and discussion, by guest speakers from on and off-campus
on research findings and practical projects in consumer
studies. May be repeated once for credit. (P/NP grading
only.)

192. Internship in Consumer Science (1-12) I, II, III.
Schulte
Prerequisite: one course in consumer science related area.
(P/NP grading only.)

Consumer Technology

(Faculty. See under Department of Agricultural
Engineering.

Courses in Consumer Technology

Questions pertaining to the following courses should be
directed to the instructor or the Department of
Agricultural Engineering, 2030 Bainer Hall.

Lower Division Courses

15. Experiments in Creative Woodworking (1) I.
Grimmer
Laboratory—2 hours. Experimental comparison of techniques
for creating objects and structures of wood. Physical principles
and properties of woods as related to structural stability,
selection and use of tools, and aesthetics of design; finishes
of preserve, enhance, or create effects.

16. Experiments in Creative Metalworking (2) II.
J. Rumsey
Lecture—1 hour; laboratory—2 hours. Prerequisite: Chemistry
1A and Physics 6A recommended. Experimental comparisons
of techniques for creating objects and structures of metal.
Physical principles, design considerations; effects of tech-
niques on quality and appearance; bases for self evaluation
of skills. Layout, fencing, finishing and finishing. (P/NP
grading only.)

17. Electrical Appliances and Systems (2).
Lecture—1 hour; laboratory—3 hours. Characteristics and
principles of electrical appliances and systems for lighting,
heating, and power. Principles of electricity: loads, distribution,
and control; safety; planning systems and selecting appli-
cances. (P/NP grading only.)

96. Directed Group Study (1-3) I, II, III.
The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Lower Division Students (1-6)
I, II, III. The Staff (In charge)
(P/NP grading only.)

Upper Division Courses

101. Engines for Automotive, Agricultural, Residential,
and Recreational Uses (3) II. Upadhyaya
Lecture—2 hours; laboratory—2 hours. Prerequisite: upper
division standing or consent of instructor. Principles of engine
construction and operation, ideal Otto and Diesel cycles.
Engine efficiencies and power measurements. Study of
valves, fuels, combustion, carburetion and fuel injection,
conventional and electronic ignition, starting and charging,
cooling, lubricating and emission control systems.

111. Home Design (2) II. O'Brien
Lecture—1 hour; discussion—1 hour; two term projects. Study
of factors to be considered in planning, buying, or remodel-
ing homes, including location, orientation, layout, traffic patterns,
size, aesthetics, facilities, materials, building codes, regu-
lations, safety, and financing.

196. Individual Projects (0-6) I, II, III. Staff
Prerequisite: consent of instructor. Directed exercises in
planning and executing independent projects consistent with
the student's abilities. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff
In charge)
(P/NP grading only.)
Critical Theory (A Graduate Group)
Marc E. Blanchard, Agnés de Lezade, Chairperson of the Group (752-4787)
Group Office, 513 South Hall, (752-0831)

Graduate Study. The Graduate Group in Critical Theory offers study and research leading to the Ph.D. with a designated emphasis in Critical Theory. The program provides theoretical emphasis and interdisciplinary perspective to students already preparing for the Ph.D. in one of the six participating departments: Comparative Literature, English, French and Italian, German and Russian, History, and Philosophy. Students complete all requirements for the Ph.D., including the dissertation, in one of the participating departments. The additional requirements leading to the designated emphasis consists of four courses: two core courses (204A, 204B) offered by the Graduate Group in Critical Theory and two graduate courses in other departments, and a special examination.

Graduate Adviser: Consult Critical Theory Group Office.

Courses in Critical Theory
Graduate Courses
204A. Approaches to Critical Theory (4 units). The Staff Lecture-discussion—4 hours. Prerequisite: graduate standing in a participating program. Investigation into research problems of Critical Theory and a critical examination of various theoretical approaches (e.g., semiotics, hermeneutics, deconstruction, social and cultural critique; feminism; theory, psychoanalysis) in an interdisciplinary perspective.

204B. Problems in Critical Theory (4 units). The Staff Seminar—3 hours; discussion—1 hour. Prerequisite: course 204A. Practical application of critical theoretical perspectives to a common problem defined in interdisciplinary terms. Topics will vary.

Dance
See Physical Education

Dermatology
See Medicine, School of

Design
(College of Agricultural and Environmental Sciences)

Faculty. See under the Department of Environmental Design.

The Major Program
Design, as taught and practiced at UC Davis, brings together creativity and ingenuity, and is interdisciplinary in nature. This major attracts students who are interested in studies which will involve them in constructing the future shape of our everyday lives. The program is flexible, changing in content and size to reflect the needs and interests of the students, faculty, and society. Self-directed and motivated students contribute to the character of the Design program. They are guided by the faculty to form individualized programs of study around a core of required courses. Students gain not just knowledge of fundamentals of the design professions as they currently exist, but also the outlook necessary to create new approaches to design, and to the development of design as a social tool. The program provides opportunities to acquire a knowledgeable and sound background in design, the skills to use this effectively, and the confidence to apply these skills to innovative design.

At the present time, this curriculum offers study in the areas of urban planning, landscape architecture, and courses in visual and graphic imagery. The lower division courses prepare the student in basic design practice and theory. Students are encouraged to develop an upper division program which includes courses from textile design, design of the environment, and wearable design and image making, in order to understand the role of design in the formation of our culture. Students may elect to concentrate in one of these areas. Through individual planning, the program offers flexibility to allow for (1) concentration on a specialty, (2) preparation for graduate programs, (3) general education in design, and (4) development of self-education throughout one's entire life span, and (5) techniques to transmit knowledge or skill to one person or many, whatever the desired areas.

The faculty is composed of a diverse group of designers and artists working in the fields of play environment and toys, wearable design and ethnic costume, the study of fantasy, printed imagery and book design, energy-efficient architecture, historical and contemporary textiles, textiles in the landscape, interior design, hand-printed and dyed textiles, constructed textiles, display and exhibition design, building renovation and conversion, contemporary furniture and light, and print technique.

Students will be required to keep a continuing portfolio of their creative work to be evaluated by faculty for the purposes of declaring the major, enrolling in over-flow courses, and re-requesting independent study, internship, or other-similar courses.

Design

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>REQUIREMENTS</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>3-8-41</td>
</tr>
<tr>
<td>Design 1, 2, 3, 11, 12, 13, 14</td>
<td>21</td>
</tr>
<tr>
<td>Oral and written expression (see College requirement)</td>
<td>7</td>
</tr>
<tr>
<td>One course from Art 1A, 1B, 1C or 1D</td>
<td>4</td>
</tr>
<tr>
<td>Two courses from American Studies 10, Anthropology 2, Geology 2, Mathematics 10, Psychology 1, Sociology 1, 25, Rhetoric and Communication 1, 3</td>
<td>7-9</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>66</td>
</tr>
<tr>
<td>Design history, select one: 12, 22, 24, 25, 27, 29, 30, 31, 32, 33, 34, 35, 42</td>
<td>14</td>
</tr>
<tr>
<td>Art and design (select two)</td>
<td>24</td>
</tr>
<tr>
<td>General Education units (see General Education Requirements)</td>
<td>16</td>
</tr>
<tr>
<td>Restricted Electives</td>
<td>(Courses to be selected with approval of advisor)</td>
</tr>
<tr>
<td>Unrestricted Electives</td>
<td>2-29</td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>180</td>
</tr>
</tbody>
</table>

Additional Requirement: Development of a course of study, in consultation with an advisor, no later than the second quarter of the junior year.

Major Adviser: J.C. Stabb (Environmental Design).

NOTE: For key to footnote symbols, see page 131.

Courses in Design

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center for the major, 152 Walker Hall (752-1185).

Lower Division Courses

1. Introduction to Design (3) I. Harrison (Offered in charge) Lecture—3 hours. To develop awareness of twentieth-century design vocabulary. To familiarize student with design elements, materials, and principles.

2. Design Methodology (3) II. The Staff (Offered in charge) Lecture—3 hours. Prerequisite: course 1 recommended. Introduction to mental, visual, and sensory processes leading to creation of new forms, images, and environments. Emphasis will be on imagination, producing, evaluating, and communicating ideas in the visual and physical realm.

3. Design in Society (3) III. Gotelli Lecture—3 hours. Prerequisite: course 2 or 1. Discussion of place of the designed object in society and the economy, including relationship of design and technology; individual need, design, manufacture, sale, use and syncretic connections.

11. Drawing Studio (4) I. The Staff (Offered in charge) Studio—8 hours. Prerequisite: course 1 must be taken concurrently; priority enrollment to Design majors. Drawing for the designer as an aid to perception and communication of ideas, objects, and plane. May be repeated once with a different instructor (course). Studio—8 hours; field trip, Prerequisite: course 2 must be taken concurrently; priority enrollment to Design majors. Tools, materials, and techniques used in the designer's studio.

12. Media Studio (4) II. The Staff (Offered in charge) Studio—8 hours; field trip. Prerequisite: course 2 must be taken concurrently; priority enrollment to Design majors. Film and video tape for description, simulation, analytical research, and design development.

21. Drafting and Perspective (4) III. I. Olson and the staff Studio—8 hours. Prerequisite: course 2. Introduction to orthographic projection, orthographic projection, and auxiliary views. Three-dimensional designs on two-dimensional surfaces.

22. Basic Image (4) IV. Butler Studio—8 hours; field trips. Prerequisite: courses 11 and 12. Presentation of the fundamentals of designed images, combining a theoretical perspective with practice using the components of visual literacy. Special focus upon (1) abstract structure, (2) symbolism, and (3) representation.

23. Personal Adornment (4) V. Stabb Studio—8 hours; field trip. Exploration of the human image altered through ornament and its relation to the human structure.

24. Hand Constructed Textiles (4) VI. Laky Studio—8 hours; one or two field trips. Prerequisite: courses 11, 12. Contemporary approaches to the techniques of construction such as netting, quilting, knotting and basketry.

25. Reproduction Graphics (4) VII. The Staff (Offered in charge) Studio—8 hours; field trip. Prerequisite: courses 11 or 12, and 13. Basic studio and photographic skills for the designer. Continuous tone, line and halftone films, mezzotint and four-color screen separations.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Offered in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

121. Design delineation (4) VIII. Olson Studio—8 hours; field trip. Prerequisite: courses 11, 12, and 21. Exploration of the principles of Hand Construction, including principles of perspective drawing, rapid visualization, techniques (the quick sketch), rendering and graphic presentation methods.

124. Textile Structures (4) IX. Laky Studio—8 hours; field trip. Prerequisite: course 23 or 24. Art and science of hand building structures in flexible materials. Studying projects in experiment in two- and three-dimensional forms with some emphasis on relationships to architecture, furniture and interiors.

125. Textiles in the Landscape (4) X. Shawcroft Lecture—2 hours; studio—6 hours. Prerequisite: courses 21, 22, 24. Structuring organic and mathematical forms in textiles, working with the symbolic relationship of these forms and their immediate placement in the outdoor landscape.

126A. Visual Presentation: Visual Merchandising (4) XI. Gotelli Studio—6 hours; field trips. Prerequisite: course 11, 12 or consent of instructor. Principles and practice of visual communication of ideas through non-verbal presentations. The
Development, Resource, and Consumer Economics
(College of Agricultural and Environmental Sciences)

The Major Program

The University has merged the Development, Resource, and Consumer Economics major with the Agricultural and Managerial Economics major. Students interested in these subjects are advised to consider the Consumer Economics or the Agricultural Economics option of the Agricultural and Managerial Economics major. Those admitted into the Development, Resource, and Consumer major before June 30, 1988 will be allowed to complete the major under the requirements listed in the 1987-88 catalog.

Advising Center for major is located in University House Annex (752-6185).

Major Adviser, S.H. Gonscik (Agricultural Economics).

Dietetics
(College of Agricultural and Environmental Sciences)

The Major Program

The Dietetics major provides the student with training in normal and therapeutic nutrition, biological and social sciences, food service, 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. Students will be qualified for admission to graduate programs in dietetics, nutrition science, public health nutrition and food service management.

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.

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>40</td>
</tr>
<tr>
<td>Oral expression (English 1 or 2)</td>
<td>4</td>
</tr>
<tr>
<td>Statistics (Statistics 13)</td>
<td>4</td>
</tr>
<tr>
<td>Bacteriology with laboratory (Microbiology 2)</td>
<td>4</td>
</tr>
<tr>
<td>Computer logic or programming (Agricultural Science and Management 21 or Computer Science Engineering 10)</td>
<td>3</td>
</tr>
<tr>
<td>Chemistry, general and organic (Chemistry 1A, 1B, 8A, 6B)</td>
<td>16</td>
</tr>
<tr>
<td>Biology (Bioscience 1)</td>
<td>5</td>
</tr>
<tr>
<td>Depth Subject Matters</td>
<td>84-88</td>
</tr>
<tr>
<td>Biochemistry (Biochemistry 101A-101B or Physiology 101A-101B)</td>
<td>6-7</td>
</tr>
<tr>
<td>Physiology (Physiology 110, 110L)</td>
<td>7</td>
</tr>
<tr>
<td>Food Service Management 120, 120L, 121, 122, 122L, 123</td>
<td>14</td>
</tr>
<tr>
<td>Agricultural Economics 115</td>
<td>14</td>
</tr>
<tr>
<td>Breadth Subject Matter</td>
<td>17</td>
</tr>
<tr>
<td>Principles of economics (Economics 1A or 1B)</td>
<td>4</td>
</tr>
<tr>
<td>Sociology 1 or Anthropology 2</td>
<td>4-6</td>
</tr>
<tr>
<td>General psychology (Psychology 1)</td>
<td>4</td>
</tr>
<tr>
<td>Principles of learning or methods of teaching (Applied Behavioral Sciences 173 or Education 110 or 111)</td>
<td>4</td>
</tr>
</tbody>
</table>

Unrestricted Electives | 57-59 |

Total Units for the Major | 180 |

Major Adviser, F.J. Zeman (Nutrition).

Advising Center for the major is located in 1151 Meyer Hall (752-2512).

Graduate Study. See the Graduate Division section in this catalog.

Dramatic Art
(College of Letters and Science)

Robert A. Fahmer, Ph.D., Chairperson of the Department

Department Office, 222 Dramatic Art Building (752-0888)
Faculty
Elizabeth Carlin, M.F.A., Assistant Professor
Ruby Cohn, Ph.D., Professor (Dramatic Art, Comparative Literature)
Everard d'Harmoncourt, Ph.D., Professor
Robert A. Fahrner, Ph.D., Professor
Rajagopalan Natarajan, M.A., Associate Professor
Henry C. Johnson, M.A., Professor
William E. Kleb, D.F.A., Associate Professor
Phyllis J. Krebs, M.F.A., Adjunct Lecturer
Robert K. Santos, Ph.D., Professor
Theodore J. Shank, Ph.D., Professor
Daniel E. Snyder, Professor
Alan A. Stambuky, Ph.D., Professor
Darrell F. Win, M.A., Adjunct 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 and Studio Seasons, has the following objectives: to form major students as part of a liberal arts education (in both lower division and upper division work); to provide a foundation for potential specialists (primarily in upper division work); and to train specialists in the arts of theatre, film, video, sculpture, or related fields (graduate work).

The University Theatre. Each year the Department of Dramatic Art presents a series of stage productions of outstanding dramas 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.

Granada Artists-in-Residence Program. Each quarter a major faculty director joins the department to direct and teach directing.

Dramatic Art

A.B. Major Requirements:

Preprofessional Subject Matter

UNITS

22

Dramatic Art 20, 21A, 24, 25

14

Dramatic Art 21B or 27

8

Additional units to achieve upper division in Dramatic Art

4

Depth Subject Matter

Dramatic Art 124A, 124B, 127A, 127B or 160B,

156, 157, 158, 159, 160A

36

Additional units chosen from the following:

Dramatic Art 115, 121A, 121B,

124A, 124B, 125, 150, 153, 155,

or with the advisor's consent, from appropriate literature courses in language and literature departments

4

Total Units for the Major

62

Minor Program Requirements:

UNITS

Dramatic Art 20, 21A, 24, 25, 124A, 160A, 156, 157, 158, 159

20

Major Advisers. R. Fetterly, T.J. Shank

Transfer Students. If you are a transfer student you should see the major adviser for an evaluation of your program.

Teaching Credential Subject Representative. T. J. Shank. See also 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, or playwriting), and Ph.D. (theater research) degrees. Detailed information may be obtained by contacting the Graduate Adviser.

Graduate Adviser. W.E. Kleb.

Lower Division Courses


15. The Art of the Cinema (4) II. d'Harmoncourt Lecture—2 hours; discussion—1 hour, film viewing—2 hours. The analysis of film as an art form, its relationship to other arts, its evolution with emphasis on the significant modern contributions.

1G. Introduction to Filmmaking (2) I. d'Harmoncourt Lecture-discussion—3 hours; film study—2 hours. Pre- requisite: course 15 concurrently or consent of instructor. Students in small groups will write, shoot, and edit 8 mm films, and prepare sound tracks for them.

20. Introduction to Dramatic Art (4) I, III. Kleb Lecture—3 hours; discussion—1 hour. Understanding and appreciation of both the distinctive and collaborative contributions of playwrights, actor, director, and designer to the total work of dramatic art. Study of playbill from the major periods of dramatic art in their cultural contexts.

21A. Fundamentals of Acting (4) I, III. The Staff Lecture—2 hours; laboratory—4 hours. Prerequisite: course 20. Physical and psychological resources of the actor. Experience in individual and group contact, communication, theatre games, improvisation, sound and movement dynamics. Viewing of theatre productions. Limited to those planning to major in Dramatic Art.

21B. Fundamentals of Acting (4) I, III. The Staff Lecture—2 hours; laboratory—4 hours. Prerequisite: course 21A and consent of instructor. Theory and practice of acting with emphasis on voice, diction, analysis, interpretation, and development. Acting in a student-directed project. Viewing of theatre productions. Limited to those planning to major in Dramatic Art.

24. Visual Aspects of Dramatic Art (4) I, II, III. Snyder Lecture—3 hours; laboratory—2 hours. Understanding and appreciation of the visual aspects of dramatic art; theatre architecture and design; scenic representation; costume, setting, lighting and sound equipment and control systems.

27. Fundamentals of Playwriting and Directing (3) III. Kleb Discussion—3 hours; laboratory—6 hours. Study of basic texts in the theory of directing and playwriting. Prerequisite: consent of instructor. Exercises in conceiving and developing theatre pieces with emphasis upon the collaboration of playwright and director.

28. Visual Arts and Theatre (4) I. Synder Lecture-discussion—4 hours. The correlation between the visual arts and theatre. Intentions for students in the visual arts as well as for prospective majors.

30. Theatre Laboratory (1-5) I, II, III. The Staff Prerequisite: course 25 or consent of instructor. Projects in acting, production, scene design, 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. Kleb Lecture-seminar—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 for credit.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Primarily for lower division students. (P/NP grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Upper Division Courses

115. Advanced Study of Major Film Makers (4) II. d'Harmoncourt. Lecture-discussion—3 hours; film viewing—2 hours. Prerequisite: course 15. Analysis of the contribution of some outstanding film makers. Study of diverse aesthetic theories of the cinema and an analysis which will be repeated for credit at different times when different film creators studied.

121A. Advanced Acting (4) I. Johnston 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) II. The Staff 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: Scenery (4) I. Fetterly Lecture—4 hours; laboratory—4 hours. Prerequisite: course 24 or consent of instructor. Scene design processes, working drawings, sketching techniques, scale models, methods and materials of scenery construction.

124B. Principles of Theatrical Design: Scenery (4) II. Snyder Lecture—4 hours. Prerequisite: course 24 or consent of instructor. Analysis of plays in terms of scenic design, elements of design, execution of designs for modern and period plays.

124C. Principles of Theatrical Design: Lighting (4) III. Winn Lecture—4 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: Costume (4) I. Kress Lecture—4 hours. Prerequisite: course 24 or consent of instructor. Analysis of plays in terms of costume design, costume design, execution of designs for modern and period plays.

126. Production Management (3) III. Winn Lecture—3 hours. Prerequisite: course 25. Theoretical study of backstage operation and procedures through the production of a play. Techniques of stage management, on-site procedures, and audience control. Offered in even-numbered years.

127A. Principles of Directing (4) I. Stambuky Lecture—2 hours; laboratory—4 hours; rehearsal. Prerequisite: courses 21A, 21B, or 27; 156, 157, 158, or consent of instructor. The director's creative approach to the play and to its staging.

127B. Principles of Directing (4) II. Stambuky Lecture—2 hours; laboratory—4 hours; rehearsal. Prerequisite: course 127A and consent of instructor. Non-majors. The director's creative approach to the actor.

150. American Theatre and Drama (4) I, II. Sarlo Lecture—4 hours. The history of the theatre from Colonial times to the present. Readings of selected plays. Offered in odd-numbered years.

153. The American Musical (4) III. Kleb Lecture—4 hours. History and development of the American Musical as a unique theatrical form. Offered in odd-numbered years.

155. Black Theatre and Drama (4) III. Johnson Lecture—4 hours. Black Theatre and drama today: the history, impact and current dilemmas and conflicts of Blacks in the theatre. Offered in even-numbered years.

156. Theatre and Drama: Aeschylus to Chekhov (4) I. Sarlo Lecture—4 hours. Selected plays and the history of the theatre from ancient Greece through the Shakespearean Renaissance. General Education credit Civilisation and Culture/Non-introductory. Recommended GE preparation: History 4A or 4B.

157. Theatre and Drama: Shakespeare to Schiller (4) I. Sarlo Lecture—4 hours. Selected plays and the history of the theatre from ancient Greece through the Shakespearean Renaissance. General Education credit Civilisation and Culture/Non-introductory. Recommended GE preparation: History 4A or 4B.

158. Theatre and Drama: Ibsen to Abele (4) III. Farmer Lecture—4 hours. Selected plays and the history of the theatre from German Romanticism to the present.

160A-160B. Principles of Playwriting (4-4) I. Kleb, Shank Lecture—4 hours; laboratory—4 hours. Prerequisite: two courses in Dramatic Art or related courses. Production of dramatic structure; preparation of scenarios; the composition of plays.

160. Theatre Laboratory (1-5) I, II, III. The Staff Prerequisite: upper division standing and/or course 25, or consent of instructor. Projects in acting, production, scene design, costume, lighting, directing, and playwriting. Participation in departmental productions.

162. Internship in Dramatic Art (1-12) I, II, III. The Staff (Chairperson in charge)
Earth Sciences and Resources (A Graduate Group)

Field work—3-36 hours. Prerequisite: upper division or graduate geosciences course related to the project; consent of instructor and Department Chairperson. Internship outside the academic department enabling student to gain professional experience may be repeated for credit for a total of 12 units. (P/NP grading only.)

1977. Tutoring in Dramatic Art (1-4) I, III. The Staff (Chairperson in charge)
Tutoring assignments. Prerequisite: upper division or graduate standing with major in dramatic art; consent of department chairperson. Leading of small voluntary groups affiliated with university drama department's regular courses may be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-9) I, II, 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. Sarlos Seminar—3 hours. Essential research tools in theatre and related fields: bibliographies, primary sources; methods of evaluating and presenting evidence; delineating research areas in the field.

211. Advanced Voice and Speech (2) I, II, III. Carlin Laboratory-hour course. Open to advanced undergraduates with consent of instructor. Voice production and speech related to specific acting problems in classical plays, particularly in verse. Additional training in performance will be given.

212. Advanced Stage Movement (2) I, II, III. The Staff Laboratory—4 hours. Prerequisite: open to advanced undergraduates with consent of instructor. Rhythmic movement patterns related to the acting problems in classic and modern plays. May be repeated for credit.

221. Special Problems in Advanced Acting (4) I, II, III. Johnson, Carlin 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 present. May be repeated for credit.

224A. Visual Problems in Theatre and Performance (4) I. Snyder Seminar—3 hours; term project. Special problems in visual and auditory aspects of theatrical production culminating in a single performance project. Open to Dramatic Art, Art, and Design majors. May be repeated for credit.

224B. Advanced Principles and Theories of Theatrical Design (4) I II. Snyder Seminar—3 hours; term project. Selected problems in the design of stage scenery and costumes; practice in design. May be repeated for credit.

224C. Advanced Principles and Theories of Theatrical Design (4) Snyder Seminar—3 hours. Design of a production for three different types of theatre: open stage, arena, and proscenium. May be repeated for credit.

224D. Advanced Principles and Theories of Theatrical Costumes Design (4) II. Kress Seminar—3 hours; research and design projects—90 hours (minimum) total. Prerequisite: course 124D or consent of instructor. Costume design projects emphasizing research, principles, and theories; the planning and presentation of costume renderings, dress accessory sketches, and scale drawings of patterns. Projects from classic theatre, musical, contemporary dance, ballet, and opera. Offered in even-numbered years.

224E. Advanced Principles and Theories of Theatrical Lighting Design (4) II. Winn Seminar—3 hours; laboratory—2 hours. Prerequisite: course 124D or consent of instructor. Design of lighting and design courses and consent of instructor. Design concepts; script/scene analysis, color, composition and style. Projects presented in studio and in front of college-community groups. Offered in odd-numbered years.

227. Seminar in Directing Theory: Realism (4) I. Granads 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. Granads Seminar—3 hours; term project. Modern directing theory as it applies to non-realistic theatre; development of directorial concepts for productions of selected non-realistic plays—Greek theatre; emphasis on textual analysis. Offered in odd-numbered years.

229. Special Problems in Directing (5) I, II, III. Granads Seminar—2 hours; laboratory—2 hours; rehearsal—4 hours. Prerequisite: consent of instructor. Projects in directing scenes selected from plays from ancient Greece to the present.

230A, 230B. Classical and Medieval Theatre (4) II-III. Kleib, Sarlos Seminar—3 hours. The theatre of Greece, Rome, and Middle Ages; emphasis on relationship of dramas of the period to 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.)

232A, 232B. Renaissance and Baroque Theatre (4) II—III. Faahrnd, Sarlos Seminar—3 hours. The theatre of Italy, Spain, England, and France, 1530-1660; emphasis on relationship of the plays of the period to physical circumstances of production. Course 232A (may be taken separately) includes readings and discussion; 232B emphasizes research culminating in a scholarly paper. (Deferred grading only, pending completion of sequence, can be in effect.)

240A, 240B. Neoclassical and Romantic Theatre (4) II—III. Faahrnd, Sarlos Seminar—3 hours. The theatre of France, England, Germany, Italy, and America, 1660-1860; emphasis on relationship of dramas of the period to 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) I. Sarlos Seminar—3 hours. The theatre of Europe and America, 1860-1940; emphasis on relationship of the plays of the period to physical circumstances under which they were produced. Offered in even-numbered years.

259. Contemporary Theatre (4) I. Cohr Seminar—3 hours; term paper. Selected aspects of contemporary Western theatre, with attention to their modes of production.


265. Theory of Dramatic Art (4) I. Kleib Seminar—3 hours. Theory and aesthetic principles of dramatic art as a fine art. Offered in odd-numbered years.

268. Theatre Laboratory (1-12) I, II, III. The Staff Advanced practice in acting, designing, directing, playwriting, and technical theatre. May be repeated for credit. (P/NP grading only.)

285. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor.

295. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

296D. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

Professional Course

412. Stage Makeup-Up (1) I. The Staff Lecture-laboratory—2 hours. Prerequisite: consent of instructor. Lectures, demonstrations, and practical work in aspects of theatrical make-up.

Earth Sciences and Resources (A Graduate Group)

Mark E. Grismer, Ph.D., Chairperson of the Group
Group Office, 113 Velhmeier Hall (752-3243/ 053)

Faculty
The Group consists of forty faculty members from the Departments of Applied Science Engineering, Chemistry, Civil Engineering, Environmental Studies, Geography, Geology, Land and Water Resources, Meteorology, and Physics.

Graduate Study. The Graduate Group in Earth Sciences and Resources offers M.S. and Ph.D. degrees for advanced training in a variety of interdisciplinary areas within the earth sciences. Among these areas are earth geophysics, geophysical fluid dynamics, climate dynamics, geological materials science, nonrenewable resources, geochemistry and hydrogeology. The above encyclopaedia makes applications: from students with a strong background in the physical sciences but little previous background in the earth sciences.

Preparation. Applicants to the program are expected to have completed or to be in the process of completing an undergraduate degree in some aspect of the physical sciences, mathematics, or engineering. Undergraduate study must include one year of calculus, one year of physics with calculus, and one year of chemistry. Additional courses in advanced calculus and computer programming are recommended. Also, either before entering the program or during the first year of graduate study, students are expected to be acquainted with thermodynamics and continuum mechanics.

Core Curriculum. The core curriculum consists of the courses in Earth Sciences and Resources listed below. A master's degree candidate is required to take four of the courses, and a doctoral candidate is required to take all six courses (although not necessarily within the first year). Students will be exempted from courses in which they have already had previous training. In addition, each student is required to take Earth Sciences and Resources 200 in their first and second years.

Atmospheric processes: Atmospheric Science 200 Earth sciences and resources: Earth Sciences and Resources 201 Solid-earth geophysics: Earth Sciences and Resources 240 Geochemistry: Geology 215 Physical and chemical oceanography: Environmental Studies 150A Groundwater hydrology: Civil Engineering 142

Specialization. Each student will pursue an individual program of advanced study under the direction of a group of faculty members with similar interests but diverse backgrounds. Coursework in addition to the above is typically taken in the most appropriate graduate departments.

Graduate Advisers. M.E. Grismer (Land, Air and Water Resources), K.L. Voseoub (Geology).

Courses in Earth Sciences and Resources

Graduate Courses

200. Survey of Earth Sciences and Resources (2) I. Grismer Lecture—1 hour; discussion—1 hour; paper. Prerequisite: open to students in the Earth Sciences and Resources program. Introductory course exposes students to the diversity of sciences involved in the program. Students prepare a paper and presentation in their area of interest. May be repeated once for credit. (SU grading only.)

201. Earth Sciences and Resources (3) I, II, III. Grismer, McLain, G. Geology (Geology) Seminar—3 hours. Prerequisites: Physics 201, Geology 22C, Chemistry 4C or consent of instructor. Advanced survey of earth's structure and processes, minerals, rocks, and plate tectonics. Principles of mineralogy and petrology, igneous, and metamorphic processes. Sedimentation and sedimentology. Deformation and regional structure. Energy, core and water resources. Students in Geology May enroll only with consent of instructor.


297. Seminar in Earth Sciences (3) I. The Staff Seminar—3 hours. Prerequisite: graduate standing; consent of instructor. Seminar on current area of research in earth sciences and resources. Topic will change from year to year. May be repeated for credit.

NOTE: For key to footnote symbols, see page 131.
East Asian Studies
(College of Letters and Science)
Joyce K. Kaltgren, Ph.D., Program Director
Program Office, 922 Sproul Hall (752-1219)

Committee in Charge
Mary H. Fong, Ph.D. (Art History)
Donald Gibb, Ph.D. (Chinese and Japanese)
Gary G. Hamilton, Ph.D. (Sociology)
Joyce K. Kaltgren, Ph.D. (Political Science)
Helen Klimo, Ph.D. (History)
Whalen W. Lai, Ph.D. (Religious Studies)
Kwong-Ching Liu, Ph.D. (History)
Don C. Phelps, Ph.D. (History)
Janet S. Shibamoto, Ph.D. (Anthropology)
Benjamin E. Wallacker, Ph.D. (Chinese and Japanese)

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 East Asian language with courses on East Asian countries. The program prepares the student 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, East Asian languages) within the major, to be chosen in consultation with their adviser.

Since six quarters of language work are required, students normally should apply no later than their sophomore year.

East Asian Studies
A.B. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Unit Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>38-39</td>
<td>History 19A, 19B</td>
</tr>
<tr>
<td></td>
<td>One course from Art 112, 120, Comparative Literature 101, History 90A, Religious Studies 470</td>
</tr>
<tr>
<td>2-4</td>
<td>Two years (or the equivalent) of Chinese or Japanese language study (Chinese 1-2-3-4-5, Japanese 1-2-3-4-5)</td>
</tr>
</tbody>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Unit Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-15</td>
<td>History 190B-190C or 1940-194C, Political Science 148A or 148B</td>
</tr>
<tr>
<td></td>
<td>Sociology 147</td>
</tr>
</tbody>
</table>

Total Units for the Major 74-75

NOTE: For key to footnote symbols, see page 131.

Students are strongly urged to take a substantial number of courses in both Chinese and Japanese civilization as a basis for comparison of a deeper understanding of America's relations with East Asia.

Minor Program Requirements:
Courses taken for the minor are expected to reflect a predominant interest in either China or Japan, but also 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.

Minors in East Asian Studies

<table>
<thead>
<tr>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>History 99B and 16 upper division units of which at least 12 must be in courses focusing on China or Japan, 18 upper division units of which at least 12 must be in courses focusing on Japan</td>
</tr>
<tr>
<td>Major Advisers: China: D. Gibb, D. Price (History); Japan: Janet Shibamoto (Anthropology)</td>
</tr>
</tbody>
</table>

Courses in East Asian Studies:
The following courses count toward the major and are open to students throughout the campus. Refer to department listings for course descriptions.

Anthropology
148. Cultures of China and Korea
149. Culture of Japan
Art
1. Asian Art
20. Myths and Symbols in Chinese Art
63. Chinese Art
63B. Chinese Art
64. The Arts of Japan
Chinese
1-2-3. Elementary Modern Chinese
4-5-6. Intermediate Modern Chinese
11. Modern Chinese Literature: Reading and Discussion
117. Intermediate Classical Chinese: Poetry
Comparative Literature
53A. Literature of China and Japan
Economics
171. Economy of East Asia
Geography
127. Contemporary East Asia
History
9A. History of East Asia (Civilization) (Not open to 198, 199, 194A, 194B, 194C, 194D, 194E, 194F, Japanese 121, Linguistics 100, Political Science 127, 135, 136, 145, 148A, 148B, Religious Studies 172, Sociology 118, 141, 147, 170. Other appropriate courses, including individual and group study courses (198, 199), as approved by the Committee in charge.)
121. History of the People's Republic of China, 1949 to the Present
149. Arithmetic and Chinese: Joint
194B. Early Modern Japan
194C. Modern Japan
194D. Business and Labor in Modern Japan
194E. Education and Technology in Modern Japan
195. Modern China and the West
Japanese
1-2-3. Elementary Modern Japanese
4-5-6. Intermediate Modern Japanese
101. Literary Studies in Chinese
111. Japanese Composition
121-122-123. Modern Japanese: Reading and Discussion
Linguistics
100. Languages of Eastern Asia
Political Science
133. The American Role in East Asia
138. International Relations: East Asia
148A. Government and Politics in East Asia
148B. Government and Politics in East Asia
Religious Studies
70. Introduction to Buddhism
172. Confucianism
Sociology
147. Sociological Perspectives on East Asia

Ecology (A Graduate Group)
181

Courses in East Asian Studies
Upper Division Courses

113. Cinema and Society in China (4) (III. Gibbons)
Lecture: 3 hours; discussion: 1 hour. Prerequisite: one course from History 190C, 193, or consent of instructor. Principles of Chinese and Western film concepts, focusing on Chinese films. Cross-listed with Chinese 113.

196. Directed Group Study (1-5) (II, III. The Staff)
Prerequisite: consent of instructor. (P/NP grading only.)

Ecology (A Graduate Group)
181

Theodore C. Foin, Ph.D., Chairperson of the Group

Group Office, 3122 Wickson Hall (752-6752)

Faculty. The Group includes faculty from 45 departments in five schools and colleges.

Graduate Study. The Graduate Group in Ecology offers the M.S. and Ph.D. degrees in the areas of biological, human, and physical and chemical ecology. Several areas of specialization are possible in each of these three areas. Details of the program may be obtained from the Chairperson of the Group or the Group office.

Preparation. Appropriate preparation is undergraduate work in any of the biological, social or behavioral, and physical sciences, mathematics or engineering. Applicants to the biological and physical-chemical option will not be expected to have completed two courses each in introductory biology, general chemistry, physics, mathematics, statistics, and evolution. Applicants to the human ecology option may substitute quantitative social science courses for up to two courses of chemistry or physics. Each of the three broad areas requires certain advanced preparation appropriate to the option. Details may be found in the Group Announcement.

Course Requirements. The Ecology program is one of the most diverse on the Davis campus. In order to accommodate varied student interests, the Group depends on close consultation between stu-
dents and faculty for program development. A list of recommended courses for various options is available from the Group office.

Graduate Adviser. T.C. Foin.

Courses in Ecology
Graduate Courses

203. Physiological Ecology of Animals (3) III. Patterson (Environmental Studies)
Lecture—2 hours; discussion—1 hour. Prerequisite: Zoology 125B or the equivalent; elementary calculus. Comparative examination of several animal groups addressing fundamental physiological mechanisms that shape the ecology of the animal groups.

204. Population and Community Ecology (4) I. Toft, Schoener, Salt (Zoology)
Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 100 or Zoology 125, Mathematics 21A-21B, or consent of instructor. Mathematics 22B strongly recommended. Review of major theoretical concepts of population and community ecology, with emphasis on both the rationale of the theory and its correspondence to natural phenomena.

205. Structure of Ecological Communities (4) I. Quinlin (Environmental Studies)
Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 100 or Zoology 125 or Botany 117, General Biology or Botany 148 or 200 or Zoology 148, and Mathematics 21A-21B; Ecology 204 and Mathematics 22A-22B strongly recommended. Provides entry-level graduate students and advanced undergraduates an introduction to literature and
Economics

A.B. Major Requirements:

Preparatory Subject Matter

1. Economics 1A-1B
2. Statistics 13, or 32, or 102
3. Mathematics 16A-16B-16C or 21A-21B-21C

Depth Subject Matter

1. Economics 100 or 100M
2. One course from Economics 110A, 110B, 111A
3. One course from Economics 112A, 112B, 112C
4. Additional economics courses to achieve a minimum of 40 upper division units

Total Units for the Major

62-66

Economics (College of Letters and Science)

Steven M. Sheffrin, Ph.D., Chairperson of the Department

Department Office, 381 Kerr Hall (752-0741)

Faculty

Giacomo Bonanno, Ph.D., Visiting Assistant Professor
Andrzej Brzeski, Ph.D., Professor
Robert C. Feenstra, Ph.D., Associate Professor
Bruce Glassmeyer, Ph.D., Professor Emeritus
W. Eric Gustafson, Ph.D., Senior Lecturer
Jay Heim, Ph.D., Associate Professor
Kevin D. Hoover, D.Phil., Assistant Professor
Hiromitsu Kaseda, Ph.D., Professor
Tracy L. Johnson, Ph.D., Assistant Professor
Peter H. Lindert, Ph.D., Professor
Louis Makowski, Ph.D., Associate Professor
Thomas Mayer, Ph.D., Professor
Julie A. Nelson, Ph.D., Assistant Professor
Alan L. Olmstead, Ph.D., Professor
John E. Roemer, Ph.D., Professor
Steven M. Sheffrin, Ph.D., Professor
T. Y. Shin, Ph.D., Professor
Joaquim Silvestre, Ph.D., Professor
Arthur M. Sullivan, Ph.D., Associate Professor (Economics, Management)
Robert K. Triest, Ph.D., Assistant Professor
Elias H. Tuma, Ph.D., Professor
Gary M. Walton, Ph.D., Professor (Economics, Management)
Leon L. Wolpe, Ph.D., Professor
Wing T. Woo, Ph.D., Assistant 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 factors. To maximize the economy's economic welfare, a society must utilize scarce 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 assists the student to learn how economists examine these questions, and is an appropriate major for undergraduates contemplating graduate study in business administration, law, regional planning or public affairs.
200B. Taxation and valuation: distribution equity, shifting and incidence, theory of optimal taxation, analysis of personal income tax, corporation income tax and other taxes, tax reforms, effective sharing; monetary and fiscal policy, debt management, burden of the debt.

235A. Alternative Approaches to Monetary Analysis (4) I. Mayer
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200B (may be taken concurrently). Focuses on the interrelationship between changes in money supply and changes in nominal GNP. Also discusses the effect of changes in money supply on interest rates.

235B. Monetary Theory (4) II. Hoover
Lecture—3 hours; discussion—1 hour. Prerequisite: course 235A. Emphasizes problems of finding an appropriate place for money in microeconomics/general equilibrium models. Consideration given to meaning of money, its relation to inflation and the nail economy and its role in models of finance.

235C. Monetary Policy (4) III. Meyer
Lecture—3 hours; discussion—1 hour. Organization of the Federal Reserve Bank, the definition of money, goals and tools of monetary policy, alternative targets for monetary policy, impact of monetary policy, the problem of lag, alternative policies.

240A. Econometric Methods (4) III. Burt (Agricultural Economics)
Lecture—4 hours; term paper. Prerequisite: Statistics 130B and 110A or an equivalent course. Statistical models and their use in estimation of economic relationships, single and multiple equation systems. (Same course as Agricultural Economics 240A.)

240B. Advanced Econometrics: Theory (4) I. Havener (Agricultural Economics)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A. Extension of 240A, more mathematical tools and applications. (Same course as Agricultural Economics 240B.)

240C. Advanced Econometrics: Applications (4) II. Wegge
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A. Time series analysis and distributed lags, pooling of time series and cross-section data, Bayesian analysis, applications for prediction and policy. (Same course as Agricultural Economics 240C.)

250A. Labor Economics (4) II. Trest
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 150A-150B or the equivalent. Philosophy, theory and history of American and foreign labor movements; union structure, organization and collective bargaining under changing labor market conditions; current labor market issues.

250B. Labor Economics (4) III. Trest
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150B. Extension of 150B, new issues; 200D recommended. Microeconomic theory of labor supply and labor demand; simulation of labor market and demand functions; human capital theory; labor market analysis.

260A. International Economics (4) II. Feenstra
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D or 200E. Balance of payments adjustment mechanisms; foreign exchange markets; theories of balance of payments policy and international monetary mechanisms.

260B. International Economics (4) I.
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D or 200E. Balance of payments adjustment mechanisms; foreign exchange markets; theories of balance of payments policy and international monetary mechanisms.

260C. International Economics (4) III.
Feenstra Seminar—4 hours; prerequisite: courses 260A and 260B. Survey of current literature in international trade theory.

280. Orientation to Economic Research (2) II. Mayer
Discussion—2 hours. Course tries to bridge the gap between discussion sections and research papers.Focusing on research topics with topics such as the origin of a research project, some mechanics of empirical research and hints on the submission of research papers. (SU grading only.)

290A. Topics in Economics (4) III. The Staff Seminar—4 hours. Prerequisite: consent of instructor. Selected topics in economic analysis and public policy, focusing on current research.

290B. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Discussion—1-5 hours. Prerequisite: graduate standing and consent of instructor. (SU grading only.)

290C. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and graduate standing. (SU grading only.)

290D. Dissertation Research (1-12) I, II, III. The Staff (SU grading only.)

NOTE: For key to footnote symbols, see page 131.
Education

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Educational issues and processes involved in teaching hand- 

117. Cultural Diversity and Education (2) (I, II, III, Professor, ... and methodology of Reading (4) (I, II, Elri -Lecture-discussion—4 hours. Prerequisite: Psychology 1 and I, II, II, and upper division standing. Theory and research on psychologi-... annual ability assessment; legal and ethical issues in personality assessment; in-terviewing techniques in assessment of social and affective functioning; specific measures in personality assessment; reporting on personality assessments; school interventions. Offered in even-numbered years.

118. Compromise in Reading and Listening (4) (I, II, Spring-Prerequisite: upper division standing. Theory and research of compromise and delegation of verbal material. Written and spoken material of two types, narrative and expository, considered. Topics include vocab-ulary, grammar, and mechanics. Prerequisite: instruction of verbal skills at the sentence and passage levels.


120. John Dewey and the Foundations of Education (4) (I, ... lecture—discussion—4 hours. Prerequisite: upper division standing. Discussion of issues in higher education and of some practical implications of varying philosophical approaches to the role of the uni-versity.

121. Church, State and School (4) III, Professor, ... Lecture—discussion—4 hours. Prerequisite: upper division standing. Discussion of issues in higher education and of some practical implications of varying philosophical approaches to the role of the uni-versity.

122. Church, State and School (4) III, Professor, ... Lecture—discussion—4 hours. Prerequisite: upper division standing. Discussion of issues in higher education and of some practical implications of varying philosophical approaches to the role of the uni-versity.

123. School Desegregation and the Civil Rights Movement (4) I, Crocken-burg. Lecture-discussion—4 hours. Prerequisite: upper division standing. Discussion of issues in higher education and of some practical implications of varying philosophical approaches to the role of the uni-versity.

124. School Desegregation and the Civil Rights Movement (4) I, Crocken-burg. Lecture-discussion—4 hours. Prerequisite: upper division standing. Discussion of issues in higher education and of some practical implications of varying philosophical approaches to the role of the uni-versity.

125. Language and Literacy in Linguistic Minorities (3) I, II, ... Seminars—2 hours; laboratory—4 hours. Prerequisite: consent of instructor. Development and application of diagnostic and prescriptive techniques in a reading clinic. (Deferred grading only, pending completion of two-quarter sequence.)

203. Research Developments in Social Studies Education (3) I,II,Lowry. Lecture—2 hours; fieldwork—2 hours. Prerequisite: consent of instructor. The nature of social studies: analysis and interpretation of contemporary social studies trends, and development of a critical multicultural social studies curriculum.

207. Research Developments in Mathematics Education (3) I, Professor. Lecture-discussion—3 hours. Prerequisite: consent of instructor. The role of research in the instruction of mathematics: critical assessment of contemporary mathematics research projects.
Education Abroad Program

275. Effective Teaching (4) I, Minnis
Seminar—4 hours. A research on the relationship of effective teacher behavior and student learning. Use of research on teacher effectiveness to develop teaching strategies, to decide on teaching methods, and to select and use of bilingual/cross-cultural materials.

277. Design of Staff Development Programs (4) III, Minnis
Seminar—4 hours. Use of research, best professional practices and legal guidelines to design staff development programs for public school personnel. Emphasis on school climate, selection of staff and staff development programs. Consideration of political perspectives and the views of teacher organizations.

290C. Research Conference in Education (1) I, II, III, The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: graduate standing. Presentations and critical discussions of research in education by selected graduate students. May be repeated twice for credit. (S/U grading only.)

298. Growth Study (1-5) I, II, III, The Staff (Chairperson in charge)
(S/U grading only.)

299. Research (1-4) I, II, III, The Staff (Chairperson in charge)
(S/U grading only.)

Professional Courses

300. Reading in the Elementary School (4) I, III, Gatherer, Skinner
Lecture—3 hours; field work—3 hours. Prerequisite: graduate standing. Principles, procedures, and curriculum materials for teaching reading of decoding skills with a special emphasis on phonics, comprehension skills, study skills, and reading in the content areas.

301. Reading in the Secondary School (4) I, II, III, Gatherer and Skinner
Lecture—4 hours. Prerequisite: must be teaching or student teaching. Principles, procedures, and materials for reading, including the reading component of their subjects. The teaching of phonics, structural analysis, and alternative methods of coping with the problem reader in the classroom.

302. Language Arts in the Elementary School (2) I, Skinner
Lecture—2 hours. Prerequisite: graduate standing. Principles, procedures, and materials for teaching of oral and written expression including the use of materials, drama, and children's literature in elementary schools.

303. Art Education (3) I, II, III, The Staff (Chairperson in charge)
Lecture-discussion—2 hours; laboratory—2 hours. Prerequisite: admission to multiple subject credential program. Understanding the principles of education in the arts through participation. Development of concepts, introduction to media, and techniques suitable for the elementary school with emphasis on cross-discipline exploration.

304A. Teaching in the Elementary Schools (5-8) I, II, The Staff (Wemple in charge)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in a public or elementary school. Selection and organization of teaching materials. Introduction to techniques of diagnosing and achieving children.

304B. Teaching in the Elementary Schools (5-8) II, III, The Staff (Wemple in charge)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 304A; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in a preschool or elementary school. Introduction to teaching materials and emphasis on study skills. (Graduate only.)

305A. Teaching in the Middle Grades (5-8) I, II, The Staff (Wemple in charge)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in middle grades. Current conceptions of the middle-grades curriculum with emphasis on social, biological, and physical sciences. Emphasis on effective teaching methods.

305B. Teaching in the Middle Grades (5-8) II, The Staff (Wemple in charge)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 305A; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in middle grades. Current conceptions of the middle-grades curriculum with emphasis on social, biological, and physical sciences. Emphasis on effective teaching methods.

306. Teaching in the Middle Grades (5-8) III, The Staff (Wemple in charge)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in middle grades. Current conceptions of the middle-grades curriculum with emphasis on social, biological, and physical sciences. Emphasis on effective teaching methods.

350C. Teaching in Secondary Schools (3-5) I, II, III, The Staff (Chairperson in charge)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in high school. Current conceptions of the high school. Current conceptions of the high school. Techniques for teaching and methods for teaching history and the social sciences in high schools.

350M. Methods in Elementary Science (2) II, Wemple, Oesterle
Lecture-discussion—2 hours. Prerequisite: acceptance into an elementary education program. Principles, procedures, and materials for teaching the biological and physical sciences in elementary schools.

350S. Methods in Elementary Social Studies (2) II, Wemple
Lecture-discussion—2 hours. Prerequisite: acceptance into an elementary education program. Principles, procedures, and materials for teaching history and the social sciences in elementary schools.

350E. Early Childhood and Kindergarten Education (3) III, Skinner
Lecture—3 hours. Prerequisite: upper division or professional standing. Methods, materials, and methods of teaching education programs for the preschool through primary grades. Development of curriculum and methods and materials which stress integration of the child's environment, social, creative, physical, and cognitive development.

353C. Second Year Art Methods (3) I, The Staff (Chairperson in charge)
Lecture-discussion—2 hours; laboratory—3 hours. Prerequisite: Art major or secondary teaching specialty or consent of instructor. Current readings and discussion of contemporary art and teaching principles and practice of techniques used in secondary schools. Observation and evaluation of several art programs.

Lecture—4 hours. Prerequisite: acceptance into a teacher education program or consent of instructor. Methods and materials of teaching concepts and thinking skills. Recent developments in applying this information to social science studies.

352. Secondary School Curriculum: Science (4) II, III, Perkes
Lecture—4 hours. Prerequisite: graduate or professional standing. Conceptions of science curriculum and instruction. Scientific knowledge and methods as applied to courses in science and teaching; rationale and objectives of science programs; laboratory as an environment for learning. Lecture, laboratory, observation. Emphasis on the high school.

354. Teaching Methods in Mathematics (3) I, II, The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: acceptance into a teacher education program; student teaching (concurrently); a mathematics background or consent of instructor. Methods and materials for teaching mathematics at the secondary level (grades 9-12). Review of innovative mathematics programs in the State.

351. Teaching in Colleges and Universities (3) III, Minnis
Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing in any department or program. Analysis of course objectives. Teaching techniques for college instruction with emphasis on the lecture and discussion. Evaluation of student performance and grading. Course and Instructor evaluations. (S/U grading only.)

352. Teaching Practicum for International Students (2) I, III, Minnis
Lecture—discussion—2 hours. Prerequisite: graduate standing in any department or program. For international students. Teaching techniques for college instruction with special recognition of language and cultural differences of experience by international instructors. Information and practical experience with the organization and oral presentation of college-level subject matter. (S/U grading only.)

353. Advanced Fieldwork in Bilingual Education: Teaching (3-5) I, II, III, The Staff (Chairperson in charge)
Seminar—2 hours; field work—3-5 hours. Prerequisite: acceptance into a bilingual education specialist program. Discussion, observation, and field experience of methods, techniques, and materials in the bilingual/cross-cultural classroom, including team teaching with paraprofessionals, implementation of bilingual/cross-cultural instruction, development of bilingual curricula, and selection and use of bilingual/cross-cultural materials.

352. Advanced Fieldwork in Bilingual Education: Evaluation and Supervision (3-5) II, Minnis
Seminar—2 hours; field work—3-5 hours. Prerequisite: upper division standing; acceptance into a bilingual/cross-cultural specialist credential program. Opportunity to acquire supervised experience in the field under the supervision of University staff and an experienced program evaluator/supervisor in bilingual/cross-cultural education.

351A. SIBLS-351C. School Psychology: Introduction (3-3-3) I, II, Sandoval and staff
Seminar—2 hours; field work—3-5 hours. Prerequisite: coursework 351A, 361B-361C, 213, 218. Therapy and techniques of school-based mental health consultation and non-bias assessment. Legal principles related to special education practice and school psychology. Advanced case study techniques. (S/U grading only.)

353A. SIBLS-352C. School Psychology: Internship (3-3) I, II, III, Sandoval, Figueroa, and staff
Seminar—2 hours; internship—18-32 hours. Prerequisite: admission to an school psychology program. Seminar—2 hours; internship—18-32 hours. Prerequisite: acceptance into a reading credential program. Internship at elementary/secondary levels, using diagnostic/prescriptive techniques, and studying district in-service programs. May be repeated twice for credit up to a total of 6 units. (S/U grading only.)

352. Programming in Education (3) II, III, Skinner
Lecture—1 hour; laboratory—1 hour. Prerequisite: consent of instructor. Computer programming in LOGO, a high-level computer language which is appropriate for instruction in elementary and secondary grades.

352. Group Study (1-5) I, II, III, The Staff (Chairperson in charge)
(S/U grading only.)

353. Individual Study (1-5) I, II, III, The Staff (Chairperson in charge)
(S/U grading only.)

Programs of Study

The Education Abroad Program (EAP) of the University of California offers upper division students who meet the minimal admission requirements the opportunity to experience a different culture while making progress toward degree objectives. Students interested in the language, literature, art, culture, history, or government of the countries or areas where study centers are located will gain substantially from first-hand academic and practical experience. The same is true for students of other fields of study. All academic fields, including the field of study, will broaden their outlook and gain new skills as the result of study in a foreign country. The academic-and non-academic-debts and credits of participation in the EAP should be weighed carefully prior to departure.
Application

Normally, students participate in the program during their junior year, but a limited number of students may be selected for participation as seniors. A few programs are open to graduate students as well. Students considering study abroad with the EAP should contact the EAP Office or the Coordinator's Office prior to submitting application and filing deadlines. This is important, as deadlines for some centers, including the United Kingdom and Ireland, are in early November.

Application forms are available from the EAP Office. A provisional academic planning form, prepared in consultation with the student's academic counselor and the major adviser, must be submitted along with the completed application to the EAP Office prior to the appropriate deadline. Applications received after the official deadline cannot be considered.

Students who do not meet the minimal requirements for acceptance (see Under Education Abroad in the Introduction section) must consult the Campus Coordinator. Students who have accumulated more than 145 units prior to the beginning of their planned year of study abroad must also consult the Campus Coordinator before submitting an application; the probability of such students being accepted is low.

Selection

The Academic Senate Committee on the Education Abroad Program is intimately involved in the selection of EAP participants on 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 probability of receiving the endorsement of the Committee, other factors being equal. Lists of suggested courses and leading materials are available in the EAP Office and the Office of the Coordinator.

Once the completed application materials have been filed, an applicant will be interviewed by a selection committee consisting of Faculty and EAP returnees. Among other things, academic goals, knowledge of the host country and the United States and proficiency in the language of the host country, when applicable, will receive considerable attention during the interviews.

Files of applicants receiving the endorsement of the Committee on EAP are forwarded to the Universitywide Office of the EAP on the Santa Barbara campus, where further selection decisions will be made.

Academic Program

In most cases, 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 their own language. Thus, language skills are very important. To aid adjustment of UC students to different, often unfamiliar educational practices, tutorials are a part of the academic program of most centers. Tutorials also assist in overcoming problems and provide cultural background information presupposed in the courses. Tutorials are taught by graduate students or junior staff of the host university and are offered in association with courses in which a sufficient number of UC students have enrolled.

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. The academic program of each student includes: (1) an intensive course in the language of the host country (except for the programs in the United Kingdom, Ireland, Canada, Australia, Egypt, Ghana, Kenya, and New Zealand); (2) a full year of academic courses; (3) broad opportunity 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.

Graduation Requirements

All prospective applicants, but particularly students who intend to study abroad during their senior year, should plan their course programs for Davis and abroad carefully in order to satisfy 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 GPA, the major departments and programs retain the right to determine which EAP courses will be accepted in satisfaction of major requirements. Some major departments or programs may prohibit upper division courses which must be completed in residence at Davis. Major advisers 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. Students planning to graduate immediately upon completion of participation in the EAP may satisfy residence requirements within the final 45 units preceding entrance into the EAP. Otherwise, subject to prior approval of the major department or program concerned, the requirement may be satisfied as follows: Within the final 90 units earned toward the degree, 55 units must be completed in residence in the student's College or School, 12 units of which must be completed after returning from EAP participation. With this option, no more than 55 units taken abroad may be applied toward the unit requirement for graduation. The applicant's College or School Dean is the source for information on the University residence requirement and additional residence requirements that may be imposed.

Participants who 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, transcripts from abroad take a long time to get to the home campus and are not received in time for EAP returns 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 the study centers listed below incorporate selected information concerning these points. More detailed information is available in the flyers describing each of the centers issued by the academic counselor in the Coordinator's Office.

In addition to the programs listed below, Davis students have access to certain special programs, such as the UC Davis exchange with French language universities in Quebec. Information can be obtained in the EAP Office at South Hall.

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-Universität 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.

Denmark. A compulsory summer intensive language program precedes the academic year and continues through the fall semester. Instruction is in Danish, though examinations in English may be available. Most students concentrate on their major or a closely related field; independent study under tutorial supervision is expected.

University of Copenhagen. Broad availability of humanities and social sciences. Programs in communications, economics and international politics, history, linguistics, and medieval studies are of particular interest.

France. A compulsory intensive language course precedes the beginning of the academic year. All courses in the universities are taught in French. UC faculty directors are in residence at Bordeaux, Grenoble, Montpellier, 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. Offerings in anthropology and psychology are limited. Not suitable for physical or life sciences.

University of Lyon. Social sciences, art history; modern languages and linguistics; Arab studies.

University of Marseille. Biological sciences and environmental marine biology. The Marseille program is open only to students in the biological sciences.

University of Montpellier. Humanities and literature, primarily through Paul Valéry University.

Paris Center for Critical Studies. Film theory, literary criticism, philosophy, theater (literature, criticism, and history), historiography, and limited art history.

Pau-Paris. Participants spend the first semester at the University of Pau. At the end of January, they move to Paris to take courses at the Paris Center for Critical Studies. In addition to required core courses from French civilization, students choose options in humanities and social sciences, with emphasis on comparative cultural studies, French language, and critical studies.

University of Pau. Pau-Paris core courses, human- ities, social sciences. Program in Basque studies is of special interest. Scholarships available for students of Basque or Breton cultural background.

University of Poitiers. Humanities is taught, with major emphasis in history and medieval studies; mathematics; physics.

Germany. A compulsory intensive language program provides the beginning of the academic year. All courses are taught in German.

Georg-August-Universität, 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.

Hungary. Karl Marx University, Budapest. A fall semester or full-year program jointly sponsored by UC and the University of Wisconsin at Madison. Offers developed for the program include conversational Hungarian and courses in Central European history, culture, economics, and economic history.

Italy. A compulsory intensive program in language and history precedes the beginning of the academic year. Students who have completed only one year of Italian may become eligible for participation by attending a summer intensive-language program in Italy in order to attain the required third-year level, 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.

NOTE: For key to footnote symbols, see page 131.
University of Venice. Economics, history; history of art.
Cini 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 study 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 unusual pattern is study of a single subject, usually the major or a closely allied field, for the entire year.
Portugal. A six-week intensive language program at UC Santa Barbara is required before departure. Environmental programs for the spring semester enroll in courses taught through the Department for Foreign Students as well as regular offerings at the University of Lisbon.
University of Lisbon. Portuguese language, literature, and culture; classical and romance languages, literature, and linguistics; history, philosophy, geography, art history, and cultural anthropology.
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, history, literature, linguistics) and some social sciences. Courses developed for the Center and taught by the University of Barcelona form the core of the program. EAP students are required to take at least one regular year-long course in 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, comprises Spanish, Spanish literature, and Spanish culture. EAP 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.
Switzerland. Compulsory intensive language course during the summer for students who are not already fluent in Swiss German. Language study continues during the fall semester for all students until the student has gained the equivalent of two years of French. Most courses are taught in French, but a few courses offered in English may be available.
University of Lund. Broad curriculum. Excellent science programs.
United Kingdom and Ireland. The program, which includes 13 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. Following selection for participation by the EAP administration, a student 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 College (London), University of East Anglia, University of Exeter, University of Hull, University of Kent at Canterbury, University of Lancaster, University of Leeds, University of Sussex, University of York. Occasionally, students may be placed on an ad hoc basis at other institutions.
Ireland: Trinity College (of the University of Dublin).
Scotland: University of St. Andrews, University of Stirling.
Wales: University College of Wales at Aberystwyth.
Generally, the host universities offer a broad curriculum that includes most liberal arts majors. Life sciences and physical sciences are available.
USSR. Two semester programs are available, depending on language preparation. Students with two years of university-level Russian participate in a program developed by the Russian Ministry of Education. Three courses for university-level Russian may apply for a program organized by the Council on International Educational Exchange (CIEE), a consortium of American universities in which UC participates. Both programs are primarily intended for language majors, but are 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 Programs for Overseas Students offers a core curriculum in Jewish, Middle East and Israeli studies, social sciences, and history of modern Israel taught in English.
Hebrew University, Jerusalem. Broad curriculum; emphasis on Israeli and Middle Eastern studies. UC students demonstrate their command of Hebrew, and UC faculty are available. Students have access to a broad curriculum throughout the Hebrew University.
Asia
Hong Kong. A limited selection of courses is offered in English. Knowledge of Chinese is not required for acceptance; however, all students are required to complete at least two courses in Chinese culture, history, or language prior to departure. A compulsory intensive Cantonese program precedes the beginning of the academic year. All students are required to include 18 units of Mandarin or Cantonese in their annual program.
Chinese University of Hong Kong. Humanities and social sciences, with emphasis on Chinese studies. Art studio and music performance courses are available. (When a course is offered in English is announced only one week before instruction begins.)
India. Instruction is in English. A compulsory intensive language program in conversational Hindi precedes the academic year. Students will take a one-year-long course focusing on developments in modern India and Indian culture and tradition, as well as continue their study of Hindi. During the second and third quarters, students will also take regular coursework at the University of Delhi.
University of Delhi. Humanities and social sciences are well represented, with some offerings in fine arts and mathematics.
Indonesia. An eight-week summer intensive-language program at Gadja Mada University in Yogyakarta is required for all students. Those with less than three years of University-level Indonesian must then take a ten-week inter- term program of continued study of the language, with additional courses in Indonesian history and culture, taught in English. Students enroll in regular courses at one of five institutions for the second semester. Instruction is in Indonesian; tutorial assistance may be available. It is possible to apply for the summer intensive language program only. Students may take more advanced language in subsequent years.
Gadjah Mada University. Agriculture, anthropology, biology, economics, geography, mathematics, philosophy, psychology, political science.
Institute Seni Indonesia (ISI). The Indonesian Institute of the Arts: visual arts, music, dance, theater, fine arts, ethno-musicology.
Akademi Seni Tari Indonesia (ASTI) at Denpasar and Bandung. The Indonesian Dance Institute of Bali: dance, music, and theater.
University of Padjadjaran at Bandung. Development of environmental studies, humanities and social sciences are available.
Japan. 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 18 units of Japanese language during their year in Japan.
International Christian University, Mitaka (Tokyo). Humanities and social sciences; emphasis on Japanese language and intercultural communication. A limited number of courses taught in English are available.
Sophia University, Tokyo. Comparative culture studies, Japanese language and literature, history, political science, economics and business are available. Many are taught in English.
Tokyo Institute of Technology. Graduate students present in Japanese language and research and take courses in science and engineering.
People's Republic of China. EAP offers a full-year program in Beijing; a semester program in Nanjing is available through the Council on International Educational Exchange. Intensive language study is one semester in the primary language in both programs.
Nanjing University. This single-semester program combines intensive intermediate language instruction with courses in Chinese history and contemporary culture. The prerequisite is one year of college-level Chinese.
Peking University. A year-long program focused on advanced-level instruction in Chinese language and literature. Courses are conducted by the Chinese Language Teaching to Foreigners Division of Peking University. The prerequisites for the programs two years of college-level Chinese.
Taiwan, Republic of China. Students participating in the Chinese Language and Culture Studies Program in Taipei receive instruction in Chinese language and enroll in lecture courses (taught in English) on Chinese culture and society arranged by CSU International Programs. Courses in art history, literature, economics, history and political science are available. Prior coursework in Chinese culture, history and art language are recommended.
This is a cooperative program with California State University, Fullerton.
Thailand. An eight-week summer intensive language program at Chiangmai University is required for all

NOTE: For key to footnote symbols, see page 131.
students. This is followed by a seven week inter-
term program of continued study of the Thai lan-
guage, with additional courses in Thai history and
culture, taught in English. Most students will remain
at Chiangmai University for the second semester
and continue taking courses in Thai language and
area studies taught in Thai. Students with sufficient language background (more than two
years of University-level Thai language) have the
option of enrolling at Chulalongkorn University in
Bangkok for the semester. Instruction is in Thai,
though English-speaking tutors are available.

It is possible to apply for the summer intensive
language program only. Students may take more
advanced language courses in subsequent years.

Africa

Ghana. University of Ghana, Legon-Accra. Open
to undergraduate and graduate students. Instruction
is in English. As in the British system, students take
a year-long program of study in a single area. End-
of-year examinations are given only once and are
mandatory for credit to be awarded.

Offerings include humanities and social sciences,
with emphasis on African studies. There is a strong
program in ethnomusicology.

Kenya. Enrollment open to undergraduate and
graduate students. As in the British system, students
take a one-year 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. Since operation of the Center
is unpredictable, interested students should contact
the EAP Office in South Hall for the latest status
reports.)

University of Nairobi. Humanities and social sciences,
with emphasis in African studies. Limited opportu-
nunities in the sciences and in veterinary science.
Graduate students in history, political science,
sociology, architecture, and design may associate
with the Institute for Developmental Studies, Institute
for African Studies, or the Housing and Research
Development Unit.

Togo. Study and field experience (SFE). An eight-
week summer program developed by UC. Four
weeks of academic coursework in French language
and contemporary Africa are taught at the University
of Dangou, Lomé, followed by four weeks of field
work.

Latin America

Brazil. Language requirements for admission to this
program are two years college-level Portuguese
or the equivalent; or one year of college Spanish
and one year of college Portuguese; or two years
of college Spanish and completion of an intensive
course in Portuguese prior to departure. Since
courses are taught in Portuguese, the equivalent
of one year of college-level Portuguese is the ab-
solute minimum. A compulsory intensive language
course precedes the beginning of regular course
work.

University of São Paulo. Brazilian literature, Por-
tuguese language, arts, humanities, social sciences.
(This is a cooperative program with the University of
Indiana.)

As is appropriate in this Hemisphere, the academic
year extends from early March through December.
UC participants leave in January. Applications for
participation in this program are due in May for
a January departure.

A mandatory intensive language program precedes
the academic year. During the academic year,
courses in Central American studies (history, lit-
erature, political science, etc.) form half of the cur-
iculum, with the remaining courses taken from any
of the faculties at the University of Costa Rica.

Costa Rica Tropical Biology Quarter at Monteverde.
This spring quarter program provides an unusual
opportunity for undergraduates to study and do field
research in a tropical cloud forest. Applicants should
have completed a year of biology, including one
upper-division ornamental biology course, and have
some background in Spanish language.

Costa Rica Medical Quarter at San Jose. This winter
quarter program provides medical students the op-
Pportunity to combine intensive medical Spanish
instruction and clinical studies. Conversational ability
in Spanish is required.

Mexico. Universidad Nacional Autónoma de Mexico
(UNAM), Mexico City. A compulsory intensive lan-
guage program precedes the beginning of the school
year, augmented by courses in contemporary Mexico
(history, art, literature, etc.). A month-long field
placement doing volunteer work in a community
outside of Mexico City is an integral part of this
program. Students have the option of spending one
semester (two UC quarters) at UNAM, or a full year.

Study and Field Experience (SFE) in Mexico. Available
for either Fall or Spring Quarter, the SFE pro-
gram begins in Mexico City with six weeks of in-
tensive language courses and a course on contempo-
rary Mexico. The final weeks of the pro-
gram are spent doing volunteer work in a community
outside of Mexico City to complement formal
coursework.

Summer Intensive Language Quarter in Morelia. This
program provides total immersion in Mexican soci-
ety and Spanish language to low and background
students who have completed one year of University-level
Spanish before departure. It is not appropriate for
advanced students in Spanish.

Peru. A compulsory intensive language course pre-
cedes the beginning of the academic year. All
quarters are spent in Lima.

Universidad Católica, Lima. Humanities, social sci-
ences, Anthropology, archaeology, and ethnographic
are of special interest. (This is a program of the
Peru Consortium, which is composed of the Uni-
versity of Indiana and a number of California uni-
versities.)

Canada

Students may enroll for one semester or a full year.
Studies on the major or a closely allied field is
expected.

University of British Columbia (UBC). Most academic
disciplines are available. Areas of special interest
include Pacific Rim and Canadian Studies.

Australia and New Zealand

As is appropriate in the Southern Hemisphere, the
academic year extends from the beginning of
instruction in early March through the examination
period, which starts in November. UC participants
must leave in February, and will be unable to attend
classes during the winter term preceding departure.
Applications for participation in these programs are
due in May for a February departure. The universities
follow the British system of higher education.

The Australian program includes the Australian Na-
tional University in Canberra; three institutions in
the Melbourne area, University of Melbourne, Mon-
ash University and La Trobe University; the University
of Sydney, Macquarie University, and the University
of New South Wales in Sydney; University of Ade-
laide and Flinders University in South Australia. A
full range of academic programs is available. The
Study Center accommodates a limited number of
students. A UC faculty member in Melbourne directs
all programs.

The New Zealand program includes the University
of Auckland, Lincoln College in Christchurch, the
University of Otago in Dunedin, and Massey Uni-
versity in Palmerston North. All academic disciplines
are available; programs in textiles and a variety of
agricultural sciences are of special interest.

Endocrinology (A Graduate Group)

Donald L. Curry, Ph.D., Chairperson of the Group

Graduate Study. The interdepartmental Graduate
Group in Endocrinology offers programs of study
leading to the M.S. and Ph.D. degrees. The M.S.
degree is offered under Plan I (thesis) of the master's
program. Detailed information regarding graduate
study is available through the Group Chairperson.
See also the Graduate division section in this catalog.

Graduate Advisers. Contact the Program Office.

Courses in Endocrinology

Graduate Courses

218. Mammary Endocrinology and Homeostasis (6) Ill. Tur-
wyn. Welsh Lecture—5 hours; seminar—1.5 hours. Prerequisite: Phys-
ological Sciences 101A-101B or Biochemistry and Biophysics
101A-101B and Physiological Sciences 110; consent of in-
structor. Physiological and biochemical properties of mam-
malian endocrine system, both endocrine and epithelial. Reproductive endocrinology. Seminar presentation of key current literature.

220. Endocrinology. Literature Critique (1) I, II, Turwyn
Discussion—1 hour. Prerequisite: consent of instructor. Criti-
cal reading and evaluation of current original publications in endocrinology. Selected papers will be presented and discussed in detail by faculty and students. May be repeated for credit. (SU grading only.)

240. Biochemical Endocrinology (3) Ill. Adams (Animal Sci-
ence) Lecture—5 hours. Prerequisite: graduate standing or consent of instructor. Examination of recent advances in biochemical endocrinology and cellular and cell biology of endocrine systems with emphasis on processes of hormone and re-
ceptor synthesis, second messenger phenomena, and hor-
monic control of gene expression.

290. Semint (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: consent of instructor. Dis-
cussion and critical evaluation of advanced topics and current trends in research in endocrinology. May be repeated for credit.

293. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor.

299. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge) (SU grading only.)

Engineering

(College of Engineering)

Mohammed S. Ghausi, Ph.D., Dean
Roy Bainer, M.S., L.L.D., Dean Emeritus
John Killeen, Ph.D., Associate Dean—Graduate
Studies and Research (Livermore)
Benjamin J. McCoy, Ph.D., Associate Dean—
Research
Zuhair A. Munir, Ph.D., Associate Dean—
Graduate Studies
James F. Slackford, Ph.D., Associate Dean—
Undergraduate Study

College Office, 2132 Bainer Hall (752-0553)

The Major Programs

Sixteen undergraduate engineering curricula, in-
cluding four formal double-major programs, are of-
fered. Each of these is a four-year program leading to the degree of Bachelor of Science. The Agricultural, Chemical, Civil, Electrical, and Mechanical Engineering and the Aeronautical Science and Engineering curricula are six programs which have been accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, 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 the Graduate Division section of this catalog. For additional information refer to the College of Engineering Bulletin, obtainable 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.

Lower Division Curricula
Students who enter the College of Engineering with fewer than 84 quarter units of credit may be admitted to the four Lower Division Programs offered below. The first program (I) is common to major programs in Aeronautical Science and Engineering, Civil Engineering, Materials Science and Engineering, Mechanical Engineering, and combinations of these majors; (II) is for those majoring in Civil Engineering and the three Agricultural Engineering options: Aquacultural and Fisheries Engineering, Food Engineering, and Forest Engineering; the third (III) is for those majoring in Chemical Engineering and the double major, Chemical Engineering/Materials Science and Engineering; and the fourth (IV) is for students majoring in Computer Science, Electrical Engineering, Electrical Engineering and the double major Electrical Engineering/Materials Science and Engineering.

The lower division program for students who enter the College with 84 or more quarter units of credit is explained in the College section, under Admission to Advanced Standing.

Engineering—Lower Division Program I
Requirements for Aeronautical Science and Engineering, Civil Engineering, Civil Engineering/Materials Science and Engineering, Mechanical Engineering, Mechanical Engineering/Materials Science and Engineering majors only.

<table>
<thead>
<tr>
<th>QUARTER</th>
<th>USUALLY TAKEN</th>
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</thead>
<tbody>
<tr>
<td>Required Courses:</td>
<td></td>
</tr>
<tr>
<td>Calculus—Mathematics 22A—21B—21C</td>
<td>12</td>
</tr>
<tr>
<td>Linear algebra—Mathematics 22A</td>
<td>3</td>
</tr>
<tr>
<td>Differential equations—Mathematics 22A</td>
<td>3</td>
</tr>
<tr>
<td>Vector analysis—Mathematics 22C</td>
<td>3</td>
</tr>
<tr>
<td>General chemistry—Chemistry 1A—1B or 4A—4B</td>
<td>10</td>
</tr>
<tr>
<td>Introduction to engineering systems—Engineering 3</td>
<td>1-2</td>
</tr>
<tr>
<td>(Engineering 3 is designed for freshmen. More advanced students may petition to substitute 3 units of technical electives for Engineering 3.)</td>
<td></td>
</tr>
<tr>
<td>Engineering graphics in design—Engineering 4</td>
<td>3</td>
</tr>
<tr>
<td>Applications of computers—Engineering 5</td>
<td>3</td>
</tr>
<tr>
<td>Circuits—Engineering 17</td>
<td>3</td>
</tr>
<tr>
<td>Statics—Engineering 35</td>
<td>3</td>
</tr>
<tr>
<td>Properties of materials—Engineering 45</td>
<td>4</td>
</tr>
<tr>
<td>Expository writing, English 1</td>
<td>1</td>
</tr>
<tr>
<td>Note: For key to footnote symbols, see page 131.</td>
<td></td>
</tr>
</tbody>
</table>

Expository writing—English 1 or 3, or Computational Literature |
Introduction to public speaking or group communication—Rhetoric and Communication 1 or 3 |
Humanities—Social Sciences/General Education electives* |
Unrestricted electives* |

(*Students majoring in Civil Engineering or Civil Engineering/Materials Science and Engineering are required to complete 12 units of physics including Physics 2A, 68, and 86. In addition, either Physics 6D, Chemistry 1C, Biological Science 1 or Geology 50-50L is required. Further, 13 units of Humanities—Social Sciences electives and 3 units of Unrestricted electives are required in these two majors. Civil Engineering majors take Civil Engineering 10 in place of 3 units of unrestricted electives.)

Total Lower Division Units: 90

Agricultural Engineering—Lower Division Program II
Requirements for majors in Agricultural Engineering, and the three Agricultural Engineering options (Aquacultural and Fisheries Engineering, Food Engineering, and Forest Engineering) only.

<table>
<thead>
<tr>
<th>QUARTER</th>
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<tbody>
<tr>
<td>Required Courses:</td>
<td></td>
</tr>
<tr>
<td>Calculus—Mathematics 21A—21B—21C</td>
<td>12</td>
</tr>
<tr>
<td>Linear algebra—Mathematics 22A</td>
<td>3</td>
</tr>
<tr>
<td>Differential equations—Mathematics 22B</td>
<td>3</td>
</tr>
<tr>
<td>Vector analysis—Mathematics 22C</td>
<td>3</td>
</tr>
<tr>
<td>General physics—Physics 8A—8B—8C—8D</td>
<td>16</td>
</tr>
<tr>
<td>General chemistry—Chemistry 1A—1B</td>
<td>10</td>
</tr>
<tr>
<td>Organic chemistry—Chemistry 8A</td>
<td>3</td>
</tr>
<tr>
<td>Principles of biology</td>
<td></td>
</tr>
<tr>
<td>15 units of biological science courses selected in consultation with adviser and approved by Undergraduate Study Committee</td>
<td>15</td>
</tr>
<tr>
<td>Engineering graphics in design—Engineering 4</td>
<td>3</td>
</tr>
<tr>
<td>Applications of computers—Engineering 5</td>
<td>3</td>
</tr>
<tr>
<td>Surveying, Civil Engineering (Forestry Engineering option only)</td>
<td>0-3</td>
</tr>
<tr>
<td>Statics, Engineering 35</td>
<td>3</td>
</tr>
<tr>
<td>Properties of materials—Engineering 45</td>
<td>4</td>
</tr>
<tr>
<td>Expository writing, English 1</td>
<td>4</td>
</tr>
<tr>
<td>Introduction to public speaking or group communication, Rhetoric and Communication 1 or 3</td>
<td>2</td>
</tr>
<tr>
<td>Humanities—Social Sciences/General Education electives</td>
<td>8</td>
</tr>
<tr>
<td>Total Lower Division Units: 97-100</td>
<td></td>
</tr>
</tbody>
</table>

Chemical Engineering—Lower Division Program III
Requirements for major in Chemical Engineering and the double major, Chemical Engineering/Materials Science and Engineering only.

<table>
<thead>
<tr>
<th>QUARTER</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Required Courses:</td>
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<tr>
<td>Calculus—Mathematics 21A—21B—21C</td>
<td>12</td>
</tr>
<tr>
<td>Linear algebra—Mathematics 22A</td>
<td>3</td>
</tr>
<tr>
<td>Differential equations—Mathematics 22B</td>
<td>3</td>
</tr>
<tr>
<td>vectormal analysis—Mathematics 22C</td>
<td>3</td>
</tr>
<tr>
<td>General physics—Physics 8A—8B—8C—8D</td>
<td>16</td>
</tr>
<tr>
<td>General chemistry—Chemistry 1A—1B</td>
<td>10</td>
</tr>
<tr>
<td>Organic chemistry—Chemistry 8A</td>
<td>3</td>
</tr>
<tr>
<td>Principles of biology</td>
<td></td>
</tr>
<tr>
<td>15 units of biological science courses selected in consultation with adviser and approved by Undergraduate Study Committee</td>
<td>15</td>
</tr>
<tr>
<td>Engineering graphics in design—Engineering 4</td>
<td>3</td>
</tr>
<tr>
<td>Applications of computers—Engineering 5</td>
<td>3</td>
</tr>
<tr>
<td>Surveying, Civil Engineering (Forestry Engineering only)</td>
<td>0-3</td>
</tr>
<tr>
<td>Statics, Engineering 35</td>
<td>3</td>
</tr>
<tr>
<td>Properties of materials—Engineering 45</td>
<td>4</td>
</tr>
<tr>
<td>Expository writing, English 1</td>
<td>4</td>
</tr>
<tr>
<td>Introduction to public speaking or group communication, Rhetoric and Communication 1 or 3</td>
<td>2</td>
</tr>
<tr>
<td>Humanities—Social Sciences/General Education electives</td>
<td>8</td>
</tr>
<tr>
<td>Total Lower Division Units: 97-100</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: For key to footnote symbols, see page 131.
Aeronautical Science and Engineering

Aeronautical science and engineering is the branch of engineering that applies scientific knowledge to the design, manufacture and operation of aircraft. The program leading to the Bachelor of Science degree in Aeronautical Science and Engineering is designed to provide a broad background and fundamental education in mathematics, the physical sciences, and the engineering sciences. These fundamentals, when complemented by the required technical courses, prepare the student for immediate employment in government or industry, while simultaneously establishing an excellent foundation for graduate studies. The fundamental disciplines of this branch of engineering apply to all bodies and vehicles whose applied loads are influenced by aerodynamic forces. Within this context, aeronautical engineers are involved with automobiles, trains, ships and submarines, aircraft, rockets and missiles, sports equipment, and a variety of energy systems. However, aeronautical science and engineering usually limits its subject matter to atmospheric studies, as does the undergraduate curriculum at UCD. The fundamental engineering disciplines are supplemented with courses in aircraft propulsion, aerodynamics, aircraft performance, stability and control, aircraft preliminary design, and aeronautical structures. A broad range of technical elective courses is available. Some students choose these electives from any one of a variety of subjects in order to develop a background in the sciences and engineering. Typical aeronautical science and engineering specialties include aerodynamics, propulsion, aircraft performance, stability, control, and aeronautical structures, flight testing, or component and mechanism design. In any case, it is recommended that students consult with their adviser before selecting technical electives.

There are a number of electives which could be recommended to all aeronautical science and engineering students regardless of their chosen area of specialization. These include Electrical and Computer Science Engineering 150, 150A, 150B, 162, 172, 184A, 184B, 186, 187

Electrical and Computer Science Engineering 150

Applied Science Engineering 115, Civil Engineering 131A

Suggested advisers:


Aeronautical and Astronautical Science and Engineering (Aerospace Engineering)

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology)

Minimum units required for major: 192.

Subject Areas and Courses

Electrical and Computer Science Engineering 100

Applied mechanics—Engineering 102A, 102B, 104B, 104C


Fluid mechanics—Engineering 103A, 103B, 103L

Aeronautical science and engineering 125

Aerospace engineering fundamentals—Aeronautical Science and Engineering 125

Aerospace engineering fundamentals—Aeronautical Science and Engineering 125

Aircraft propulsion, performance, stability and control—Aeronautical Science and Engineering 128, 129, 130, 139A, 138A

Aircraft preliminary design—Aeronautical Science and Engineering 130

Aeronautical science and engineering 131B, Aeronautical Science and Engineering 135

Measurement and control engineering 176

Total units for upper division program 102

Agricultural Engineering

Combine a broad general training in engineering with a basic understanding of biological phenomena and you have the preparation for a socially useful and personally rewarding career.

Agricultural engineers create systems, equipment, and processes for producing, processing, packaging and utilizing agricultural products. They integrate a cross-section of engineering disciplines with special attention to the interface between physical systems and biological products. Agriculture (including nursery and greenhouse enterprises), food processing and manufacturing, forest production and management, and aquaculture and fisheries specialists all must deal with handling, packaging, storing and transporting biological materials. The practice of agricultural engineering requires an understanding of the properties of these materials and the knowledge to control the environment to provide conditions conducive to optimum biological activity and assure that applied stresses are not damaging or disruptive.

Agricultural engineers often work in interdisciplinary teams with biological scientists and other engineering specialists. The growth of biotechnology, environmental issues, and concerns for the human interaction with engineering systems are opening up new and exciting opportunities. Agricultural engineers are needed to harness for the public good the many rapid advances being made in the biological sciences.

The program allows students to select one of four curricula, depending on their specific interests, while still retaining the versatility and flexibility to adapt to careers in several areas. All programs share a common lower division program and a common core in the upper division. The four curricula are: Agricultural Engineering, a general program offering three possible areas of specialization; Agricultural Engineering (Aquacultural and Fisheries Engineering option); Agricultural Engineering (Food Engineering option); and (4) Agricultural Engineering (Forest Engineering option).

AREAS OF SPECIALIZATION:

Irrigation and drainage specialists apply engineering and scientific principles in the design and operation of irrigation and drainage systems.

Suggested technical electives:

Agricultural Engineering 140, 141, 143 Atmospheric Science 265

Civil Engineering 142, 144, 145 Water Science 103, 104, 110, 111, 114, 150, 154, 160, 172

Power and Machinery specialists design, develop and apply machinery and power-utilities for crop production.

Suggested technical electives:

Agricultural Economics 140

Agricultural Engineering 117, 119 Civil Engineering 131A

Engineering 122, 140 Mechanical Engineering 150A, 150B, 151, 152, 171, 176

Structures and Environment specialists design agricultural structures for providing an optimum environment for animal production, product storage and conditioning, or crop production in greenhouses.

Suggested technical electives:


Mechanical Engineering 165

Physiology 110, 149

Agricultural Engineering

Curriculum 1

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology)

Upper Division Requirements

Minimum units required for major: 195.

UNITS

Subject Areas and Courses

Electrical and Computer Science Engineering 102A, 102B, 104B, 104C 6


Engineering economics—Engineering 122, 123 3

Mathematics—Applied Science Engineering 131A, 131B, 131C, 131D 3

Statistics—Civil Engineering 114, 115 3

Agricultural engineering 150A 13

Select one course from Agricultural Engineering 114, 129, 132 and 140 or 141 or Water Science 180

Agricultural engineering design 11

(a) Agricultural Engineering 170A, 170B, and 170C.

(b) Select one course from Civil Engineering 132A, 145, Mechanical Engineering 150A.

Professional responsibilities—Engineering 131A 3

Humanities—Social Sciences/General Education electives 16

Biological and agricultural sciences 9


Required technical courses 11

Agricultural Engineering 112, Civil Engineering 141, 14L, Engineering 111

Total units for upper division program 98

Agricultural Engineering (Aquacultural and Fisheries Engineering Option)

Curriculum 2

Aquacultural and fisheries engineers are involved in the design, fabrication and management of equipment and facilities for aquatic cultures, harvesting and handling aquatic plants and animals. Maintenance of proper habitat and environmental conditions, both in controlled aquaculture operations and in natural fishery settings, is a primary consideration.

Suggested technical electives:

Agricultural Engineering 119, 132 Chemical Engineering 131 A

Civil Engineering 142, 153

Engineering 156B, 122, 140, 144

Mechanical Engineering 171, 172, 176

Upper Division Requirements

Minimum units required for major: 201.
Subject Areas and Courses

Electronic circuits and microcomputers—Engineering 100 and Agricultural Engineering 165.  
Engineering economics—Engineering 108.  
Mathematics—Applied Science Engineering 115 or Engineering 100.  
Statistics—Civil Engineering 114.  
Agricultural Engineering.  
Engineering design.  
(a) Agricultural Engineering 170A, 170B, and 170C.  
(b) Select one course from Civil Engineering 129A, 129B, 129C, Mechanical Engineering 150A.  
Professional responsibilities—Engineering 190.  
Electrical and agricultural sciences 15.  

Required technical electives 13.  
Engineering 103B, 105B, 111.  
Mechanical Engineering 165A.  

Agricultural Engineering (Forest Engineering Option)

Curriculum 4

Forest Engineering is the application of engineering principles and silvicultural knowledge in the management of forests and forests. 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 harvesting, logging, and forest residue management, reforestation, forest fire protection, soil and water control and conservation, forest road development, materials handling, and other phases of the industry. This option is administered in cooperation with the Department of Forestry and Resource Management at UC Berkeley. Fall quarter of the junior year is spent on the Berkeley campus, following an eight-week summer field course sequence at the UC Foresty Camp near Quincy.

Students who transfer to the University from another institution to enter this program should apply for admission to the Davis campus even if they plan to attend the UC Foresty Camp 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 semester to be spent on that campus. Application forms for intercampus Visitor status are available from the Department of Agricultural Engineering.

Suggested technical electives:

Agricultural Engineering 112, 114, 117, 119  
Civil Engineering 141, 153  
Forest Products 133, 141, 144, 145

Upper Division Requirements

Minimum units required for major: 211.5.

Subject Areas and Courses

Electronic circuits and microcomputers—Engineering 100 and Agricultural Engineering 165.  
Engineering economics—Engineering 108.  
Mathematics—Applied Science Engineering 115 or Engineering 100.  
Statistics—Civil Engineering 114.  
Agricultural Engineering 10.  

Total units from Agricultural Engineering 114, 125, and 140 or 141 or Water Science 160.  

Chemical Engineering

Chemical Engineering is concerned with the application of the principles of chemistry and engineering to the production of useful products. The products of the process industries range from antibiotics to zinc, from integrated circuits to integrated management of wastes, from food and agricultural chemicals to synthetic polymers. Students are increasingly concerned with chemical and engineering processes related to the environment, food, and pharmaceutical 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.

A major in Chemical Engineering has been planned to provide a sound knowledge of engineering and chemical sciences so that the student 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, process design, and process dynamics and control. The program is strengthened and broadened with introductory courses in the electrical and mechanical sciences.

The curriculum includes 12 units of technical electives and 6 units of advanced chemistry electives which allow the student to strengthen specific areas in Chemical Engineering, to explore new areas, or to pursue areas of specialization. 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 to prepare the student for graduate work in biomedical engineering or to meet the undergraduate requirements for entrance into medical school. Because of the emphasis on the natural sciences and the application of fluid mechanics, transport, heat transfer, thermodynamics, reaction kinetics, and process dynamics to problems in natural science, students are well-prepared to understand problems in living systems. Many biological phenomena, such as blood flow, solute transport, and energy exchange, can be dealt with using the theoretical tools learned as an undergraduate.

AREAS OF SPECIALIZATION:

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:

Chemistry 111, 115, 121, 126, 128C, 128B, 129C, 130, 131, 150  

Textiles and Clothing 100, 110

Applied Mathematics. The mathematics specialization is designed both to strengthen the student's understanding of the foundations of engineering science and to improve his ability to treat complex engineering problems. Courses in advanced 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 Engineering 115, 116  

Biochemical Engineering. This area of specialization prepares students to do graduate work in biochemical engineering and for employment in the biotechnology, pharmaceutical, and food industries.
Suggested technical electives:

- Strongly recommended
  - Microbiology 102 (instead of Physics 8D), 102L, 130A, 130B, and 130L
  - Biochemistry and Biophysics 101A, 101B
  - Chemical Engineering 161

- Recommended
  - Genetics 100, 102A, 102B, 102L
  - Biochemistry and Biophysics 101L, 123, 123L, 133

**Computers and Automation.** This specialization offers the opportunity to master various computational techniques to formulate, solve, and analyze chemical engineering problems. In addition, the student is exposed to the theory and practice of monitoring and operation of chemical processes using microprocessor-based control systems. The common ingredient in all these studies is the use of computers. Development of expert systems for detecting process failures, using computer-aided design (CAD) packages to optimize product yields, solving large numbers of equations on supercomputers to assess transient behavior of processes and implementation of plantwide control systems are all examples of chemical engineering endeavors based on extensive use of computers. The following list of elective courses is suggested to help the student obtain the necessary background in respective areas.

Suggested technical electives:

- Artificial Intelligence and Computer Graphics
  - Computer Science Engineering 170, 175
- Numerical Analysis and Optimization
  - Applied Science Engineering 115, 116
  - Mathematics 128B-128C
- Civil Engineering 153
- Automatic Control
  - Electrical and Computer Science Engineering 150, 151, 157B
  - Mechanical Engineering 176
- Food and Technology 156

**Electronics Processing.** Because the manufacture of semiconductor devices, integrated circuits, and magnetic memories, tapes, and disks involves the application of chemistry and engineering principles, chemical engineers are finding productive careers in the electronics industry. The electronics processing specialization introduces the student to the analysis and design of modern circuits and devices and provides a strong background in the layout and fabrication of such devices.

Suggested technical electives:

- Computer Science Engineering 140
- Chemical Engineering 163
- Physics 140A, 140B

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

Suggested technical electives:

- Agricultural Engineering 112
- Engineering 111, 112
- Mechanical Engineering 162
- Resource Sciences 103

**Environmental Engineering.** The environmental engineering option prepares the student to deal with problems of environmental quality by developing knowledge of fundamental chemical and transport phenomena; 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, provides sound expertise in environmental topics, prepares the student to seek employment with industry or government. For this specialization six courses should be selected from the following:

Suggested technical electives:

- **Air Environment**
  - Strongly recommended
  - Chemical Engineering 148A
  - Recommended
  - Atmospheric Science 121A, 121B, 158
  - Civil Engineering 242A, 242B, 244
  - Environmental Studies 110
  - Environmental Toxicology 111, 112A, 112B, 131

- **Water Environment**
  - Strongly recommended
  - Chemical Engineering 161
  - Civil Engineering 148A, 148B
  - Microbiology 102 (instead of Physics 8D)
  - Recommended
  - Biophysics and Biophysics 101A, 101B
  - Civil Engineering 147, 240, 243A, 243B, 244, 245, 246A, 246B
  - Environmental Studies 110
  - Environmental Toxicology 111, 112A, 112B
  - 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:

- Strongly recommended
  - Microbiology 102 (instead of Physics 8D)
  - Biophysics and Biophysics 101A, 101B
  - Chemical Engineering 161
  - Agricultural Engineering 132
  - Food Science and Technology 104, 104L, 111

  **Recommended**
  - Food Science and Technology 150, 150L, 151

**Marketing.** Specialty chemical and product manufacturers need chemical engineers who have training in market management, which involves the application of economics, psychology, and statistics in market planning and forecasting and in strategically developing and promoting new products.

Suggested technical electives:

- Management 250, 251
- Agricultural Economics 113, 130, 136
- Psychology 183
- Statistics 103, and 32 or 102

**Prebiomedical Engineering.** This area of specialization is designed to prepare the student 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 Biomedical Sciences 1.

Suggested technical electives:


**Premedical.** Inclusion of both organic and physical chemistry in the curriculum allows the student to complete the premedical requirements while satisfying the requirements of the Chemical Engineering major. Those electing the premedical (including preprofessional) area of specialization should verify the specific preparation requirements with the Health Sciences Advising Office before making a formal decision on electives. To insure that room is provided for the biology courses, it is important to prepare a course schedule with a Chemical Engineering adviser early in the freshman year.

Suggested technical electives:

- Anatomy 100

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**Chemical Engineering**

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 193.

**Subject Areas and Courses**

| Engineering—Engineering 100, 106 | 7 |
| Chemistry—Chemistry 110A, 110B, 110C | 9 |
| Adverse chemistry electives | 6 |


**Technical electives**

- 72

**Humanities-Social Sciences/General Education electives**

- 8

**Total Units for Upper Division Program**

- 100

**Chemical Engineering/Materials Science and Engineering**

Minimum units required for major: 200.

**Subject Areas and Courses**

| Engineering—Engineering 100, 106 | 7 |
| Chemistry—Chemistry 110A, 110B, 110C | 9 |
| Materials science—Engineering 130, 130L, 134, 138, and two courses chosen from Engineering 140, 142, 144, 147, and three laboratory courses chosen from 130L, 134L, 138L, 140L, 142L, and 144L | 21 |
| Humanities-Social Sciences/General Education electives | 8 |

**Total Units for Upper Division Program**

- 103

**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) Environmental 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; however, such specialization is required. While developing your individual program, you are urged to consult a faculty adviser.

Because of the direct concern of professional civil engineers for the quality of human life, civil engineering students are encouraged to include among their technical electives courses such as Economics 125A and 125B, Environmental Studies 160 and 166, Political Science 108, 109, and Sociology 143.
Other technical electives of possible interest to majors in all five of the areas of specialization are Applied Science Engineering 115 and Engineering 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 advisor 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 115
Geography 153, 162
Geology 134
Political Science 100, 101, 102, 107, 108
Water Science 150, 154

Suggested advisers:


Environmental Engineering. Specialization in this area is concerned with improving and maintaining the qualities of the air, land, and water environments that affect the 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 designs of waterborne, solid, and airborne waste management systems; the design of potable water supply systems; and environment monitoring.

Suggested technical electives:

Applied Science Engineering 115
Atmospheric Science 120, 121A, 121B, 158
Microbiology 102, 103, 130A
Biochemistry and Biophysics 101A, 101B
Chemical Engineering 154A, 154B, 156A, 156B
Chemistry 107A, 107B, 110A, 128A, 128B
Civil Engineering 143, 145, 146, 148B, 149A, 152
Engineering 118, 180
Environmental Studies 150A, 150B, 150C, 151, 186
Mathematics 128A, 128B, 128C
Statistics 130A, 130B

Suggested advisers:


Structural Engineering, Structural Mechanics, and Geotechnical Engineering. This area is concerned with conception, design, analysis, economics, and construction of structures such as buildings, bridges, highways, and dams. Structural Engineering encompasses structures made from materials such as metals, reinforced concrete or timber. Geotechnical Engineering encompasses natural and man-made types of structure such as foundations or slopes which are composed of rock or soil. Structural mechanics emphasizes more theoretical aspects of structures—such as mathematics or physics—while materials analysis and characterization of material properties.

Suggested technical electives:

Applied Science Engineering 115
Art 121A
Civil Engineering 131B, 132C, 133, 134, 137, 138, 139, 162, 173, 175, 177
Engineering 122, 125, 190
Mathematics 128A, 128B, 128C

Suggested advisers:


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 integrated system. Students should acquire an awareness of the social sciences and environmental sciences through courses in these areas.

Suggested technical electives:

Civil Engineering 137, 149A, 152, 153, 160, 161, 162
Environmental Engineering 118, 180
Environmental Studies 167, 168A, 168B, 171, 173, 178, 179

Suggested advisers:

P. Jovannis, R. Kitamura, D. Sperring.

Water Resources Engineering. This area includes hydrology, hydraulics, and water resources systems planning and design. Hydraulics is concerned with flow in pipe and open-channel water-distribution systems and through hydraulic structures. Water resources system planning and design is concerned with the comprehensive development of water resources for multiple uses. 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 148, 176
Atmospheric Science 120, 121A, 121B
Civil Engineering 143, 144, 145, 146, 148B, 152, 153
Electrical and Computer Science Engineering 112, 151
Environmental Studies 128, 150A, 151
Geography 162
Water Science 103, 110, 111, 150, 190

Suggested advisers:


Civil Engineering

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 180.

Subject Areas and Courses

Electronic circuits—Engineering 100
Applied mechanics—Engineering 102A, 103A, 104A, 104L
Applied thermodynamics—Engineering 105A or Chemistry 110A
Structures—Engineering 110B, 115
Laboratory—Civil Engineering 115, and either Applied Science Engineering 116 or Civil Engineering 118
Transportation electives—select from Civil Engineering 160, 191, or 192
Technical electives

Six of these units must be selected from engineering courses.

Humanities-Social Sciences General Education electives

Total Units for Upper Division Program

Civil Engineering/Materials Science and Engineering

Minimum units required for major: 184

Subject Areas and Courses

Electronic circuits—Engineering 100
Applied mechanics—Engineering 102A, 103A, 104A, 104L
Applied thermodynamics—Engineering 105A or Chemistry 110A
Structures—Engineering 110B, 115
Laboratory—Civil Engineering 115, and either Applied Science Engineering 116 or Civil Engineering 118
Transportation electives—Civil Engineering 160, 191, or 192
Technical electives

Six of these units must be selected from engineering courses.

Humanities-Social Sciences General Education electives

Total Units for Upper Division Program

Civil Engineering

Engineering 132A, 132C, 134, 139, 145, 147, 148B, 152, 162, 173 (must include one course from courses 134, 145, 148B, 152, or 173)...

Economics—Engineering 106

Engineering mathematics and applied science—Civil Engineering 115, Civil Engineering 114, and either Applied Science Engineering 116, Civil Engineering 118, or 158

Transportation electives—select from Civil Engineering 160, 191, or 192

Technical electives

Six of these units must be selected from engineering courses.

Humanities-Social Sciences General Education electives

Total Units for Upper Division Program

E94

Electrical Engineering and Computer Science

(See also Computer Science)

The Department of Electrical Engineering and Computer Science administers three undergraduate curricula, Electrical Engineering, Computer Science and Engineering, and Electrical Engineering/Materials Science and Engineering. The Department, through the Division of Computer Science, also administers a Computer Science curriculum in the College of Letters and Science which is described in detail under the listing "Computer Science" in this catalog.

The upper division requirements for the degrees in Electrical Engineering, Computer Science and Engineering, and Electrical Engineering/Materials Science and Engineering are described below. Lower division requirements are listed under Lower Division Currricula at the beginning of the Engineering section. Please note that the lower division requirements for these majors differ from those of other Engineering curricula and are found in "Lower Division Program IV."

Electrical Engineering. Electrical Engineering involves the design, analysis, and effective use of electrical systems. Electric systems play central roles in nearly all aspects of modern life, including home entertainment, space exploration, medicine, communications, transportation, energy, industrial automation, defense, commerce, and education.
The Electrical Engineering curriculum combines a strong background in scientific and theoretical aspects of electrical engineering with a practical knowledge of the design of electrical systems to prepare students both for careers in industry and graduate study.

Areas of Specialization. The Electrical Engineering curricula in the degrees provide you with a solid grounding in mathematics and physical sciences preparatory to a study of fundamental electrical engineering principles, including electromagnetics, physical electronics, and electronic circuits. Through the choice of upper division technical electives, you are then able to concentrate your studies in one of the many specialized fields of electrical engineering.

Examples of some of the possible fields of specialization are circuits and electronics, signal processing, computer engineering, controls, automation, solid-state electronics, communication, microwave, and electro-optics. You should select the electives courses leading to a specialty in consultation with a faculty advisor.

In addition to the general Electrical Engineering curriculum, the Department of Electrical Engineering and Computer Science offers a double major in Electrical Engineering/Materials Science and Engineering. In the past decade, the fields of solid-state electronics, opto-electronics, magnetics, and superconductors have expanded to the point that demands for new materials now pace progress in these fields. Materials scientists with an electronics background are key to continued progress in these areas. Electrical Engineering/Materials Science and Engineering curriculum is designed to provide such a background.

Computer Science and Engineering. Computer Science and Engineering encompasses the organization, design, development, analysis, theory, programming, and application of digital computers. It spans the hardware-software spectrum and, thus, combines many aspects of computer science and computer engineering. The Computer Science and Engineering curriculum has been designed to meet the demands for graduates knowledgeable in all major aspects of digital computers. As a consequence, it is broader than either computer engineering or computer science. Compared with computer engineering (i.e., the electrical Engineering degree with a specialization in computer design), it is distinguished by the additional study of software systems and computational theory. Compared with computer science, it is distinguished by the inclusion of many engineering and design-oriented courses.

Through the selection of upper division technical electives, students are able to emphasize either hardware software design within the Computer Science and Engineering curriculum.

Electrical Engineering

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 180.

Subject Areas and Courses

Mathematics, Statistics 120, 131A or 131B, 132A, 133A .......................... 4
Professional responsibilities—Engineering 190 ........................................ 3
Engineering science—Engineering 102A, 105A ........................................ 6
Circuits, systems and electronics—Engineering 100, Electrical and Computer Science Engineering 110A, 110B, 111A, 111B, 112 .................. 16
Electrical Engineering breadth requirements—select nine units from Electrical and Computer Science Engineering 131A, 145A, 145B, 151, 176, 177, 178 ................................. 9
Electromagnetic fields and physical electronics—Electrical and Computer Science Engineering 132A, 132B, 140A ......................................... 4

Materials Science and Engineering

Materials Science and Engineering is directed toward an understanding of the structure, properties, and behavior of materials. Society demands new and improved materials with capabilities superior to conventional metals, alloys, and ceramics. These 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.

Both 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, stability of chemical species, reaction rates, and physical and chemical behavior of engineering materials.

The services of materials engineers are required in many different engineering operations; they study subjects ranging from fracture behavior in automobile bodies 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 semiconductor devices. Materials engineers are also increasingly involved in developing the new materials needed to attain higher efficiencies in existing and proposed energy conversion schemes.

The undergraduate program in materials science and engineering provides the background for activities in research, processing, and the design of materials.

The curriculum is based on a common core of courses basic to engineering. These courses, taken during your first two years, provide a strong foundation in fundamental engineering concepts. In your third year, you will take a set of "fundamentals" courses (Engineering 130, 132, 134, 143). With this background, the third year of the "applications" courses (Engineering 140, 142, 144, 146, 147, 149) which are recommended for the fourth year.

Technical electives, selected from other engineering, or physical and natural science disciplines, give some degree of specialization at the bachelor's degree level. They also provide preparation for research in a selected area at the graduate level.

Twelve 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 General Education electives, you may qualify for the program to suit your interests and career objectives. These objectives may 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 in Materials Science and Engineering.

The following technical elective courses and the suggested areas of specialization are guide lines to assist you and your advisor in the preparation of your study lists. You may also 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 171, 172, 175, 187 Electrical and Computer Science Engineering 150, 157A, 157B

Biomedical Engineering:
Chemistry 107A, 107B Biological Sciences 1

Zoology 2

Physical Education 111A, 111B, 112, 113

Physical Education 101, 102

NOTE: For key to footnote symbols, see page 131.
The Mechanical Engineering curriculum is based on a common core of engineering courses taken in the first three years. Your 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 either prepare for graduate study in Mechanical Engineering or obtain a broad background for entering engineering practice at the bachelor's level.

You are encouraged to select elective courses from among the areas of specialization listed below.

**AREAS OF SPECIALIZATION:**

**Creative Designs.** The creation and improvement of products, processes, or systems that are mechanical in nature are the primary activities of a professional mechanical engineer. The solutions to such major social problems as environmental pollution, lack of mass transportation, and shortages of raw materials 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 solve a variety of problems. In addition to 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:
- **Aeronautical Science and Engineering 130**
- **Agricultural Engineering 119, 165**
- **Applied Science Engineering 115**
- **Civil Engineering 131B**
- **Engineering 111, 118, 122, 140, 142, 160**
- **Mechanical Engineering 134, 150B, 151, 152, 162, 172, 184A, 184B, 185, 187, 188**

Suggested advisers:

**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, and the techniques of applied combustion engines, gas turbines, heat exchangers, nuclear reactors, MHD power generation, solar energy systems, and others.

Suggested technical electives:
- **Engineering 160**
- **Mechanical Engineering 162, 186**

Suggested advisers:

**Systems Dynamics and Control.** Engineers are increasingly concerned with the performance of integrated dynamic 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 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 to social, economic, and other dynamic systems.

**Graduate research includes projects on continuously variable transmissions, active and semi-active suspension systems, anti-skid braking systems, electronic, thermoelectric actuator design, design and control of walking machines, electronically controlled steering, mathematical models of motorcycle dynamics, and the analysis of fuel management systems.**

An Automotive System Dynamics Laboratory is being developed for testing components such as engines, transmissions, brakes, and steering systems as well as complete test vehicles. As a result, on-campus laboratories and a test track proceed, ten experimental vehicles are housed in a rented facility and research on vehicle components proceeds in various Mechanical Engineering laboratories.

Suggested technical electives:
- **Aeronautical Science and Engineering 128, 129, 131**
- **Civil Engineering 134, 152, 172, 184A, 184B, 187**
- **Engineering 122**

Suggested advisers:

**Transportation Systems.** An important aspect of Mechanical Engineering is 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 improvements in the way people and goods are moved. Such innovations 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:
- **Aeronautical Science and Engineering 127, 128, 129**
- **Civil Engineering 131A, 149A, 160**
- **Engineering 122, 160**
- **Mechanical Engineering 134, 152, 162, 172, 184A, 184B, 187**

Suggested advisers:

**Mechanical Engineering** (Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology)

Minimum units required for major: 186.

**Subject Areas and Courses**

**Units**

Electronic circuits—Engineering 100 .................................................. 4
Applied mechanics—Engineering 102A, 102A, 104A ................................ 9
Applied thermodynamics—Engineering 105A .................................. 130
Engineering design elective—two courses from Aeronautical Science and Engineering 137, Civil Engineering 132A, 132B, 133, Mechanical Engineering 150A, 150B ................................................. 6
Materials in design—Engineering 140, 149 ........................................ 6
Measurements and laboratory—Engineering 135, 136, 140, 145, 146, 144 .................................................. 18
Mechanical Engineering 176 ............................................................... 9
Materials science—Engineering 133, 134, 136 ................................ 142, 144, 147 .................................................. 18
Applied mathematics—Engineering 180 ........................................... 3
Basic science—Chemistry 110A and 110C or Physics 140A-140B .................................................. 4
Technical electives (Engineering 140B .............................................. 12
Humanities-Social Sciences/General Education electives ................. 15

Total units for Upper Division Program ........................................ 94

**Mechanical Engineering**

The mechanical engineer uses basic science in the design and manufacture of complex engineering systems requiring the application of physical and mechanical principles in the development of machinery, 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.

**NOTE:** For key to footnote symbols, see page 131.
Engineering

Mechanical Engineering/Materials Science and Engineering

Minimum units required for major: 192.

UNITs

Subject Areas and Courses

Electronic circuits—Engineering 100...4

Applied mathematics—Engineering 103A...

Applied thermodynamics—Engineering 105A...

Mechanical Engineering 105A, 105B, Mechanical Engineering 153...

Fluid mechanics—Engineering 129A, 103B...

Mechanical Engineering 150A, 150B, 172, and one course from 184A-184B...

Electronics—Engineering 140, 142, 144, 147...

Measurements and laboratory—Engineering 103L, 103L, 105L, Mechanical Engineering 176...

Applied mathematics—Engineering 180...

Professional responsibilities—Engineering 199...

Technical electives...

In order to satisfy design requirements, select two courses from Aeronautical Science and Engineering 125, 130, Environmental Materials, and one electives course in three-dimensional systems, rigid-body dynamics, elementary dynamics of vibrating systems, intrusion to energy measurement.

5. Applications of Computers (3) I, II, III. The Staff (Chairperson in charge)

Course 1—lecture—3 hours; laboratory—3 hours. Prerequisite: algebra and trigonometry. Introduction to the engineering profession. General view of the engineering process as obtained by participation in an employer-sponsored illustrative of the solution of representative, but greatly simplified, engineering problems.


7. Circuits (3) I, II, III. The Staff

Course 3—lecture—3 hours; laboratory—1 hour. Prerequisite: Calculus, introductory course. Boolean circuits; logic gates and truth tables; basic logic circuits; exclusive-OR and exclusive-NOR gates; and logic circuit design.

20. The Technological World (3) II. Kemper

Course 3—lecture—3 hours. Prerequisite: algebra. The nature of technology; computers and automation; energy systems; engineering design, analysis, and problem solving; metric system; patents and copyrights; technology and social change; technology assessment and technological costs.

Intended primarily for students who are not engineering or science majors. For all other science students, they may receive only 2 units of credit. General Education credit: Nature and Environment/Introduction.

35. Statics (3) I, II, III. The Staff (Sheng in charge)

Course 3—lecture—3 hours; laboratory—2 hours. Prerequisite: 104A, 104B...

Fluid mechanics—Engineering 129A, 103B...

Mathematical methods design—Mechanical Engineering 150A, 150B, 172, and one course from 184A-184B...

Technical electives...

Materials science—Engineering 132L, 132L, 134, 134L...

Electronics—Engineering 140, 142, 144, 147...

Measurements and laboratory—Engineering 103L, 103L, 105L, Mechanical Engineering 176...

Applied mathematics—Engineering 180...

Professional responsibilities—Engineering 199...

Technical electives...

Total Units for Upper Division Programs...

Individual (Engineering) Major

Minimum units required for major: 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 Individual Major in the Programs and Courses section of this catalog.)

Courses in Engineering

Lower Division Courses

3. Introduction to Engineering Systems (3) I, II. The Staff (Chairperson in charge)

Course 3—lecture—3 hours; laboratory—3 hours. Prerequisite: algebra and trigonometry. Introduction to the engineering profession. General view of the engineering process as obtained by participation in an employer-sponsored illustrative of the solution of representative, but greatly simplified, engineering problems. (P/NP grading only.)


5. Applications of Computers (3) I, II, III. The Staff (Chairperson in charge)

Course 3—lecture—3 hours; laboratory—1 hour. Prerequisite: Calculus, introductory course. Boolean circuits; logic gates and truth tables; basic logic circuits; exclusive-OR and exclusive-NOR gates; and logic circuit design.

188. Thermodynamics Laboratory (1) II, I. Baughn

Laboratory—1 hour, discussion—0.5 hours. Prerequisite: 103B, 110 hours (alternate weeks with course 103J). Prerequisite: course 105B (may be taken concurrently). Demonstrations and experiments to illustrate first and second laws of thermodynamics, and thermodynamic cycles. (P/NP grading only.)

190. Engineering Economics (3) I, II. Harschlag, Jenkins Laboratory—3 hours. Prerequisite: course 103B.

Introduction to the analysis of problems in engineering economy; the selection of alternatives; replacement decisions. Current cost, tax, and interest factors; life; and risk and uncertainty are applied to methods of selecting most economic solutions. (P/NP grading only.)

191. Electric Power Equipment (3) I, II. Delviche Laboratory—2 hours; laboratory—2 hours. Prerequisite: course 17. Principles of AC and DC electric motors and solenoids, their control systems and principal components of electric power equipment components based on their construction features and performance characteristics.

192. Introduction to Mechanical Vibrations (3) I. Henderson Laboratory—3 hours. Prerequisite: course 102B. Free and forced vibrations in lumped-parameter systems with and without damping; vibrations in coupled systems; electromagnetic analogy; use of energy conservation principles.

193. Thermodynamics of Materials Processes (3) I. Mulhoner Laboratory—3 hours. Prerequisite: courses 45 and 105A (or the equivalent); upper division standing in Engineering. Application of the principles of thermodynamics to the understanding of the mechanical properties of engineering materials with emphasis on solving problems associated with materials processes, e.g., alloying, phase stability, surface properties, selection and design, thermal-electric power and thermionic energy conversion.

194. Structure of Engineering Materials (3) I. Howitt Laboratory—3 hours. Prerequisite: course 45B concurrently. Experimental investigations of the structure of solid materials. Laboratory exercises emphasize methods used to study structure of solids at atomic and microstructural levels.

195. Rate Processes in Materials Science (3) II. The Staff Laboratory—3 hours. Prerequisite: course 132 concurrently. Experimental investigations of the structure of solid materials. Laboratory exercises emphasize methods used to study structure of solids at atomic and microstructural levels.

196. Mechanical Behavior of Materials (3) I. Muskhoeve Laboratory—3 hours. Prerequisite: courses 45 and 105A (or the equivalent); upper division standing in Engineering. Mechanical properties of materials are discussed with emphasis on recent developments in materials science and literature mechanics. High temperature effects, plastic deformation, strengthening, and mechanical failure modes of materials systems are outlined.

198. Mechanical Properties Laboratory (1) II. Muehlhauser Laboratory—3 hours. Prerequisite: course 138 concurrently. Experimental investigations of mechanical behavior of materials as materials. Laboratory emphasizes exercises fundamental relations between microstructure and mechanical properties.

199. Materials in Engineering Design (3) III. Gibling Laboratory—3 hours. Prerequisite: senior standing in Engineering and Introduction to Engineering 101. Discussion of common engineering materials. Discussion of design parameters of typical materials including metals, ceramics, glasses, polycrystalline materials, and composites. Selection of heat treat cycles and fabrication as they affect design parameters and applications in engineering will be emphasized.

200. Materials Selection Laboratory (1) III. Gibling Laboratory—2 hours. Prerequisite: course 104B concurrently. Experimental investigations of processing and properties of materials used in structural applications. Laboratory exercises emphasize fundamental concepts and procedure of materials to structural and property. Consideration given to the role of property control in materials selection.

192. Principles of Nondestructive Testing (3) I. The Staff Laboratory—3 hours. Prerequisite: senior standing in Engineering or consent of instructor. Basic principles of nondestructive testing including radiological, ultrasonic, electrical, magnetic, and acoustic methods. Equipment of heat treat cycles and fabrication as they affect design parameters and applications in engineering will be emphasized.
characterization, flaw detection, crystallographic information, chemical inhomogeneity, residual stress analysis, etc., are emphasized.

141. Nondestructive Testing Laboratory (I) II. The Staff Lecture—4 hours. Laboratory course: course 141 concurrently. Laboratory experience in non-destructive testing techniques with emphasis on X-ray radiography, X-ray diffraction, and ultrasonic techniques.

144. Corrosion and Oxidation of Engineering Materials (3) I. The Staff Lecture—3 hours. Prerequisites: upper division standing in Engineering. Principles 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. Corrosion Laboratory (1) I. The Staff Lecture—2 hours. Prerequisite: course 144 concurrently. Laboratory experiments to demonstrate corrosion behavior of materials in aqueous and high temperature environments. Relationship between corrosion behavior and fundamental principles and theories emphasized.

147. Principles of Polymer Science (3) II. The Staff Lecture—4 hours. Prerequisite: chemistry through organic or course 45; introductory physics sequence. Basic principles of polymer science presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and plastic deformation; polymer processing. (Same course as Textiles and Clothing 100)

149. Materials Engineering Design Project (3) I, II, III. The Staff Laboratory—9 hours. Prerequisite: consent of instructor; course 140 recommended (may be taken concurrently). A capstone engineering design experience involving analysis of design and development processes applied to engineering material problems. The various principles of materials science introduced in other courses in the curriculum are integrated into the design project.

150. Energy, Society, and the Environment (4) I. Craig Lecture—6 hours; discussion—1 hour. Overview of energy: uses, resources, energy conversion, technology and environmental problems. Interactions of society with technology, policies and economics are considered. Current and future energy systems are studied: nuclear, fossil fuel, geothermal, solar and others. For engineering and nonengineering students. Offered in even numbered years. (Lower division students are referred to Resource Sciences 3)

155. Advanced Energy Technology (4) I. Craig Lecture—6 hours; discussion—1 hour. Prerequisite: course 105A or consent of instructor. Technical overview of energy technologies. Emphasis on semiquantitative understanding. Additional course with lecture. Designed to mesh with course 160, which is primarily policy (PINP grading only.) Offered in odd numbered years.

156. Engineering Analysis (3) I, III. Hafetz, Brandt Lecture—3 hours. Prerequisite: Mathematics 22A, 22B. Analysis of steady-state and nonsteady-state problems for discrete and continuous systems; analytic and approximate solutions. Typical engineering problems in heat transfer, fluid mechanics, electrical networks, mechanical vibrations, and elasticity.

159. Professional Responsibilities of Engineers (3) I, III. The Staff Lecture—3 hours; laboratory—1 hour. Prerequisite: upper division standing. Organization of the engineering profession; engineering and management; introduction to contracts, specifications, and business law; technical writing; oral presentations on the interactions between engineering and society.

Graduate Course

291. Seminar in Teaching (1) I. Baugh Seminar—1 hour. Discussion of previous experience as a student and actual practice as a teacher. (SU grading only.)

Faculty

Norman B. Aebersold, M.S., Professor Emeritus
Roy Bainer, M.S., I.D., Professor Emeritus
Robert H. Burgy, M.S., Professor Emeritus
William J. Chanchoor, Ph.D., Professor Emeritus
Pictaw (Paul) Chen, Ph.D., Professor Emeritus
Michael J. Colonna, Ph.D., Associate Professor Emeritus
Roger E. Garrett, Ph.D., Professor Emeritus
D. Ken Giles, Ph.D., Assistant Professor Emeritus
John R. Goss, M.S., Professor Emeritus
Mark E. Griesemer, Ph.D., Associate Professor Emeritus
Bruce R. Hartsough, Ph.D., Assistant Professor Emeritus
S. Milton Henderson, M.S., Sc.D., Professor Emeritus
David J. Hills, Ph.D., Professor Emeritus
Bryan M. Jenkins, Ph.D., Associate Professor Emeritus
Robert A. Kepner, B.S., Professor Emeritus
John M. Krochta, Ph.D., Professor Emeritus
Coby Laramore, Jr., M.S., Professor Emeritus
Miguel A. Marini, Ph.D., Professor Emeritus
Kathryn McCarthy, Ph.D., Assistant Professor Emeritus
Michael J. McCarthy, Ph.D., Assistant Professor Emeritus
R. Larry Merson, Ph.D., Professor Emeritus
John A. Miles, Ph.D., Professor Emeritus
Stanton R. Morrison, Ph.D., Professor Emeritus
Loren W. Neubauer, Ph.D., Professor Emeritus
Michael O’Callahan, Ph.D., Associate Professor Emeritus
Raul H. Pineda-Ruiz, Ph.D., Associate Professor Emeritus
James W. Rumsey, M.S., Assistant Professor Emeritus
Thomas R. Rumsey, Ph.D., Associate Professor Emeritus
Vern H. Stuckey, Ph.D., Professor Emeritus
R. Paul Singh, Ph.D., Professor Emeritus
Henry E. Studer, M.S., Professor Emeritus
Shravinda K. Upadhyaya, Ph.D., Associate Professor Emeritus
Wesley W. Wallender, Ph.D., Associate Professor Emeritus
Wesley E. Yates, M.S., Professor Emeritus

Courses in Engineering: Agricultural

Lower Division Courses

1. Introduction to Agricultural Engineering (1) I. The Staff Lecture—1 hour. Introduction to the types of problems addressed by agricultural engineers. Selected topics in field machinery design and management, irrigation, agricultural structures, properties of agricultural materials, and waste management. Review of employment opportunities.

2. Introduction to Forest Engineering (I) III. Hartsough Discussion—3 hours; laboratory—1 hour. Prerequisite: Engineering 105A or Environmental Engineering 105A. Introduction to the engineering aspects of forestry problems, including nursery operations, reforestation, harvesting, log transport, milling and residue utilization. (PINP grading only.)

85. Introduction to Microcomputers and Data Acquisition Systems (3) III. Jenkins, Brandt Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 105A or Environmental Engineering 105A. Design and programming of microcomputers for solving data acquisition problems. Introduction to microcomputers, peripherals, interfaces, interfaces, sensors, data acquisition systems, and data handling and manipulation programs.

92. Internship in Agricultural Engineering (1-5) I, II, III. The Staff (Student in charge) Internship work experience: lower division standing; project approval prior to period of internship. Supervised work-study experience in agricultural engineering. May be repeated for credit. (PINP grading only.)

98. Directed Group Study (1-1) I, II, III. The Staff (Student in charge) Prerequisite: consent of instructor. Group study of selected topics; restricted to lower division students. (PINP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Student in charge) (PINP grading only.)

Upper Division Courses

112. Combustion Engines (4) II. Jenkins Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 5 and 105A. Theory of design and operating characteristics of internal combustion engines, and diesel engines. Thermodynamics of relevant power cycles, performance testing, engine mechanics, fuel metering systems, ignition systems, structures, hazardous materials, and engines. Design for engine applications. Comparison of alternative fuels and engines.

114. Principles of Field Machinery Design (2) III. Studer Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 102A. Functional requirements and basic operating principles of agricultural field machinery; elements of field machinery design; use of instrumentation and computer techniques for analysis of specific machines.

115. Forest Engineering (3) I. Hartsough Lecture—3 hours. Prerequisite: Environmental Engineering 10, Engineering 102A and 104A; Forestry and Resource Management 100A, 100B, 100C, 100D (Berkley campus) strongly recommended. Applications of engineering principles to problems in the forest industry, including consideration of nursery operations, reforestation, harvesting, road layout, logging transportation and milling operations.

116. Forest Engineering Field Problems (2) I. Miles Lecture—1 hour; three weekend field trips to Bigfoot 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. Chen Lecture—2 hours. Prerequisite: Engineering 105A and 104A. Drive train elements, suspensions, tires, tracks, chassis configuration and steering system mechanics for heavy-duty vehicles. Performance, stability and traction during pulling, turning and transport. Vehicle interactions with off-road terrain conditions.


125. Agricultural Structures: Environmental Aspects (3) I. Jenkins Lecture—3 hours. Prerequisite: Engineering 105A. Fundamentals of heat transfer, solar radiation, psychrometrics, ventilation, animal energetics, lighting with respect to plant growth, atmospheric properties with respect to storage of agricultural products. Application of this information to the design of animal and plant production and product storage structures.

132. Unit Operations in Food Engineering (4) III. Singh, T. R. Rober Lecture—2 hours; laboratory—1 hour. Prerequisite: Engineering 103A. Mechanical unit operations applied to such processes as non-Newtonian flow, size reduction, sorting and mixing of granular materials. Thermal operations related to refrigeration, freezing, evaporation and drying of foods.

140. Seepage and Drainage (3) I. Grismer Lecture—3 hours. Prerequisite: Engineering 103A or Water Science 142. Flow through porous media; measurement of hydraulic conductivity; seepage and drainage, anisotropy flow nets; drainage design for water table and salt control. (Same course as Water Science 140.)

141. Sprinkle Irrigation Design (3) II. Wallender Lecture—2 hours; laboratory—1 hour. Prerequisite: Engineering 103A. Engineering and scientific principles applied in design of sprinkler irrigation systems for farms. Pumping plants, pipe hydraulics, sprinkler characteristics and equipment machines.

143. Micro-Irrigation Design (2) I. Hils Lecture—2 hours. Prerequisite: Engineering 103A. Engineering and scientific principles applied in design of micro-irrigation systems for farms. Water treatment, hydraulics, emitter characteristics, specialized hardware associated with micro systems.

165. Digital Instrumentation in Agricultural Engineering (4) I. Keller Lecture—3 hours; laboratory—2 hours. Prerequisite: Engineering 100. Digital logic concepts and devices; assembly language programming; data acquisition and control.

170A. Engineering Projects: The Design and Evaluation Process (3) I. Miles Lecture—1 hour; laboratory—3 hours. Prerequisite: two courses from the following (one may be taken concurrently): course 114, 115, 125, 132, 133, 140, 141, 143, 144, 145, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170A, 170B. Design and evaluation projects applied to projects in agricultural and forestry projects. Project selection, data sources, agricultural and forestry factors, specifications, failure modes, human factors, safety, test design, measurement techniques. Develop proposals for courses 170A, 170B. Engineering Projects: Design (3) II. Miles Laboratory-discussion—3 hours. Prerequisite: course 170A. Individual or group projects involving the design of systems, structures, and systems analysis in agriculture or forestry. Students may select their projects, subject to approval of instructor.
Engineering: Applied Science

(College of Engineering)

Frederick Wootten, Ph.D., Chairperson of the Department

Yin Yeh, Ph.D., Vice Chairperson of the Department

Department Office, 228 Walker Hall (752-0360)

Faculty

Berri J. Alder, Ph.D., Professor
Roger E. Anderson, Ph.D., Professor
Maera M. Baker, Assistant Professor
Stewart D. Bloom, Professor
Stuart Cameron, Ph.D., Assistant Professor
Ralph Carlson, Ph.D., Lecturer
Richard Christiansen, Ph.D., Professor
Paul C. Craig, Ph.D., Professor
4 John S. De Groot, Ph.D., Professor
Michael Feit, Ph.D., Lecturer
John G. Fletcher, Ph.D., Lecturer

Roger A. Haas, Ph.D., Professor
Lawrence Hall, Ph.D., Lecturer
William G. Hoover, Ph.D., Professor
David G. Hwang, Ph.D., Associate Professor
John Killeen, Ph.D., Professor
William L. Krueger, Ph.D., Lecturer
Nelson Max, Ph.D., Professor
Andrew McNahan, Ph.D., Lecturer
Arthur A. Milin, Ph.D., Assistant Professor
William A. Newcomb, Ph.D., Professor
Ann Orel, Ph.D., Assistant Professor
Richard F. Post, Ph.D., Associate Professor
Harry B. Radinsky, Ph.D., Lecturer
Gary Rodriguez, Ph.D., Professor
Bruce Shore, Ph.D., Lecturer
Eugene Schulz, Ph.D., Lecturer
Stephen K. Skedzielewski, Ph.D., Lecturer
Wilson K. Talley, Ph.D., Professor
Edward Teller, Ph.D., University Professor
Emeritus

Richardson, Bonnyenbug, Ph.D., Lecturer
Rao Venuri, Ph.D., Professor
Richard W. Watson, Ph.D., Lecturer
Frederick Wootten, Ph.D., Professor
Yin Yeh, Ph.D., Professor

Courses in Engineering: Applied Science

Davis

Lower Division Courses

37. Physics of Nuclear Arms Effects and Control (1) I. Jungman (Physics), Craig
Lecture-discussion—1 hour. Prerequisite: high school algebra; course 137 concurrently. Intended for students in letters. Course will emphasize the physics concepts of course 137. No credit allowed to students who have had any other physics course. (Same course as Physics 37.)

91. Directed Group Study (1-5) I, II, III. The Staff (Wooten in charge)
Prerequisite: consent of instructor and lower division standing.

99. Special Study for Undergraduates (1-3) I, II, III. The Staff (Wooten in charge)
Prerequisite: consent of instructor; lower division standing. (P'TP grading only.)

Upper Division Courses

115. Introduction to Numerical Methods for Engineers and Scientists (3) I. Jungman (Physics), Wooten in charge
Lecture—3 hours. Prerequisite: Engineering 5; Mathematics 22B. Introduction to error analysis, roots of equations, interpolation, quadrature, eigenvalue problems, linear algebraic equations, ordinary differential equations, and numerical solutions of partial differential equations, eigenvalue problems, Monte Carlo methods, linear programming.

135. Introductory Nuclear Science and Technology (3) I. The Staff
Lecture—3 hours. Prerequisite: Physics 12 or the equivalent. Introductory aspects of nuclear phenomena, nuclear masses, size, energy, and decay modes. Interaction of particles and electromagnetic radiation, instrumentation and theory of measurements; neutron technology. Nuclear chemistry.

137. Science and Technology of Nuclear Arms Effects and Control (3) I. Jungman (Physics), Craig
Lecture—3 hours. Prerequisite: upper division standing; one course from Physics 1B, 6C, 80, 10 or Physics 37 course 37 (may be taken concurrently). Scientific and technical aspects of nuclear arms effects and nuclear arms control including the nuclear physics of atomic and hydrogen bombs, blast and radiation effects, radioactive and electromagnetic pulse, ICBM accuracy, laser weapons, verification safeguards, biological and ecological effects. Emphasis on order of magnitude calculations. Only 1 unit of credit toward bachelor's degree if course is taken for nuclear arms effects and nuclear arms control. (Same course as Physics 37.) General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Physics 10.

147. Arms Races Strategies and Technologies (3) I. Craig
Lecture—2 hours; discussion—1 hour. Prerequisite: course
15A. Chemical Engineering Fluid Mechanics (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A, 22B, 22C. Fluid statics and one-dimensional laminar fluid flow. Conservation equations of mass and momentum, and mechanical energy balances to a variety of practical problems. Introduction to compressible flow. The entropy equation and isentropic processes. Shock waves and boundary layer flow. Not open for credit to students who have completed Engineering 103B or Civil Engineering 141.

15B. Chemical Engineering Fluid Mechanics (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 15A. Turbulent flows and time averaging. Application of Bernoulli’s equation and the macroscopic mass, momentum, and energy balances to a variety of practical problems. Introduction to compressible flow. The entropy equation and isentropic processes. Shock waves and boundary layer flow. Not open for credit to students who have completed Engineering 103B or Civil Engineering 141.

151. Material Balances (3) I. The Staff
Lecture—3 hours. Prerequisites: Chemistry 110A and 128B (may be taken concurrently); a working knowledge of FORTRAN. Application of principles of conservation of mass for single and multi-component systems in chemical process calculations. Studies of batch, semi-batch and continuous processes involving mass transfer, change of phase and chemical reaction.

152A. Chemical Engineering Thermodynamics (4) II. The Staff
Lecture—3 hours. Prerequisite: course 151; Chemistry 110A. Application of principles of thermodynamics to chemical processes. Not open for credit to students who have completed Engineering 105A.

152B. Chemical Engineering Thermodynamics (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 152A. Continuation of course 152A. Not open for credit to students who have completed Engineering 105B.

153. Chemical Engineering Heat Transfer (4) III. The Staff

154A. Mass Transfer (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 153; Chemistry 110A. Fundamental concepts of mass transfer in fluids. Problems in pure diffusion and convective mass transfer.

154B. Applications of Mass Transfer (3) II. The Staff
Lecture—3 hours. Prerequisite: 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. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 153A. Laboratory experiments in heat, mass, and momentum transfer and in chemical kinetics.

155B. Chemical Engineering Laboratory (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 154A. Laboratory experiments in heat, mass, and momentum transfer and in chemical kinetics.

155C. Chemical Engineering Laboratory (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisites: courses 153B, 154B, 155A, Continuation of 155A.

156A. Chemical Engineering Kinetics (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisites: courses 152A; Chemistry 110A (may be taken concurrently). Chemical kinetics and introduction to homogeneous and heterogeneous reactor design.

156B. Chemical Engineering Kinetics (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisites: courses 153B, 154B, 155A, Continuation of 156A.

157. Process Dynamics and Control (4) I. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 154B. Study of linear chemical processes. Classical feedback and feedforward control of dynamic processes. Direct digital control. Laboratory experiments in process control, analog and digital feedback control.

158. Chemical Engineering Process Design (3) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisites: Engineering 106 (may be taken concurrently), courses 154B, 156A, 160. Chemical Engineering process design optimization and economics.

159. Chemical Engineering Process Analysis (3) III. The Staff
Lecture—3 hours. Prerequisite: Mathematics 22B. Chemical engineering applications of partial differential equations, tensors, systems of linear equations, and operational calculus.

160. Design of Piping Systems and Heat Exchangers (3) I. The Staff
Lecture—3 hours. Prerequisite: courses 150B and 153. Design of piping systems including pumps, compressors and valves. Shortcut methods for approximating pressure drop in piping. Design of shell and tube heat exchangers.

161. Biochemical Engineering Fundamentals (3) III. McDonald Lecture—3 hours. Prerequisite: Chemistry 128A, Mathematics 229B, and Microbiology 2 or 102, or consent of instructor. Enzyme and microbial kinetics, bioreactor design and analysis, transport phenomena in bioreactors, and downstream processing.

163. Chemical Engineering in Integrated Circuit Fabrication Technology (4) I. The Staff
Lecture—4 hours. Prerequisite: course 154A (concurrently). Chemistry 128B. Manufacture of semiconductor devices, integrated circuits, magnetic bubble memories, tapes and disk drives, and new processing techniques. The chemistry and engineering of the industrial fabrication of modern circuits and devices.

190. Research Group Conferences (I) I, II, III. The Staff
Discussion—1 hour. Prerequisite: Instructor consent. Research group conferences. May be repeated for credit. (P/N grading only.)

198. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
Prerequisite: Instructor consent. (P/N grading only.)

Graduate Courses

206. Biochemical Engineering (3) II. Ryu Lecture—3 hours. Prerequisite: course 161 and Microbiology 2. Biochemistry 128A, 128B, and 128C. Science and Technology 295 recommended. Introduction to biochemical engineering, microbiology, and chemical engineering of microbial systems. Kinetics of enzyme and microbial processes, mechanisms and control of growth, death, and metabolism. Continuous fermentation, agitation, mass transfer and scale-up in fermentation systems, product recovery, enzyme technology. Offered in even-numbered years.


246. Advanced Biochemical Engineering (3) II. Ryu Lecture—3 hours. Prerequisite: course 226. Advanced biochemical engineering principles and techniques. Lectures to cover large scale production and separation of enzymes, immobilized enzyme systems, enzyme reactor design and optimization, and new applications of enzymes in genetic engineering related biotechnology. Offered in even-numbered years.

252. Advanced Thermodynamics (3) I. The Staff
Lecture—3 hours. Prerequisite: course 152B or Engineering 105B. A general description of the first and second laws of thermodynamics and their applications of thermodynamic relationships to phase and chemical reaction equilibria; introduction to statistical thermodynamics.

253A. Advanced Fluid Mechanics (3) I. The Staff
Lecture—3 hours. Prerequisites: courses 150A, 150B, and 295 or be taken concurrently) or the equivalent. Kinematics and basic principles of fluid flow. Principles of constitutive equations. Navier-Stokes equations for Newtonian fluids. Survey of compressible fluids and the layer theory. Macroscopic mass, momentum and mechanical energy balance.

253B. Advanced Heat Transport (3) II. The Staff
Lecture—3 hours. Prerequisites: courses 154A, 154B, and 259 (may be taken concurrently) or the equivalent. Kinematics and basic principles of heat flow. Principles of constitutive equations. Energy transport equations of Newtonian fluids. Survey of compressible fluids and the layer theory. Macroscopic mass, momentum and mechanical energy balance.

253C. Advanced Mass Transfer (3) II. The Staff
Lecture—3 hours. Prerequisites: courses 154A, 154B, and 259 (may be taken concurrently) or the equivalent. Kinetics and basic principles of mass transfer. Principles of constituent equations for momentum, heat and mass transfer. Transfer to binary and ternary systems. Details of diffusion with reaction, and the effects of concentration.
Engineering: Civil

(College of Engineering)

Chin-Kang Shen, Ph.D., Chairperson of the Department (752-1753)

Department Office, 206 Walker Hall (752-0566)

Faculty
Kandiah Arulananand, Ph.D., Professor Takashi Asano, Ph.D., Adjunct Professor David Brice, Ph.D., Professor Emeritus Robert H. Burg, M.S., Professor Emeritus (Civil Engineering: Land, Air and Water Resources)
Darrel P. Halvorson, Ph.D., Professor James A. Cheney, Ph.D., Professor Yannis F. Dafallas, Ph.D., Professor Jeanette L. Darby, Ph.D., Assistant Professor Joseph Dlouhy, Ph.D., Adjunct Lecturer Leonard R. Hermann, Ph.D., Professor James R. Hutchinson, Ph.D., Professor (Graduate Adviser)
William K. Johnson, M.S., Lecturer Paul P. Jovanis, Ph.D., Associate Professor Meven Kavvas, Ph.D., Associate Professor Ian P. King, Ph.D., Professor Ryuki Kitamura, Ph.D., Associate Professor Ray B. Krone, Ph.D., Professor Emeritus Bruce L. Kutter, Ph.D., Associate Professor Bruce E. Larock, Ph.D., Professor Jay R. Lunn, Ph.D., Assistant Professor Miguel A. Marfinho, Ph.D., Professor (Civil Engineering: Land, Air and Water Resources)
Kyran D. Mish, Ph.D., Assistant Professor Gerald T. Oribi, Ph.D., Professor Carlos E. Puente, Ph.D., Visiting Assistant Professor (Civil Engineering: Land, Air and Water Resources)
Otto G. Raabe, Ph.D., Professor in Residence (Civil Engineering: Laboratory for Energy-Related Health Research)
Melvyn R. Ramo, Ph.D., Professor Karl M. Romstad, Ph.D., Professor Edward D. Schroeder, Ph.D., Professor Verne H. Scott, Ph.D., Professor (Civil Engineering: Land, Air and Water Resources)
Chin-Kang Shen, Ph.D., Professor Daniel Sperling, Ph.D., Assistant Professor (Civil Engineering: Environmental Studies)
Michael A. Taylor, Ph.D., Professor George Tchobanoglous, Ph.D., Professor

Courses in Engineering: Civil

Lower Division Courses

1. The Civil Engineer in Society (1) I. The Staff (Chairperson in charge)

Lecture—1 hour. A description of the field of civil engineering and the function of the professional civil engineer. Discussion of professional practice with respect to application of engineering principles, ethics, and responsibilities. (P/NP grading only.)

10. Introduction to Surveying (3) III. The Staff (Chairperson in charge)

Lecture—2 hours; laboratory—3 hours. Theory and practice of measurements for distance, elevation, and angles; the analyses and adjustments for systematic and random measurement errors. Use of draughting, traverse computations, horizontal and vertical curves; astronomical observations and calculations for latitude, longitude, azimuth, and time.

30. Engineering A Better Environment (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: intermediate algebra, and Physics 10 or Engineering 20. Introduction to fundamental concepts and methodologies of environmental engineering. Topics presented include: air and water pollution, environmental radiation and radiotoxicity, air pollution, toxic/metallic substances, water and energy issues in written essays and oral discussion. Intended for non-science major students. General Education credit: Natural Science/Non-Introduction.

92. Internship in Engineering (1-5) I, II, III. The Staff (Chairperson in charge)

Work-time experience. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised full-time work-study experience in civil engineering. May be repeated for credit. (P/NP grading only.)

96. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor and lower division standing. (P/NP grading only)

98. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor; lower division standing. (P/NP grading only)

Upper Division Courses

114. Probabilistic Systems Analysis for Civil Engineers (3) I, II. Kitamura

Lecture—3 hours. Prerequisite: Mathematics 21C. Probabilistic concepts and models in Civil Engineering. Statistical analysis of Civil Engineering experimental and field data. Introduction to stochastic processes models of Civil Engineering systems.

131A. Structural Analysis (3) I, II. Romstad


132A. Structural Design: Metallic Elements (3) II. Ramsey

Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Metallic beams, columns, other members; analysis and design of built-up and welded joints; design of simple beam connections, moment resistant connections, and column base plates.

132B. Structural Design: Concrete Elements (3) I, II. Taylor

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Design of reinforced concrete structures. Introduction to simple element methods for elasticity and bending problems.

132C. Structural Design: Timber Elements (3) I. Ramsey

Lecture—3 hours. Prerequisite: course 132A. Elements of timber structures and laminated structures, including connection design.

133. Properties of Concrete (4) I. Taylor

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 35; senior standing. Physical and chemical properties of cementitious materials; properties of fresh concrete, the ingredients of concrete, the desirable characteristics of hardened concrete, and how to obtain them. Mix design methods.

134. Analysis and Design of Buildings (3) III. Taylor

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 131A, 135A; 132B (may be taken concurrently). Design and load analysis of buildings. Reinforced concrete building design. Plastic analysis of metal frames.

137. Construction Principles (3) III. The Staff (Chairperson in charge)

Lecture—2 hours; laboratory—3 hours. Prerequisite: senior standing in Engineering. A study of the construction industry; its form, evolution, and methods of operation; fundamental principles underlying construction; economic factors in planning, organizing, and operating a construction force. Field trips and analysis of local construction projects.

138. Earthquake Loads on Structures (3) II. Romstad

Lecture—3 hours. Prerequisite: Engineering 102A. Analysis of loads on structures due to base excitations. Methods of static lateral forces, approximate dynamic analysis (resonance spectrum), and time history. Concepts of mass, damping, and stiffness of structural systems. Design for inelastic behavior. Consideration of wind and blast loading.

139. Prestressed Concrete (3) II. Taylor

Lecture—3 hours. Prerequisite: course 132B. Principles and methods: analysis and design of members for bending. Interactive computer analysis, ultimate strength of sections. Loss of prestress, shear design. Applications to bridges, buildings, and tanks. Special materials properties needed for effective prestressing.

141. Engineering Hydrostatics (3) I, II. Kavvas

Lecture—3 hours. Prerequisite: Engineering 103A. Open to Engineering students only. Nature of flow of a real fluid with special reference to flow in pipes; open channel flow; turbomachinery; fluid forces on objects: boundary layers, lift and drag.

141L. Engineering Hydrostatics Laboratory (1) I, II. Kavvas

Lecture—3 hours. Prerequisite: course 141 (may be taken concurrently). Open to Engineering students only. Laboratory experiments and demonstrations on flow measurement, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps.

142. Engineering Hydrology (3) II. Kavvas

Lecture—3 hours. Prerequisite: course 141 (may be taken concurrently). Or the equivalent. Study of the hydrologic cycle. Frequency analysis of hydrologic variables. Precipitation analysis for hydrologic design. Evapo-transpiration, interception, depression storage and infiltration. Streamflow analysis. Flood routing through channels and reservoirs.

142L. Engineering Hydrology Laboratory (1) I. Kavvas

Lecture—3 hours. Prerequisite: course 142 may be taken concurrently. Laboratory experiments and demonstrations on flow measurement, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps.

143. Water Resources Engineering and Management (3) II. Scott

Lecture—3 hours. Prerequisite: course 142 recommended. Engineering and management of water affecting, planning, development, and design of projects for water resources. Consideration of water sources, data, quality and use policies, legislation; economic, environmental, and public participation.

144. Groundwater Systems Design (3) I. The Staff

Lecture—3 hours. Prerequisite: Engineering 5 and course 143 may be taken concurrently. Laboratory experiments and demonstrations on flow measurement, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps. Introduction to groundwater modeling.

145. Hydraulic Structure Design (3) III. DeVries

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 141, 141L. Principles of project design. Methods of analysis and hydraulic design of storage systems, diversion structures, conveyance and regulation systems, and structures for irrigation, power, and flood control. Emphasis is on application of principles of open channel hydraulics in these systems.

146. Waste Resources Simulation (3) I. Kavvas

Lecture—3 hours. Prerequisite: courses 142 and 144; course 145 recommended. Simulation techniques in the design of waste resource projects; introduction to simulation theory and modeling; development and application of simulation models to surface water and ground water problems.

147. Solid Waste Management (3) I. Tchobanoglous

Lecture—2 hours; laboratory—3 hours. Characteristics and amounts of solid wastes; collection systems; introduction to waste treatment processes and return of treated wastes to the environment.

148A. Water Quality Management (3) I, II. Schroeder

Lecture—3 hours. Prerequisite: course 142. Open to Engineering students only. Introductory to basic concepts of water quality, fundamentals of water and wastewater treatment processes. Analysis of treatment process flowsheets. Analysis of water quality management alternatives.

148B. Water Quality Management Systems Design (3) III. Tchobanoglous

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 148A (may be taken concurrently). Introduction to the design of water and wastewater treatment processes.

149A. Introduction to Air Pollution (I. Carroll (Land, Air and Water Resources), Chang, Raabe)

Lecture—3 hours. Prerequisite: Mathematics 22B, 22C; Chemistry 11B; Atmospheric Science 101A, 103A. Examination of physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as chemical and physical properties of pollutants. (Same course as Atmospheric Science 149A.)

152. Introduction to Civil Engineering Planning (3) I. The Staff

Lecture—3 hours. Basic planning concepts; role of engi-
prior to the period of the internship. Supervised work-study experience in civil engineering may be repeated for credit. (P/NP grading only.)

189. Directed Group Study (1-3) S, T, L, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

189. Special Study for Advanced Undergraduates (1-5) S, T, L, III. The Staff (Chairperson in charge)
Prerequisite: senior standing in engineering and at least a B average. (P/NP grading only.)

Graduate Courses

201. Introduction to Theory of Elasticity (3) S. Hutchinson Lecture—3 hours. Prerequisite: Engineering 1048B. Fundamentals of constitutive equations in three dimensions: plane strain, plane stress, and plane strain; torsion and bending of bars of various shapes. Introduction to variational and approximate methods.

202. Buckling of Columns and Plates (3) S. The Staff Lecture—3 hours. Prerequisite: course 201. Analysis of the buckling behavior of structural members: buckling of columns, lateral buckling of beams, nonlinear bending and lateral-torsional buckling of beam-columns, stability of structural frames, buckling strength and ultimate strength of plates.

203. Inelastic Behavior of Solids: Plasticity (3) S. Dafalias Lecture—3 hours. Prerequisite: course 201. Fundamentals of plasticity, the concept of yield, strain-hardening and the associated constitutive equations for elastic-plastic solids. Solution of problems involving elastic-plastic, strain-hardening materials. Slip line field theory and limit analysis. Offered in even-numbered years.


205. Continuum Mechanics (3) S. Dafalias Lecture—3 hours. Prerequisite: course 204 or 204T. Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Introduction to nonlinear elasticity and viscoplasticity. Solution of one-dimensional problems. Offered in odd-numbered years.

211. Advanced Matrix Structural Analysis (3) S. Remotis Lecture—2 hours; laboratory—3 hours. Prerequisite: course 131A, and course 202. Matrices and graph theory. Solution of complex frameworks by the displacement method. Analysis of trussed, curved and beam on elastic foundation members; partial and full linear and non-linear analysis; introduction to structural optimization.

212. Finite Element Procedures in Applied Mechanics (3) S. Hermann Lecture—3 hours. Prerequisite: 115 or 115A and 118A (118B may be taken concurrently). Computer analysis of complex frameworks by the displacement method, design of columns, curvature of beams, and stability of structures. Use of computer programs in structural analysis. Offered in odd-numbered years.

117. Soil Mechanics (4) S, T, L. Arulanandan Lecture—4 hours. Prerequisite: Engineering 1044A (may be taken concurrently). Open to Engineering students only. Soil properties and mass-volume relationships, principle of effective stress, soil characteristics (classification and identification), compaction, collapsibility and permeability, compressibility and consolidation, strength—state of stress and failure criteria.

122. Soil Properties, Soil Behavior, and Engineering Applications (1-2) S, T, L. System operations: traffic characteristics and methods of measurement; safety and operations; models of transportation operations and congestion applied to urban street systems.

126. Transportation Planning Facilities Design (3) S, T, L. The Staff Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 1042A. Geometric and structural design of transportation facilities. Analysis of design of roadways. Capacity and functional design of travelways and terminals. Pavement design and construction. Economic and other design considerations.

163. Energy and Environmental Aspects of Transportation (3) S. Splering Lecture—3 hours. Prerequisite: course 160. Application of engineering, economics and systems planning concepts to the relationship between transportation and energy, and the environmental and air quality, including technical, institutional, and policy considerations. Offered in even-numbered years. (Same course as Environmental Studies 163.)

179. Soil Mechanics (3) S, T, L. Arulanandan Lecture—3 hours. Prerequisite: Engineering 1044A (may be taken concurrently). Design of transportation systems. Course 122 may be taken concurrently. Open to Engineering students only. Soil properties and mass-volume relationships, principle of effective stress, soil characteristics (classification and identification), compaction, collapsibility and permeability, compressibility and consolidation, strength—state of stress and failure criteria.

177. Soil-Water Dynamics Laboratory (2) S, T, L. Cherry Lecture—1 hour; laboratory—3 hours. Prerequisite: course 171C. Field observations in current research areas in soil dynamics. Topics to vary from year to year. Examples: exudation by soils, impact penetration in soil, soil moisture depression in centifuge models, seepage erosion in soil.

184. Soil-Water Dynamics Laboratory (2) S, T, L. Cherry Lecture—1 hour; laboratory—3 hours. Prerequisite: course 171C. Use of field techniques in the study of soil dynamics. Topics to vary from year to year. Examples: exudation by soils, impact penetration in soil, soil moisture depression in centifuge models, seepage erosion in soil.
251. Transportation Demand Analysis (3) II. Kitamura Lecture—3 hours. Course 114 or the equivalent. Detailed discussions of a standard procedure used in urban passenger travel demand forecasting. Principles and assumptions of the models, trip generation, trip distribution, and modal split. Computer exercises using empirical data to calibrate models and forecast travel demand. Offered in odd-numbered years.

254. Discrete Choice Analysis of Travel Demand (3) II. Kitamura Lecture—3 hours. Prerequisite: course 114 or the equivalent. Behavioral and statistical principles underlying the formulation and analysis of consumer choice models. Practical application of discrete choice models to characterization of choice behavior, hypothesis testing, and forecasting. Emphasis on complex models, including large-scale data sets obtained from home interview surveys.

255. Transportation Network Analysis (3) III. Kitamura Lecture—3 hours. Prerequisite: course 251. Discussion of methods for representing and analyzing transportation network flow and network optimization. Graphs and networks, flows on networks, shortest path algorithms, equilibrium and stochastic traffic assignment, optimal routing, optimal facility location, and optimum network design are covered. Offered in odd-numbered years.

258. Urban Traffic Management and Control (3) II. Jovane Lecture—3 hours. Prerequisite: graduate standing. Nature of urban vehicle traffic congestion; road capacity; inferences from empirical studies; cardiac delay calculations; freeway operations and management; corridor control.

259. Urban Traffic Management and Control (II) III. Jovane Lecture—3 hours. Prerequisite: course 258. Macroscopic and microscopic traffic signal delay models; queuing theory applications; traffic surveillance and detection; traffic forecasting; applications to traffic control systems. Offered in odd-numbered years.

260. Transportation Planning in Developing Countries (3) III. Spiering Lecture—3 hours. Prerequisite: course 160 or consent of instructor. Investigation of the role that transportation investments and policies play in the development of regions and countries. Emphasis on identifying appropriate techniques of public policy for designing transportation systems in regions of differing socioeconomic, geographic and institutional settings. Offered in even-numbered years.

262. Advanced Highway Technology and Automation (3) II. Kitamura Lecture—3 hours. Prerequisite: graduate standing. Technology covered includes vehicle navigation and guidance, telecommunications and information systems, and highway electrification. Analysis and evaluation of policy implementation issues, driver response and pricing strategies and costs, and formulation of control theory.

265. Noncohesive Sediment Transportation (3) II. The Staff Lecture—3 hours. Prerequisite: course 262. Sediment materials. Particle suspension by currents, waves, and winds. Modes of transport. Bed load relations and suspended load relations. Laboratory procedures. Emphasis on closed systems. May be repeated for credit. Offered in odd-numbered years.

266. Cohesive Particle Transportation (3) III. The Staff Lecture—3 hours. Prerequisite: course 265. Cohesive particle classification. Processes of aggregation and dispersion; aggregate properties; deposition and scour; channel stability, and channel design and maintenance. Offered in odd-numbered years.


269. Water Supply and Hydroelectric Power Planning (3) III. Johnston Lecture—3 hours. Prerequisite: courses 142 and 152 or the equivalent. Analysis of drought phenomena and low streamflow; water demand and reliability analysis; conjunctive use of surface and ground water; supply and conservation; planning alternatives. Capacity and energy determination; operations studies; planning alternatives; material requirements and load studies; analysis of system power and supply; regulatory considerations. Offered in even-numbered years.

270. Advanced Water Resources Management (3) III. Lund Lecture—3 hours. Prerequisite: courses 153 and 257 or the equivalent. Discussion of technical papers related to planning theory, systems analysis, regionalization, multi-objective methods, risk analysis, institutional issues, pricing, model application, economic development, forecasting, operating, and other topics.

271. Water Resources Planning Laboratory (3) III. Johnston Lecture—2 hours; laboratory—2 hours. Prerequisite: courses 142, 152. Application of hydrology, hydraulics, systems analysis, economics and principles of plan formulation and plan evaluation in conducting a water resources planning study. Lecture provides instruction on principles and methodology used in the laboratory study. Offered in odd-numbered years.

272. Advanced Groundwater Hydrology (3) III. Marino Lecture—3 hours. Prerequisite: course 144 or the equivalent; Mathematics 119A, recommended. Flow in confined, unconfined, and leaky aquifers. Hydraulics of pumping and recharging wells. Identification of aquifer parameters.


276. Hydrologic Time-Series Analysis (3) III. Karvas Lecture—3 hours. Prerequisite: course 153. Mathematics 131A or Statistics 140A. Planning, design, and management of water resources systems. Case studies of deterministic and stochastic optimization techniques. Water allocation, capacity expansion, and design and operation of reservoir systems. Surface water and ground-water management.


293. Advanced Soil Mechanics Laboratory (3) III. Shen Lecture—1 hour; laboratory—6 hours. Prerequisite: course 292. Subsurface exploration, advanced laboratory techniques including consolidation, axial drainage, direct pore-water pressure measurement, pavement design tests, in situ tests. Offered in even-numbered years.

299. Physicochemical Properties of Soils and Soil Behavior (3) I. Aripanadan Lecture—3 hours; laboratory—3 hours. Prerequisite: course 171. Analysis of the mechanistic behavior of soils from consideration of clay mineralogy, colloidal phenomena, ion-exchange and soil-water characteristics. Laboratory includes electrochemical characterization of soils. Optimization of electrical dispersion, and rotating cylinder tests.

284. Theoretical Soil Mechanics (3) II. Cherry 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 stresses of soil, anisotropy, and time dependent behavior.

285. Pavement Design and Soil Stabilization (3) II. Shen Lecture—3 hours. Prerequisite: course 171. Principles and performance of pavement design as applied to the problem of pavement; 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 bulkheads; deep excavation; tie-back systems; tunneling in soft ground; loads on buried conduits; lateral piles; loading on pier foundations; additional topics of footing and raft design.

287. Dynamic Response of Soils (3) III. Aripanadan Lecture—2 hours; laboratory—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; using one-dimensional and two-dimensional analysis procedure; centrifuge testing of structures subjected to earthquake loading.

288A. Selected Topics in Civil Engineering (1-5) I, II, III. The Staff (Chairperson in charge) Lecture, laboratory, or combination. Prerequisite: consent of instructor. Directed group study of special topics with seminars and discussions in (A) Environmental Engineering; (B) Hydraulics and Hydrologic Engineering; (C) Engineering Planning; (D) Geotechnical Engineering; (E) Structural Engineering; (F) Transportation Planning; (G) Water Resources Engineering. May be repeated for credit.

289. Seminar (1-5) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Research problems, progress and techniques in civil engineering. May be repeated for credit. (S/U grading only.)

290. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (S/U grading only.)

291. Research (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

Professional Course

300. The Teaching of Civil Engineering (I) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Civil Engineering. Participation as teaching assistant or associate-in-designated engineering course. Methods of teaching discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for total of 9 units. (S/U grading only.)

Engineering: Electrical and Computer Science

(College of Engineering)

S. Louis Hakimi, Ph.D., Chairperson of the Department

Stephen T. Kowel, Ph.D., Vice Chairperson of the Department

Department Office, 3026 Bainer Hall (752-0583)

NOTE: For key to footnote symbols, see page 131.
Faculty
Khaled Abdel-Ghaffar, Ph.D., Acting Assistant Professor
V. Ralph Alpaz, Ph.D., Professor
Robert W. Bower, Ph.D., Acting Professor
R. Branner, Ph.D., Associate Professor
Tsu-Shiang Chang, Ph.D., Associate Professor
John N. Churchill, Ph.D., Professor
K. Wayne Crock, Ph.D., Professor
Andrew J. Dienes, Ph.D., Professor
Richard C. Duf, Ph.D., Professor
(Engineering Electrical, and Computer Science Management)
Kamilo Feher, Ph.D., Professor
Herman J. Fink, Ph.D., Professor
Gary E. Fitch, Ph.D., Professor
William A. Gardner, Ph.D., Professor
Mohammed S. Ghausi, Ph.D., Professor
Nazi A. Gudes, Ph.D., Assistant Professor
S. Louis Hakimi, Ph.D., Professor
Stephen B. Hale, Ph.D., Professor
I. Horowitz, Ph.D., Professor
T.C. Steve Hsieh, Ph.D., Professor
Charles E. Hunt, Ph.D., Assistant Professor
Paul J. Hurst, Ph.D., Assistant Professor
Andre Knoesen, Ph.D., Assistant Professor
Stephen T. Kowal, Ph.D., Professor
Bernard C. Lee, Ph.D., Associate Professor
Wen C. Lin, Ph.D., Professor
John B. Powers, Ph.D., Professor Emeritus
G.R. Redfield, Ph.D., Professor
Romeramy Smith, Ph.D., Assistant Professor
Michael A. Soderstrand, Ph.D., Professor
Ronald F. Soocho, Ph.D., Professor
Richard R. Spencer, Ph.D., Assistant Professor
Jerome J. Suran, Ph.D. (Hon.), Senior Lecturer
(Engineering Electrical, and Computer Science Management)
Shih-Ho Wang, Ph.D., Professor
Division of Computer Science
Richard F. Walters, Ph.D., Chairperson of the Division
Division Office, 4455 Chemistry Annex (752-7064)
Faculty
Sergio Alvarado, Ph.D., Acting Assistant Professor
Myla M. Archer, Ph.D., Assistant Professor
Gene L. Fisher, Ph.D., Assistant Professor
Daniel Gusfield, Ph.D., Associate Professor
Kenneth I. Joy, Ph.D., Associate Professor
Lawrence T. Koo, Ph.D., Professor
Karl Loberg, Ph.D., Professor
Peter Linz, Ph.D., Professor
Charles U. Martel, Ph.D., Associate Professor
Nicholas S. Sokoloff, Ph.D., Associate Professor
Sawathane Mukehrjee, Ph.D., Assistant Professor
Ronald A. Olson, Ph.D., Assistant Professor
Arvin Park, Ph.D., Assistant Professor
Manfred G. Ruschitzka, Ph.D., Professor
Richard F. Walters, Ph.D., Professor
Courses in Engineering: Electrical and Computer Science
(Courses in Electrical and Computer Science Engineering are listed below; courses in Computer Science Engineering are listed immediately following.)
Lower Division Courses
1. Introduction to Electrical and Computer Engineering (1)
   The Chairperson 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. Presentation of basic ideas and their applications. Examination of some case studies. (P/N grading only.)
   NOTE: For key to footnote symbols, see page 131.
   115A. Fabrication process for CMOS, VLSI. Laboratory projects examine devilment of thin films, ion implantation, process simulation, etching, sputtering, metalization, and C-V analysis. Topics include isolation, projection alignment, thin oxide growth, thin gate oxidation, and rapid thermal annealing.
   130A. Introductory Electromagnetics (3) II. Dienes, Fink, Kroesen
   Lecture—3 hours. Prerequisites: Mathematics 228 and 22G; Physics 8B strongly recommended. Static electric and magnetic fields; time-varying electromagnetics.
   130B. Introductory Electromagnetics (3) III. Dienes, Fink, Kroesen
   Lecture—3 hours. Prerequisites: courses 130A and 17. Plane electromagnetic waves, transmission, reflection, transmission lines.
   111A. Electromagnetic Fields and Waves (3) I. Dienes, Fink
   118B. Electromagnetic Fields and Waves (3) II. Dienes, Fink
   Lecture—3 hours. Prerequisite: course 131A or the equivalent. Recomputercarries: microcomputer networks and components.
   132A. High-Frequency Systems, Circuits and Devices (4) I. Branner
   Lecture—3 hours—laboratory—3 hours. Prerequisite: course 130B. Application of electromagnetic theory to analysis and design of practical devices, circuits and systems operating at radio frequencies. Energy transfer at high frequencies, transmission line, microwave integrated circuits, circuit analysis of electromagnetic energy transfer systems, the scattering parameters.
   132B. High-Frequency Systems, Circuits and Devices (4) II. Branner
   Lecture—3 hours—laboratory—3 hours. Prerequisite: course 132A. Passive high frequency device analysis, design, microwave circuit and filter design, modulation and analysis of microwave transistor and Gunn diode amplifiers.
   134. Radar Systems and Signals (3) III. Haller
   Lecture—3 hours. Prerequisite: course 112; course 160 strongly recommended. Introductory course on radar systems and signals. Emphasis on analysis of practical radar system configurations and signals. The prediction of radar range performance, accuracy and resolution is discussed for a number of radar classes including: pulse, cw and pulse doppler.
   135. Optical Communications I: Fibers (3) III. Dienes, Kroesen
   138. Fields and Waves for Computer Majors (4) III. Dienes, Fink
   Lecture—4 hours. Prerequisite: Mathematics 22B, 22C, Physics 8B. Static electric and magnetic fields. Electromagnetic waves and transmission lines.
   140A. Fundamental Principles of Device Physics (3) I. Bower
   Lecture—3 hours. Prerequisite: Physics 8B. Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, density of states, electrons and holes, p-n junctions, Shockley junctions, and junction effects on devices.
   140B. Fundamental Principles of Device Physics (3) II. Bower
   Lecture—3 hours. Prerequisite: course 140A. Electrical properties, the design of various semiconductor devices. Devices to be discussed include metal-semiconductor diodes, PN junction diodes, and bipolar transistors.
   145A. Solid-State Electronics (3) III. Bower, Churchill, Haley, Kowel, Soocho
   Lecture—3 hours. Prerequisite: course 140A. Electrical properties and design of various semiconductor devices. Devices to be discussed include fieldeffect transistors, and bulk and negative-resistance devices.
148. Solid-State Electronics (3) II. Shooch Lecture—3 hours. Prerequisite: course 148A. Design of de-
vice and their associated circuits utilizing the magnetic
properties of solids. Devices studied include the ferrite core,
ferrite memory, and emitters used in disk, tape and bubbles
and mass storage.

149. Superconductivity (3) III. Fink Lecture—3 hours. Prerequisite: course 130B or 140B. Funda-
mentals of superconductivity, including the concepts of the first and second
kind. London and Ginsburg-Landau theories, Josephson effects, applications and devices.

150. Microprocessor-Based Instrumentation Systems (4) III. Shooch Lecture—3 hours. Prac-
tical engineering applications of microprocessors and micro-
processor devices. Sequence of instructional plans, applica-
tions, and design methods common to modern instrumentation. Instructional plans include:
dynamic response, signal conditioning, A/D and D/A con-
version, digital transmission, digital interfacing, software development, noise and safety.

151. Discrete Time Systems (3) II. Haia, Ford, Wang Lecture—3 hours. Prerequisite: course 112. Characteriza-
tion, analysis, and design of discrete time systems. Difference
equation models. Z-transform analysis methods. Introduction
to digital filter design. Discrete and fast Fourier transformers.

152. Feedback Design of Uncertain Systems (3) II. Horowitz Lecture—3 hours. Prerequisite: course 112. Quantitative
design techniques. Optimal and suboptimal prescribed
performance tolerances. Performance tolerances are limited by uncertainties in plant pa-
rameters and competing disturbance inputs. Application to single-input single-output time
invariant, time-varying, and non-linear systems. Minimization of the cost of feedback.

157. Control Systems (3) II. Haia, Dorf, Wang, Chang Lecture—3 hours. Prerequisite: course 112. Design and analysis
of continuous time control systems. Elements and principles are drawn from all engineering fields. The mathematical representation of systems; frequency, s-plane and state space methods; stability criteria.

158. Control Systems (3) III. Haia, Dorf, Lyn Lecture—2 hours. Prerequisite: course 112. Course 157. Control system optimization and compensation tech-
niques. Introduction to computer aid in the laboratory includes: servo-system experiments and computer simulation studies.

160. Signal Analysis and Modulation (3) III. Algazi, Fehrer, Gehr, Levy Lecture—3 hours. Prerequisite: course 112. Course 158. Signal analysis based on Fourier methods. Fourier series and transforms; time-sampling, convolution, and filtering; autocorrelation and spectral density; modulation; carrier-amplitude, carrier-frequency, and pulse-amplitude.

161. Signal Processing (3) II. Ford Lecture—4 hours. Lecture—1 hour; laboratory—6 hours. Prerequisite: course 151. Introduction to analog and digital signal processing and implementation of analog and digital signal processing systems. Topics include: filters, spectral estimation, Fourier transform, circuits, A/D and D/A converters, and digital communication systems.


170. Telecommunications Measurements and Instrumentation (3) III. Fehrer Lecture—3 hours. Prerequisite: course 160. Measurements and instrumentation for digital communications and signal processing systems. Analysis of bit error rate, noise and jitter measurement uncertainties. Digital and analog video and speech measurements. Expert (artificial in-
telligence) applications. In-class experiments: demonstrations.

171. Introduction to Computer Architecture (4) III. II. Lin Lecture—3 hours; discussion—1 hour. Prerequisite: course 70. Study of the design and implementation of various com-
ponents of a computer system (including instruction set, process-
ing unit, and control system) and the relationship of these components to the computer's architecture and system hierarchy.

173. Microcomputer-Based System Design (4) III. II. Lin Lecture—2 hours; laboratory—6 hours. Prerequisite: course 170. Course 177 (concurrently) recommended. Study of

Courses in Engineering: Computer Science

Lower Division Courses

10. Basic Concepts of Computing (3) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school mathematics or equivalent. Introduction to principles of computer science. Basic programming languages and algorithms for solving problems by use of a digital computer. Not intended for students in physical science, engineering, or mathematics. Not open for credit to students who have completed course 30, 303E, Engineering 40, or former course 8, 20, or Mathematics 20A.

30. Introduction to Programming and Problem Solving (4) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 18A or 21A (may be taken concurrently). Introduction to digital computers and computer programming; emphasis on their design and efficiency. Basic programming design, running, debugging, testing of well-structured programs. Programming language Pascal will be used to solve simple problems. (Not open for credit to those who have completed Engineering 5 or Computer Science Engineering 30H, and only 2 units of credit allowed to those who have completed course 120, former course 20 or Mathematics 19). Those who have completed Engineering 5 or the equivalent and transfer into an Electrical Engineering or Computer Science Engineering major should take the Engineering 5-Computer Science Engineering 32 sequence as opposed to the Computer Science Engineering 30-40 or 30H-40H sequence.

30H. Honors Structure and Interpretation of Computer Programs (4) I (4). The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Major in Computer Science Engineering or Electrical Engineering or Electrical Engineering 21A; Mathematics 18A or 21A (may be taken concurrently). More intensive treatment of material in course 30. Forty additional hours above suggested in mathematical foundations of computer science. Procedural abstraction, data abstraction, and modularity. The Scheme programming language is used. Design and analysis of algorithms are stressed. (Not open for credit to those who have completed Engineering 5 or Computer Science Engineering 30, and only 2 units of credit allowed those who have completed course 120, former course 20 or Mathematics 19). Those who have completed Engineering 5 or the equivalent and transfer into an Electrical Engineering or Computer Science Engineering and Engineering should take the Engineering 5-Computer Science Engineering 32 sequence as opposed to the Computer Science Engineering 30-40 or 30H-40H sequence.

30D. Pascal Programming and Software Development (4) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 18A or 21A (may be taken concurrently). Engineering 5 or the equivalent, or consent of instructor. Introduction to graduate and transfer students. Fast-paced course teaching Pascal programming language as well as software development. Students should have completed 30, 30H, 40, 40H; those who take Engineering 5 or the equivalent and transfer into an Electrical Engineering or Computer Science Engineering major should take the Engineering 5-Computer Science Engineering 32 sequence as opposed to the Computer Science Engineering 30-40 or 30H-40H sequence.

40. Introduction to Software Development (4) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 30. Elementary software engineering; computer programming style, documentation, efficiency, debugging, verification; advanced features of Pascal and introduction to FORTRAN; introduction to dynamic data structures. (Not open for credit to those who have received Credit for Engineering Computer Science 32, or 40H). Those who take Engineering 5 or the equivalent and transfer into an Electrical Engineering or Computer Science Engineering major should take the Engineering 5-Computer Science Engineering 32 sequence as opposed to the Computer Science Engineering 30-40 or 30H-40H sequence.

40H. Honors Structure and Interpretation of Computer Programs II (4) I (4). The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 30H. More intensive treatment of material in course 40. Continuation of 30H. Comparison of Pascal-like languages and LISP-like languages. Defining recursive data structures such as linked lists and trees. Advanced abstraction and problem solving techniques. Programming languages Scheme and Pascal are used. (Not open for credit to those who have completed Engineering 5 or Computer Science Engineering 40). Students who have completed Engineering 5 or the equivalent and transfer into a major in Electrical Engineering or Computer Science Engineering and should take Engineering 5-Computer Science Engineering 32 sequence as opposed to Computer Science Engineering 30-40 or 30H-40H sequence.

88A-L. Special Topics in Computer Science (1-3) I, II, III. The Staff

Lecture (by laboratory or collection). Prerequisite: consent of instructor. Special topics in (A) Computer Science Theory; (B) Architecture; (C) Programming Languages and Compilers; (D) Operating Systems; (E) Software Engineering; (F) Data Bases; (G) Artificial Intelligence; (H) Computer Graphics; (I) Networks; (J) Scientific Computing; (K) Parallel Processing; (L) Outlining. Computer Science. May be repeated for credit when the topic is different.

120. Internship in Computer Science (1-5) I, II, III. The Staff

Internship—1 credit per quarter. Non-credit internship experience including independent study, project proposal approved prior to period of internship. Supervised work-experience in computer science. May be repeated for credit. (P/NP grading only.

120L. Directed Group Study I (1-8) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.

120S. Special Study for Lower Division Students (1-5) I (5), II, III. The Staff

Internship—1 credit per quarter. Supervised work-experience in computer science. May be repeated for credit. (P/NP grading only.

Upper Division Courses

100. Discrete Structures (3) I, II, III. Archer, Kour

Lecture—3 hours. Prerequisite: Mathematics 21C. Discrete structures: sets, relations, functions, methods of counting. (Not credit allowed to those who have completed former Electrical and Computer Science Engineering 191.)

110. Data Structures and Programming (4) I, II, III. Martel

Lecture—3 hours, 2 laboratory periods. Prerequisite: course 40 or 40H or consent of instructor; Electrical and Computer Science Engineering 70 or former Electrical and Computer Science Engineering 170. Concept of data-type, arrays, records, sets, structures and their representation. Sequential file structures. Dynamic information structures, linear lists, tree structures, heap structures, recursive algorithms, sorting and searching. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 160 or former Mathematics 128A)

120A. Automata Theory and Formal Languages (3) I, II, Archer, Linz

Lecture—3 hours. Prerequisite: course 100. Finite automata and regular languages; context-free grammars and non-deterministic finite automata, finite-state transducers. Regular sets, pumping lemma, closure properties, minimization. Context-free grammars, derivation and recognizers. Pushdown automata, pumping lemma and their relation to context-free languages. (Not open for credit to students who have completed former course 123 or former course 128A)

120F. Algorithm Design and Analysis (3) I, II. Guzdial, Martel

Lecture—3 hours. Prerequisite: courses 100, 110. Complexity of algorithms, bounds on complexity, algorithms for searching, sorting, pattern matching, or manipulating sets of strings, NP-completeness, problems, and solution to NP-complete problems. (Not open for credit to students who have completed course 123 or former course 128A)

140. Programming Languages (4) I, II. Archer, Fisher

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Syntactic definition of programming languages. Introduction to programming language features including variables, data types, data abstraction, looping, parameters, disciplined exception handling. Comparative study of several high-level languages. (Open for credit to students who have completed Mathematics 129C)

142. Compilers (3) I. Archer, Fisher

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 120 and 140; course 160 recommended. Principles and techniques of lexical analysis, syntax analysis, lexical error detection, code generation. Implementation of compilers. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 181.)

150. Operating Systems and System Programming (4) I, II. Levitt, Malhotra

Lecture—3 hours; discussion—1 hour. Prerequisite: Electrical and Computer Science Engineering 171 strongly recommended. Basic concepts of operating systems and system programming. Microprogramming and interprocess communication, virtual memory, program loading and linking; file and I/O subsystems; utility programs.


160. Introduction to Software Engineering (4) I (4). Fisher, Levitt

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 140 and 140. Requirements, specifications to problems, implementation, testing, and verification of large software systems. Study and use of software engineering methodologies. Team programming. (Not open for credit to those who have completed former course 129 or former Mathematics 176)

165. Database Systems (4) II. Walters

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Relational database systems: file types; database models; reliability, integrity and security; operating system interfaces with databases.

166. Information Systems for Navigators

Lecture—3 hours. Prerequisite: course 40 or the equivalent; upper division standing. Design, creation, implementation, and study evaluation of information systems. Project-oriented, self-paced implementation of actual information including survey collection of data, input design, and development of components to edit, sort, and retrieve data. Case study of typical information systems problems. Offered in even-numbered years.

170. Introduction to Artificial Intelligence (4) II. Levitt

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110; course 140 or experience with LISP recommended. Design and implementation of intelligent computer systems. LISP as a programming language for building symbolic processing systems. Knowledge representation and organization, Memory and inference. Problem solving. Natural language processing. (Not open for credit to those who have completed former course 128 or former Mathematics 174)

172. Natural Language Processing (4) I. Alvarez

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Introduction to cognitive modeling. Study of knowledge structures and processes required for computer comprehending. Based on Conceptual Dependency Theory, scripts, goals, and plans. Techniques for designing and implementing natural language parsers and generators.

175. Computer Graphics (4) I, II. Joy

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110, Mathematics 22A. Principles of computer graphics. Current graphics hardware, elementary operations in two- and three-dimensional space, transformation geometry, clipping, graphics systems and individual projects. (Not open for credit to students who have completed former course 127 or former Mathematics 173)

189A-L. Special Topics in Computer Science (1-9) I (9), II, III. The Staff

Lecture, laboratory or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science Theory; (B) Architecture; (C) Programming Languages and Compilers; (D) Operating Systems; (E) Software Engineering; (F) Data Bases; (G) Artificial Intelligence; (H) Computer Graphics; (I) Networking; (J) Computer design, standards, graphics, databases. (P/NP grading only.

190C. Research Group Conferences in Computer Science (1-9) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Computer Science Engineering and consent of instructor. Research group conferences. May be repeated for credit. (P/NP grading only.

192. Internship in Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)

Work-experience. Prerequisite: completion of a minimum
of 84 units; project approval prior to period of internship. Supervised work-study experience in computer science. May be repeated for credit. (P/NP grading only.)

196. 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 Course

220. Theory of Computation (3) II. Archer, Kou Lecture—3 hours. Prerequisite: courses 122 and 122. Theory of computation, the notion of effective procedures, computability, Turing machines, Post symbol manipulation system, recursive functions, and incomputable problems. (Not open for credit to students who have completed the same topic under Electrical and Computer Science Engineering 289.)

221. Formal Language Theory (3) III. Arletz, Lutz Lecture—3 hours. Prerequisite: course 220. Definition and properties of formal languages, deterministic context-free languages, context-sensitive languages, abstract families of languages, special topics of current interest.

222A. Design and Analysis of Algorithms (3) I. Gusfield, Martel Lecture—3 hours. Prerequisite: course 122. Algorithms 131A recommended. Techniques for designing efficient algorithms and analyzing their complexity. Use of data structures, sorting and searching, estimation. Techniques for solving problems. Selected advanced topics. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 277A.)

222B. Advanced Design and Analysis of Algorithms (3) II. Martel Lecture—3 hours. Prerequisite: course 222A. Advanced topics in complexity theory, Problem classification. The classes P, NP, NP-completeness, and the polynomial hierarchy. Advanced concepts and results from operations research and computer science. Selected advanced topics. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 277B.)

223. Parallel Algorithms (3) III. Martel Lecture—3 hours. Prerequisite: course 222A. Models of parallel computing and communication. VLSI, parallel computing. Interconnection networks. Parallel algorithms for classical problems are studied as well as general techniques for their design and analysis. Lower bounds on parallel computation are proved in several settings.


226. Computational Algorithms in VLSI (3) I. Kou Lecture—3 hours. Prerequisite: course 122; Electrical and Computer Science Engineering 176. Application and implementation of VLSI design. Algorithms and analysis of algorithms for the design of VLSI circuits; VLSI test set generation and simulation.

240. Programming Languages (3) II. Archer, Fisher Lecture—3 hours. Prerequisite: courses 140, 142. Advanced topics in programming languages including formal syntax and semantics, formal verification, modularization, data flow languages, object-oriented languages, concurrent processing. Principles of programming language design. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 278C.)

242. Transition of Programming Languages (3) III. Archer, Fisher Lecture—3 hours. Prerequisite: course 220. Advanced code generation techniques. Representation of intermediate code. Data flow analysis, code optimization, loop optimization, constant folding, and instruction scheduling. Optimization by program transformation. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 278C.)

243. Code Generation and Optimization (3) J. Fisher Lecture—3 hours. Prerequisite: course 242. Advanced code generation techniques. Representation of intermediate code. Data flow analysis, code optimization, loop optimization, constant folding, and instruction scheduling. Optimization by program transformation. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 278C.)

244. Principles of Concurrent Programming (3) J. Olsson Lecture—3 hours. Prerequisite: course 100, 150 or Electrical and Computer Science Engineering 129D. Fundamental concepts of concurrent programs: concurrent program verification and derivation; synchronization mechanisms in programming languages; distributed programming techniques; case studies of languages.

252. Local Area Networks (3) II. Mukherjee Lecture—3 hours. Prerequisite: course 152. Local area networks and their applications, network structures, and protocols: emphasis on performance modeling and analysis of multiple access techniques in polling, ring, and random access networks. Adaptation layer standards, example protocols, and recent research directions.

253. Cryptography and Data Security (3) I. Levitt Lecture—3 hours. Prerequisite: course 150; consent of instructor. Methods of data encryption and authentication for secure communication systems from unauthorized disclosure and modification. Introduction to mathematical principles of security with applications to operating systems, database systems, and computer networks.

256A. Analytic Methods for Computer Systems Design (3) I. Matloff Lecture—3 hours. Prerequisite: course 100, Electrical and Computer Science Engineering 171, Statistics 131A. Analysis of the package: Electrical and Computer Science Engineering 239B and 239C recommended. Use of simulation and queuing theory in computer design. Applications to memory hierarchy, network protocols, fault-tolerance, and scheduling. Only one unit of credit allowed to students who have completed former Electrical and Computer Science Engineering 186.

256R. Modeling and Analysis of Computer Networks (3) III. Matloff Lecture—3 hours. Prerequisite: course 256A. Use of simulation and queueing theory to analyze large-scale computer systems and local computer networks, with particular emphasis on optimization. Multiple access protocols, capacity planning, topological design, and performance evaluation. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 277B.)

256R. Program Verification (3) I. Archer Lecture—3 hours. Prerequisite: Mathematics 125 or Philosophy 112 or familiarity with first-order logic. Knowledge of an intermediate and a functional programming language essential. Methods of proving correctness of programs with respect to formal specifications, with attention to those suited for employing automated deduction. Logic background, symbolic execution, techniques suited for iterative programming, methods from denotational semantics, termination, dynamic logic and proof of correctness programs.


258. Database Systems (3) III. Kou Lecture—3 hours. Prerequisite: course 152; course 165. Data models (especially relational and entity relationship), performance measures, query languages and optimizers, data base security and integrity, distributed and networked systems. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 280.)

259. LAPMPS Language (3) I. Walters Lecture—3 hours. Prerequisite: course 140. Review of MUPMPS language: history, features, implementation techniques, validation procedures, performance evaluation and applications. Projects in programming, meta-language implementation, validation and performance measures.

270. Artificial Intelligence (3) I, II. The Staff Lecture—3 hours. Prerequisite: course 170 recommended. Concepts and techniques underlying the design and implementation of models of human performance on intelligent systems. Emphasis on development of high-level knowledge structures, Models of mind and memory. Intelligence and natural language acquisition. Natural language processing and its applications. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 279B.)

272. Cognitive Modeling (3) I, II. The Staff Lecture—3 hours. Prerequisite: courses 170 and 270. Conceptual issues in artificial intelligence emphasizing the modeling and simulation of human performance. Discussion and implementation of models, computer simulation in knowledge representation, memory processes and organization, natural language understanding, and planning and problem solving.

274. Automated Deduction (3) III. Archer Lecture—3 hours. Prerequisite: course 256A or Philosophy 112 or familiarity with first-order logic. Techniques of mechanical theorem-proving. Methods based on resolution and term-rewriting. Decision procedures. Induction. Applications to program verification, question-answering and plan generation. Offered in even-numbered years.

275. Computer Graphics (3) II. Joy Lecture—3 hours. Prerequisite: course 175. Advanced topics in computer graphics. Hidden surface models, rendering of various surface types, shading techniques, anti-aliasing, modeling techniques.

276. Advanced Raster Graphics (3) III. Joy Lecture—3 hours. Prerequisite: course 275. Advanced topics in raster graphics: ray tracing models, advanced modeling techniques, anti-aliasing, animation. Discussion of current research in the field.


280A-K. Special Topics in Computer Science (1-5) I, II, III. The Staff Lecture, laboratory, or combination. Prerequisite: consent of instructor. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 277B.)

290C. Graduate Research Group Conference (1) I, II, III. The Staff Lecture, laboratory, or combination. Prerequisite: consent of instructor. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 277B.)

290R. Research (1-12) I, II, III. The Staff (S/U grading only.)

Professional Course

390. The Teaching of Computer Science (1-12) I, II, III. The Staff Lecture—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in-charge in Computer Science. Participation as a teaching assistant or associate-in-charge in a College of Engineering discussion group or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit.

Engineering: Mechanical

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Engineering: Mechanical

(Harry Brandt, Ph.D., Chairperson in charge)

Department Office, 2021 Bainer Hall (752-3580)

James W. Baugh, Ph.D., Professor (Aeronautical and Astronautical Engineering) Charles W. Twitchell, Chairperson in charge

Enzo Bertolini, Ph.D., Adjunct Professor

Harry Brandt, Ph.D., Professor

Ray W. Brewer, Ph.D., Professor

Ray A. Dwyer, Ph.D., Professor (Aeronautical and Astronautical Engineering)

Andrew A. Frank, Ph.D., Professor

Clyne F. Garland, M.S., Professor Emeritus

Warren H. Gled, Ph.D., Professor Emeritus

John F. Gisla, J.D., Lecturer

Mohamed Hafez, Ph.D., Professor (Aeronautical and Astronautical Engineering)

William H. Heisz, Ph.D., Visiting Professor (Aeronautical and Astronautical Engineering)

NOTE: For key to footnote symbols, see page 131.
Lower Division Courses

1. Mechanical Engineering

(1) The Staff (Brandt in charge)

Lecture—1 hour. Discussion of the field of mechanical engineering with examples taken from industrial applications; discussion of the practice with respect to engineering principles, ethics, society, and responsibility.

2. Internship in Mechanical Engineering (1-6) I, II, III.

The Staff (Brandt in charge)

Work-learning experience. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised work-study experience in engineering. May be repeated for credit (P/NP grading only).

3. Special Study for Undergraduates (1-5) I, II, III.

The Staff (Brandt in charge)

Prerequisite: consent of instructor; lower division standing. (P/NP grading only).

Upper Division Courses

134. Vehicle Stability (4) I. Kantopp

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 171 and power 125B. Introduction to static and dynamic stability characteristics of ground transportation vehicles. Examples drawn from automobiles, trains, articulated vehicles, motorcycles, bicycles and others. Lateral handling characteristics, oversteer, understeer. Laboratory experiments illustrate effects of vehicle parameters on dynamic vehicle response.

150A. Mechanical Design and Manufacturing Processes (4) I, II, III.

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Engineering 102B and 105B. Restricted to Aeronautical and Mechanical Engineering and Materials Science majors. The principles of engineering mechanics applied to the fundamentals of manufacturing design. Theory of static and fatigue failure of metals. Design projects emphasizing reduction of conceptual design to hardware. Manufacturing processes laboratory.

150B. Mechanical Design and Manufacturing Processes (4) I, II, Frank, Henderson

Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A; restricted to Aeronautical and Mechanical Engineering and Materials Science majors. Principles of engineering mechanics, failures of structures, and design and selection of mechanical components. Design projects which concentrate on conceptual design, engineering analysis, methodology, material selection and cost. Introduction to computer-aided design.

151. Statistical Methods in Design (3) II. Beadle

Lecture—3 hours. Prerequisite: course 150A. Methods of statistical analysis with emphasis on applications in mechanical design. Applications include product evaluation and decision making, stress-strength interference, probabilistic design, systems reliability, and fatigue under random loading.

152. Mechanism Design (3) II. Yang

Lecture—3 hours. Prerequisite: Engineering 102A. Application of complex-number method to kinematic, static and dynamic analyses of mechanisms and dynamic balancing mechanisms. Design of epicyclic gear trains and intermittent mechanisms. Introduction to kinematics of simple mechanisms for function generation, curve tracing and body guidance.

162. Modern Power Systems (4) II. Hofman

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 102B, 105B. Study of modern powerplants for electric power generation and cogeneration. Thermodynamic analysis of different powerplant cycles, fuels, solar energy, etc. Design studies of some specific powerplants.

165. Fundamentals of Heat Transfer (4) II. McKillop, Dwyer

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 5, 103B and 105B; restricted to Aeronautical and Mechanical Engineering and Materials Science majors. Fundamentals of heat transfer. Convection and radiation heat transfer; applications to engineering equipment with use of digital computers.

171. Analysis, Simulation, and Design of Dynamic Systems (4) I. Kantopp, Hofman


172. Automatic Control of Engineering Systems (4) II. Brewer

Lecture—3 hours; discussion—1 hour. Prerequisite: course 171. Classical feedback control for engineering systems. Control systems design using time and frequency domain methods. State space techniques.

178. Measurement Systems (3) II, III. Beadle

Lecture—2 hours; discussion—1 hour. Laboratory—1 hour. Prerequisite: Engineering 100 and 105A; restricted to Aeronautical and Mechanical Engineering and Materials Science majors. Theory of measurement; precision; measurement techniques for mechanical systems; transducers; data manipulation and processing; data digitization.

194A. Mechanical Engineering Design Project (2) II, I, III.

The Staff

Laboratory—6 hours. Prerequisite: senior standing in Mechanical Engineering; consent of instructor. Performance of a major design project which involves design and fabrication. Development and evaluation of mechanical engineering systems.

194B. Mechanical Engineering Design Project (2) II, I, III.

The Staff

Laboratory—6 hours. Prerequisite: course 194A; consent of instructor. Performance of projects which include design and possible development and evaluation of a mechanical engineering system.

195. Mechanical Systems Design Projects (4) III. Henderson

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series, 184-188). Design of a thermal system such as a power plant or engine, including consideration of engineering and economic factors based on individual contributions to projects. Limited enrollment.

197. Control Systems Design Project (4) III. Frank

Lecture—3 hours; discussion—1 hour. Prerequisite: course 172; senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series, 184-188). Design of dynamic engineering systems. Formulation of goals, mathematical modeling of system, consideration of passive, open loop, and closed loop active solutions. Hardware and cost/performance considerations. Grading based on individual contributions to projects.

198. Vehicle Systems Design Project (4) II, Frank

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 150B; senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series, 184-186). Design of vehicle systems, including components, and/or complete vehicles for groups or individuals. Students will design, analyze, construct and evaluate a vehicle-related component. Grading based on individual contributions to projects. Limited enrollment.

199. Internship in Engineering (1-5) I, II, III.

The Staff (Brandt in charge)

Work-learning experience. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work-study experience in engineering. May be repeated for credit. (P/NP grading only).

200. Directed Group Study (1-5) I, II, III.

The Staff (Brandt in charge)

Prerequisite: consent of instructor. (P/NP grading only).

Graduate Courses

205. Thermal Radiation (3) III. Brandt

Lecture—3 hours. Prerequisite: course 165 or consent of instructor. The transfer of radiant energy. Geometrical and spectral characteristics of systems involving thermal radiation. Gaseous radiation. Applications to solar energy systems.

208A. Experimental Methods in the Thermal Sciences (3) I. Baughn

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 165. Experiment design, statistics, and uncertainty analysis. Steady-state and transient temperature measurement. Steady-state flow and pressure measurements.

208B. Experimental Methods in Fluid Mechanics and Combustion (3) III. Kenny

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 165 and Engineering 103B. Application of shadow, schlieren and other flow visualization methods. Introduction to optical lenses. Measurement of velocity and concentration, reacting and non-reacting flows with laser diagnostic techniques including LDV, Rayleigh, Raman and fluorescence scattering and CARS. Offered in even-numbered years.

208C. Experimental Methods in Fluid Mechanics and Heat Transfer (3) III. White

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: Engineering 103B. Measurements in fluid mechanics and thermal science.

130. Aircraft Preliminary Design (4) I. III. Van Dam Lecture—4 hours. Prerequisite: Engineering 104B may be taken concurrently. Introduction to methods used in the analysis and design of aircraft structures. Shells flow in open, closed, and multibody beam cross sections, buckling of flat and curved sheets, tension field beams, local buckling.

137. Structural Composites (4) I. Reifheld Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 105B. Introduction to the theory and design methodology for creating structures from fiber reinforced resin matrix composite material systems. Elementary design analysis and case studies employing computational applications.

138A. Aircraft Propulsion (4) II. Heiser Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 65, 103B, and 105B. Analysis and design of modern aircraft gas turbine engines to meet environmental requirements and to the detailed design of components. Provides a broad understanding of integrated design, and emphasizes the relationships of analytical tools, testing, and judgment.

196. 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


232. Advanced Aerodynamics-Viscous Flow (4) I. Van Dam Lecture—4 hours. Prerequisite: Engineering 103B. Discussion of boundary-layer theory, laminar and turbulent boundary layers, laminar-boundary-layer instability and transition, separation, viscous/inviscid interaction, three-dimensional flows and computational methods and their application. Offered in odd-numbered years.


262. Aerodynamics in Nature and Technology (4) I. White Lecture—4 hours. Prerequisite: Engineering 102B. Introduction to aerodynamics in nature, fundamentals of turbulence in atmospheric flows, planetary boundary layer, and motion on the earth, analysis of self-organized objects, pedestrian-level winds in urban areas. Criteria for laboratory modeling of atmospheric flows, wind-tunnel testing, extra-terrestrial aerodynamics. Offered in odd-numbered years.

272. Analysis and Design of Composite Structures (4) I. Hafetz Lecture—3 hours; discussion—1 hour. Prerequisite: course 127. Modeling and analysis methodology for composite structures. Graph theory and finite element methods. Laminated plate bending theory. Introduction to failure processes.

275. Advanced Topics in Aircraft Stability and Control (3) I. Hess Lecture—3 hours. Prerequisite: course 129 or Mechanical Engineering 134; and Mechanical Engineering 172. Analysis of aircraft modes of motion; response to control actuation; time and frequency domain descriptions; response to random inputs—turbulence description; autopilot and stability augmentation system design; vehicle/airflow analysis; handling qualities. Offered in even-numbered years.

280-G. Special Topics in Aerodynamics (4) I. III. Van Dam Lecture—4 hours. Prerequisite: consent of instructor. One of the following topics: (A) Unsteady Aerodynamics and Flutter Analysis; (B) Advanced Aerodynamics and Optimization; (C) Wind Tunnel Testing and Wall Interference; (D) Hypersonic Flow; (E) Rarefied Gas Dynamics; (F) Atmospheric Boundary Layers; (G) Nonlinear Stability Theory and Transition to Turbulence. Offered in odd-numbered years.

290C. Graduate Research Conference (1) I, II, III. The Staff (Brandt in charge) Discussion—3 hours. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress and techniques in mechanical engineering research. May be repeated for credit. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (S/U grading only.)

Professional Course

300. The Teaching of Aeronaautical Science and Engineering (1) I, II, III. The Staff (Brandt in charge) Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in-a designated engineering course. Methods of lecturing, discussion, group study, grading, and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated twice for credit. (S/U grading only.)


243. Kinetics of Phase Transformation in Engineering Materials (3) III. Muttonje Lecture—3 hours. Prerequisite: graduate standing in Engineering and consent of instructor. Engineering 130 recommended. Theory of crystal growth, kinetics of phase change, homogeneous and heterogeneous transformation, transformation by shear, order-disorder reactions. Offered in even-numbered years.

244. Interaction of Materials and their Environment (3) I. Muttonje Lecture—3 hours. Prerequisite: Engineering 45 and 105A, or consent of instructor. Thermodynamic and kinetic foundations of the corrosion and oxidation processes. Practical aspects of corrosion control and prevention. Stress-corrosion and gas-induced phenomenon. Special topics in corrosion; microbiological and atmospheric corrosion. Offered in even-numbered years.

245. Advanced Topics in Structure of Materials (4) III. Shackelford Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 132 and graduate standing in Engineering or consent of instructor. Engineering 130 recommended. Nature of microstructure in engineering materials will be explored. Crystalline and non-crystalline structures will be studied with special emphasis on grain size and the development of polycrystalline microstructure and the radial distribution function of amorphous materials. Offered in odd-numbered years.

247. Advanced Thermodynamics of Solids (3) I. Muttonje Lecture—3 hours. Prerequisite: Engineering 130 or the equivalent. Thermodynamics of gas-solid and solution; criteria for phase stability, thermodynamics of surfaces and interfaces; thermodynamics of defects in compounds, their influence on transport processes; thermodynamics of EMF cells and application to solid-state electrolytes. Offered in odd-numbered years.


249. Mechanisms of Fatigue (3) I. Gibling Lecture—3 hours. Prerequisite: Engineering 130 or consent of instructor; course 248 recommended. Microstructural description of mechanisms of fatigue in metals. Topics include a phenomenological treatment of cyclic deformation, dislocation processes in cyclic deformation, crack nucleation, stage I crack growth, threshold effects and high temperature cyclic deformation. Offered in even-numbered years.

250-A.250B-250C-250D-250E-250F. Special Topics in Polymer and Fiber Science (3) I. Zeronian Lecture—4 hours. Prerequisite: Engineering 147 or consent of instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. Same course as Textiles and Clothing 250A-250B-250C-250D-250E-250F.

290C. Graduate Research Conference (1) I, II, III. The Staff (Brandt in charge) Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress and techniques in materials science and engineering research. May be repeated twice for credit. (S/U grading only.)

294. Materials Science Seminar (1) I, II, III. The Staff (Brandt in charge) Lecture—1 hour. Prerequisite: graduate student in good standing. Review and discussion of current developments in materials science with presentations by individual students. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Brandt in charge) Prerequisite: consent of instructor. (S/U grading only.)

Professional Course

300. The Teaching of Materials Science (1-3) I, II, III. The Staff (Brandt in charge) Discussion—1 hour. Prerequisite: qualifications and acceptance as teaching assistant or associate-in-a designated engineering course. Methods of teaching, discussion group study, grading, and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated twice for credit. (S/U grading only.)

NOTE: For key to footnote symbols, see page 131.
English
(College of Letters and Science)
Robert H. Hopkins, Ph.D., Acting Chairperson of the Department
Department Office, 114 Sproul Hall (752-2257)

Faculty
William E. Baker, Ph.D., Professor
*Max Byrd, Ph.D., Professor
Everett Carter, Ph.D., Professor Emeritus
Christopher Craft, M.A., Acting Assistant Professor
*Peter A. Dale, Ph.D., Professor
*Elliott L. Gilbert, Ph.D., Professor
Thomas A. Hanzo, Ph.D., Professor Emeritus
Wayne Harsh, Ph.D., Professor
*(English, Linguistics) Emeritus
John O. Hayden, Ph.D., Professor
*Peter L. Hays, Ph.D., Professor
W. Jack Hicks, Ph.D., Associate Professor
Michael J. Hofman, Ph.D., Assistant Professor
Robert H. Hopkins, Ph.D., Professor
Michael P. Kramer, Ph.D., Assistant Professor
*Richard A. Levin, Ph.D., Associate Professor
Kari E. Lokked, Ph.D., Assistant Professor
*Arthur E. McGuinness, Ph.D., Professor
Sandra J. McPherson, B.A., Professor
Patricia L. Moran, Ph.D., Assistant Professor
Linda A. Morris, Ph.D., Assistant Professor
James J. Murphy, Ph.D., Professor
Marijane Oeborn, Ph.D., Associate Professor
David A. Robertson, Ph.D., Associate Professor
Winfried Schleiermacher, Ph.D., Professor
Gwendolyn Schwabe, M.A., Senior Lecturer
Kari J. Shapiro, Professor Emeritus
Daniel Silvis, Ph.D., Associate Professor
Gary A. Snyder, B.A., Professor
Margie K. Stange, M.A., Acting Assistant Professor
David Van Leer, Ph.D., Associate Professor
*Raymond J. Waddington, Ph.D., Professor
Brom Weber, Ph.D., Professor of American Literature Emeritus
Robert A. Wiggins, Ph.D., Professor
*Alan B. Williamson, Ph.D., Professor
James L. Woodress, Ph.D., Professor Emeritus
Celeste T. Wright, Ph.D., Professor Emeritus
Kari F. Zender, Ph.D., Associate Professor

The Major Program
The study of English develops skills in reading analytically and perceptively and in writing clearly and with effect; thus it is a preparation for careers in writing, teaching, and editing, or for any role in which clear communication is important. The program offers its majors several options. A student majoring in English may elect the general study of English and/or American literature or may choose to emphasize Teaching or Writing.

Faculty-student interaction is encouraged by participation in the English Club, which meets once a quarter, often in a faculty home. Qualified creative writing students may gain valuable experience for academic credit by helping to edit the Department's nationally known California Quarterly.

English

A.B. Degree Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>24</th>
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<tbody>
<tr>
<td>English 140</td>
<td>4</td>
</tr>
<tr>
<td>English 30A, 30B, 46A, 46B, 46C</td>
<td>20</td>
</tr>
</tbody>
</table>

Depth Subject Matter (for each emphasis, see below)

<table>
<thead>
<tr>
<th>Core requirement</th>
<th>28</th>
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<tbody>
<tr>
<td>A. Historical Periods</td>
<td>15</td>
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One course each in four of the following five areas:

1) British literature, beginnings to 1500: English 111, 150A
2) British literature, 1500-1600: English 114, 150B
3) British literature, 1600-1600 or American literature, 1600-1600: English 116, 127, 145, 155A
4) Nineteenth-century British or American literature: English 135, 137, 139, 146, 150D, 152, 155B, 155D, 160, 179, 181

B. Major Requirements

Two courses in different authors selected from English 111A, 113A, 117A, 117B, 127, 128, 131A, 131B, 144, 145, 153, 155C, 156A

C. Senior Seminar

One course selected from English 167, 168

The following courses—English 107, 110A, 110B, 115, 150, 152, 171A, 171B, 173, 175, 177, 181, 185, 187, 188, 189, 190, 195, and 196—are designed for students studying a major subject, one that may be fairly coherent in form (as with English 110A, 110B, 150, 152, 171A, 171B, 173, 175, 177, 180, 181, 185, 186) or one that may vary from time to time and be offered as English 107, 187, 188, 189, 190. These special subject courses may satisfy core requirements and emphasis core requirements; in order to ascertain the applicability of one of these courses to the major, you should consult an advisor.

General Major

Depth Subject Matter

Core requirements (see above)

One course from the following categories:

- English 105A, 105B, 105C, 105D, 107
- Twelve elective units in upper division English courses

Total units for the major: 68

Teaching Emphasis

Depth Subject Matter

Core requirement, same as for General major above

One course selected from English 178, 181, or an ethnic literature course from the English Department

Total units (Teaching Emphasis): 68

Writing Emphasis

Depth Subject Matter

Core requirement, same as for General major above

One course from the following categories:

- English 105A, 105B, 105C
- 105D, 107
- Twelve units: English 100F, 100P, and 100NP

Total units (Writing Emphasis): 68

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:

<table>
<thead>
<tr>
<th>English</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five upper-division courses, four of which will be literature courses</td>
<td>20</td>
</tr>
</tbody>
</table>

Campus Writing Center: The Campus Writing Center, an integral part of the English Department, is a program designed to provide writing instruction across the curriculum. Of special interest to students are its adjunct writing courses, which are offered to students who are simultaneously enrolled in specified courses in other disciplines. Topics of instruction and writing assignments in each adjunct course relate to the subject matter of the companion course. These are credit-bearing courses offered in conjunction with both lower- and upper-division courses in agriculture, engineering, and letters and sciences. Interested students and faculty should contact the Campus Writing Center, telephone 752-8224, for the current schedule of courses.

Subject A. Students must have passed the Subject A requirement before taking any course in English.

Prerequisites: English 1 or 3 is required for admission into courses 30A, 30B, 45, 46A, 46B, 46C, and all upper division courses. Course 45 is recommended as preparation for the 30 and 46 series. Students taking course 30A, 30B, 45, 46A, 46B, or 46C for General Education credit may substitute Comparative Literature 1, 2, or 3 for English 1 or 3.

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 advisor.

Honors and Honors Program: Refer to the Academic Information section and the College section for Dean's Honors List Information.

Teaching Credential Subject Representative: R. A. Wiggins. See also under 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 Advisor or the Chairperson of the Department.

Graduate Advisor: D.A. Robertson.

Courses in English

Lower Division Courses

A. Language Skills (2) I, II, III. The Staff (Morris in charge) Lecture—discussion—4 hours. Introductory course to help students gain writing proficiency required for successful University-level work. Focus on critical thinking, reading, and writing; on the fundamentals of essay writing; and on the relationship between writing mechanics and coherent thought. This course must be taken for letter grade. Minimum passing grade is a C; students receiving a C- or below must repeat course. Satisfies Subject A requirement. (Counts as 4 units toward minimum progress.)

R. Communications Skills Workshop (0) I, II, III. The Staff (Morris in charge) Lecture—4 hours; workshop—2 hours; reading laboratory—1 hour. Workshop in language skills for students from non-standard-English backgrounds who need to strengthen basic skills before taking English A. Course worth 6 units toward minimum study list requirement. (P/NP grading only.)

1. Expository Writing (4) I, II, III. The Staff (Morris in charge) Lecture—4 hours. Prerequisite: completion of Subject A requirement. Composition, the essay paragraph structure, diction, and related topics. Frequent writing assignments will be made. (CAN Eng 2)

2. Introduction to Literature (4) I, II, III. The Staff (Morris 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 assignments will be made.
Recommended GE preparation:
100F Creative Writing: Fiction (4) I, II, III, The Chairperson in charge
Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course SF or SP, or consent of instructor; priority given to English (Creative Writing) majors. Writing of fiction. May be repeated for credit with consent of instructor.
No final examination.
100HF Creative Writing: Non-Fiction (4) I, II
Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course SF or SP, or consent of instructor; priority given to English (Creative Writing) majors. Writing of non-fiction. May be repeated for credit with consent of instructor. No final examination.
120. Adjunct Writing (3) I, II, III. The Staff (Morris in charge)
Discussion—3 hours; prerequisite course 1 or 3; concurrent enrollment in a subject-matter discipline. Instruction in the elements of effective writing and emphasis on their application to writing projects in a specified academic discipline. May be repeated once for credit if taken in conjunction with some other course. No final examination.
120A-G Advanced Composition (4) I, II, III, The Staff (Morris in charge)
Discussion—3 hours; individual evaluations and conferences—1 hour. Prerequisite: course 1 or 3; courses 20 recommended. Instruction and practice in a variety of modes of composition. Frequent written assignments. One area receives more emphasis than others (or "strongly recommended"). Study areas are: (A) General; (B) Legal Writing; (C) Article Writing; (D) Report Writing; (E) Technical Writing; (F) Composition for Elementary and Secondary teachers. (G) Preparation for the bar. Prerequisite: GE preparation may be repeated once for credit in different area of emphasis.
104. Scientific Writing (1-3) I, II, III. The Staff (Morris in charge)
Discussion—2 hours; prerequisite: discussion—1 hour. Prerequisite: upper division enrollment in a science curriculum. Analysis and practice of scientific writing; research methods, organization, proper use of language and format, critical thinking. Lecture and workshop-discussions by English-scientists department. May be repeated for total of 4 units of credit. (P/NP grading only.)
105A. Language (4) I, II.
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. History of English language. Examination of the language as recorded from Old English to present-day English. Relationship of English to other languages; development of vocabulary, phonology, and grammatical patterns. Required of teaching credential candidates.
105C. Language Change Reflected in Literature (4) I, II.
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of literary texts from the various historical periods in the English language; attention also paid to other stylistic features, those characteristics particularly connected with development and change in the respective linguistic periods.
105D. Linguistics, Literature, and Composition (4) Lecture-discussion—3 hours; term paper. Prerequisite: courses 105A and 105B. Linguistic theories and methods in literary analysis and in composition. Course considers structural linguistics and transformational grammar exemplified in analysis, criticism, and content of biliticism and nonbilateralistic written material.
107. Special Topics in English Language (4) Seminar—3 hours; special project. Prerequisite: course 1 or 3. Investigation of varied subjects in contemporary and historical English languages and literatures. May be repeated for credit when a different topic is studied.
110A. Introduction to Principles of Criticism (4) I. Haydn Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Essentials of literary criticism and its history from Aristotle to the modern era, with emphasis on the major critics.
110B. Introduction to Principles of Criticism (4) I. Haydn Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. History of literary criticism in the modern era, with emphasis on the titles of the past and the special problems presented by modern literatures. Study of...
of the crucial periods of artistic development in western culture.

188. Special Topics in Literary Studies (4) I, II, III. The Staff (Chairperson in charge)

Seminar—3 hours; term paper. Prerequisite: junior or senior standing. Group study of a special topic drawn from English or American literature. Course will be offered in sections according to the instructor's schedule, and papers will be assigned. Limited enrollment. May be repeated for credit with consent of instructor.

189. Seminar in 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. One major writer will be studied in depth, with special attention to intellectual and literary milieu. Limited enrollment. May be repeated for credit with consent of instructor.

190. Internship in English (1-12) I, II, III. The Staff (Chairperson in charge)

Field work—3–300 hours. Prerequisite: course 1 or 3. Internships in fields where students can practice their skills. A maximum of 4 units is allowed toward the major in English. May be repeated for credit for a total of 12 units. (P/N grading only.)

197. Tutoring in English (1-4) I, II, III. The Staff (Chairperson in charge)

Tutoring—1–14 hours. Prerequisite: upper division standing and consent of Chairperson. Leading of small voluntary discussion groups in one of the department's regular courses. Does not fulfill requirement for major. May be repeated for credit for a total of 8 units. (P/N grading only.)

197C. Community Tutoring in English (1-4) I, II, III. The Staff (Chairperson in charge)

Tutoring—1–14 hours. Prerequisite: upper division standing and a major in English; consent of Chairperson. Field experience in peer tutoring. Enrollment in tutorial in instruction in English language, literature, and composition. Does not fulfill requirement for major. May be repeated for credit. (P/N grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: one course from courses 1, 2, 3, 5, SP, SF. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Graduate Courses

200. Techniques of Literary Scholarship (4) II. Hopkins (Chairperson in charge)

Discussion—3 hours; oral report; individual conferences. The language of Anglo-Saxon England; readings in Old English prose and poetry.

205. Beowulf (4) II. Osborn

Discussion—3 hours; oral and written report; conferences with students. Prerequisite: course 205 or the equivalent. A study of the poem and the Heroic Age of Germanic literature. Offered in even-numbered years.

207. Middle English (4) I. Osborn

Discussion—3 hours; term paper. Study of the phonology, morphology, syntax, and lexicon between 1100 and 1500 with special attention to the language of Chaucer, both the internal and external linguistic history; intensive reading of texts.

209. Present-Day English Linguistics (4)

Discussion—3 hours; term paper. Theory and methods of structural linguistics and transformational grammar as applied to the analysis of English. Emphasis will be on recent linguistic techniques and development, particularly as these relate to the teaching of language, literature, and composition.

210. Readings in English and American Literature (4) I. Levin; II. Zender

Discussion—3 hours. Prerequisite: upper division English

252. Victorian Literature (4) I. Davis

Seminar—3 hours; conference—1 hour. Studies in Victorian literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

254. Twentieth-Century British Literature (4) II. Hoffman

Seminar—3 hours; conference—1 hour. Studies in twentieth-century British literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

256. Early American Literature (4) I. Kramer

Seminar—3 hours; conference—1 hour. Studies in Early American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

258. American Literature: 1800 to the Civil War (4) I. Davis

Seminar—3 hours; conference—1 hour. Studies in American literature from 1800 to the Civil War. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

260. American Literature: Civil War to 1914 (4) II. Faber

Seminar—3 hours; conference—1 hour. Studies in American literature from the Civil War to 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

262. American Literature after 1914 (4) I. Sweet

Seminar—3 hours; conference—1 hour. Studies in American literature after 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

264. Studies in Modern British and American Literature (4) I. Williamson

Seminar—3 hours; conference—1 hour. Studies in modern British and American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

265. Literary Theory by Women (4) II. Stange

Seminar—3 hours; conference—1 hour. Studies in literature by and about women and the theoretical approaches to literature by and about women. May be repeated for credit when a different topic is studied.

269F. Seminar in Creative Writing of Fiction (4) I, II, III. The Staff (Chairperson in charge)

Seminar—3 hours; 1 additional hour of writing. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of prose. Evaluation of written material and individual student conferences. May be repeated for credit.

269N. Seminar in Creative Writing of Non-Fiction (4) I, II, III. The Staff (Chairperson in charge)

Seminar—3 hours; term paper. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in master's program in Creative Writing. A workshop in the writing of literary non-fiction, with emphasis, according to student interest, on autobiography, biography, memoir, the occasional or nature essay, or other non-fiction prose narratives.

270P. Seminar in Creative Writing of Poetry (4) I, II, III. The Staff (Chairperson in charge)

Seminar—3 hours; 1 additional hour of writing. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of poetry. Evaluation of written material and individual student conferences. May be repeated for credit.

276. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

(SU grading only.)

296C. Colloquium on Literary Scholarship (1-4) I, II, III. The Staff (Chairperson in charge)

Oral presentation and critique of research papers. (SU grading only.)

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 (1-3) I, II. Lecture-discussion—2 hours. Prerequisite: senior or graduate standing; an English teaching major or minor. This course should be completed before practice teaching. Course is
Materials of Teaching English as a Second Language (ESL) (4) II. Schwabe
Lecture 3.0; practice teaching—3 hours. Prerequisite: Linguistics 300. Design and development of classroom curricula and surveying/evaluating ESL materials combined with intensive work in the ESL Clinic. Guided practice in teaching English pronunciation, grammar, and sentence structure, listening comprehension and composition, discussion, and reading to foreign students.

Recent Research and Problems in ESL (4) III. Schwabe
Lecture—1 hour; practice teaching—2, 4, or 6 hours. Prerequisite: course 302. Analysis of a particular problem in teaching English as a second language (ESL) and testing possible solutions. Course work will include a review of literature in this area as well as presentation of a project addressing problems/solution.

Teaching English at the College Level (4) I, II.
Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing. Consideration of the problems and techniques of teaching composition and literature at the college level. (SU grading only.)

Oral English for ESL Students (3) II, III. The Staff
(Schwabe in charge)
Lecture—2 hours; laboratory—2 hours. Prerequisite: open only to non-native English-speaking students with prior enrollment to foreign student teaching assistants; completion of any combination of courses in the lower division. Intensive work in oral English to increase fluency and accuracy plus use of appropriate discourse strategies in academic settings (i.e., discussion, laboratory). (SU grading only.)

Teaching Internship in English (4) I, II, III. (Coordinator of Writing Programs in charge)
Supervised internships—4 hours. Prerequisite: graduate standing. In-class instruction with English Department faculty member. (SU grading only.)

Problems in Teaching College Composition (2) I, II, III. The Staff (Chairperson in charge)
Discussion—2 hours. Prerequisite: open to graduate students teaching composition in a variety of University courses including English A 1, 3, 5, 20, 102, and 103. Designed for the relatively experienced student teacher who would profit from developing skills in specific areas. (SU grading only.)

Editing "California Quarterly" (2) I, II, III. McPherson, Gilbert
Seminar—2 hours; conference—1 hour. Prerequisite: participation in Creative Writing Program. Students will read all manuscripts submitted to California Quarterly and attend weekly editorial board meetings, choosing manuscripts for publication. They will also participate in copy-editing, copy-reading, layout, and other aspects of journal production. May be repeated for a total of 6 units. (SU grading only.)

Entomology
(College of Agricultural and Environmental Sciences)
Jeffrey Granett, Ph.D., Chairperson of the Department
Department Office, 367 Briggs Hall (752-0475)

Faculty
Oscar G. Bacon, Ph.D., Professor Emeritus
Richard M. Bohart, Ph.D., Professor Emeritus
James R. Carey, Ph.D., Associate Professor
Hugh Dingle, Ph.D., Professor
Sean S. Dusky, Ph.D., Professor
Lester E. Ehler, Ph.D., Professor
Norman E. Gary, Ph.D., Professor
Jeffrey Granett, Ph.D., Professor
Albert A. Grigatnick, Jr., Ph.D., Professor
Bruce D. Hambrock, Ph.D., Professor
(Entomology, Environmental Toxicology)
Charles L. Judson, Jr., Ph.D., Professor
Richard Kaban, Ph.D., Associate Professor
Harry K. Kaya, Ph.D., Professor
Harry H. Ladlaw, Jr., Ph.D., Professor Emeritus
W. W. (Shane) Lange, Jr., Ph.D., Professor Emeritus
Thomas F. Leigh, Ph.D., Lecturer
G. A. H. McClelland, Ph.D., Professor
Donald L. McLean, Ph.D., Professor Emeritus
Susumu Maeda, Ph.D., Assistant Professor
Michael P. Parmelee, Ph.D., Associate Professor
Christine Y. S. Peng, Ph.D., Associate Professor Timothy Prout, Ph.D., Professor Emeritus
(Entomology, Genetics)
Richard E. Riese, Ph.D., Lecturer
Francis M. Summerson, Ph.D., Associate Professor
Robbin W. Thorp, Ph.D., Professor
Philip S. Ward, Ph.D., Associate Professor
Robert W. Washington, Jr., Professor
Loyd T. Williams, Ph.D., Professor
Frank G. Zalom, Ph.D., Lecturer

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: biosystematics, management of pest insects with natural enemies and chemicals, and management of keybees for pollination of agricultural crops and honey production, nematology and transmission of plant and animal pathogens. Employment opportunities are available in managerial and technical positions with state and federal agencies and agricultural production or chemical companies, some entomology graduates prepare to teach entomology and other biological sciences in high schools. Other graduates matriculate in graduate programs leading to a higher degree.

Entomology
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 and may be critical for the attainment of some career goals. Courses shown without parentheses are required.)

Preparatory Subject Matter

72-75
Chemistry (Chemistry 1A, 1B, 8A, 8B)
Mathematics 16A, 16B, 16C
Statistics
Computer science (Math 160, or additional subject)
Physics (Physics 1A, 1B)
Biology (Biology Sciences 1)
Botany (Botany 2)

Zoology (Zoology 2, 2L)
Upper-division course in Microbiology and Immunology (Microbiology 102, Botany 114, 119, PLW 120, Veterinary Microbiology and Immunology 120, 125, 126)
Genetics (Genetics 100)
Ecology (Ecology 101, 102, 103, 104, 110)

Evolution (Zoology 140)
Physiological chemistry (Physiological Sciences 101A, 101B)

Upper-division electives in courses science (qualitative of entomology), and related to student's interests

Depth Subject Matter

42-48
General entomology, Entomology 100, 101
Structure and function, Entomology 101, 102
Systematics, Entomology 103
Ecology, Entomology 104
Entomology 109, or Entomology 105, 106 or Entomology 107

Applied entomology, one course from Entomology 110, 115A, 115B, 153

Upper-division electives in entomology

Breadth Subject Matter

39-41
English (see College requirement)
Rhetoric (Rhetoric Science 101, 102)
Economics
Philosophy

At least one course from the following categories:

Anthropology, political science, psychology
Art or music
Electives in social sciences and humanities

At least one course chosen from agrarian studies, geography, or geology

Unrestricted Electives

Total Units for the Major

Major Adviser: C.Y.S. Peng

Minor Program Requirements:
The Department of Entomology has seven minor programs open to students in other disciplines who are interested in rounding out their academic study with a concentration in the area of entomology.

Entomology

Units

Entomology 100, 100L

5

At least two courses from Entomology 103, 104, 106

7-8

At least two additional upper division

Entomology courses (except courses 102, 198, 199)

6

Agricultural Entomology

Units

Entomology 100, 100L, 110, 115A, 115B

17

Entomology 118 or 120

10

Agricultural Entomology

Units

Entomology 100, 100L, 119, 119L

10

Entomology 104 or 110

4

Additional courses recommended: Agronomy 120, Botany 102, Pomology 102

Units

Insect Ecology

20

Entomology 100, 100L, 104, 105

7

Zoology 149 or Environmental Studies 121

4

Medical Veterinary Entomology

Entomology 100, 100L, 104, 153, 156

16

At least two courses from Entomology 155, 156, Veterinary Microbiology 126, 126L, 126L, 132

2

Nematology

18-20

Nematology 100, 100L and/or Veterinary Microbiology 132

10-15

Two or three courses from one of the following areas

5-8

(a) Plant Science: Microbiology 101, Botany 120, 121, Entomology 100, 115A, 115B, 153, 156, 158, Soil Science 111, 112, 113, 142.

(b) Entomology: Microbiology 101, Botany 120, 121, one upper division Entomology course, Soil Science 100, 111, Zoology 112, 142.

Minor Adviser: C.Y.S. Peng

Graduate Study: The Department of Entomology offers a program of study and research leading to the M.S. and Ph.D. degrees. See the Graduate Division Section and the Graduate Announcement for further details.

Graduate Advisers. See Class Schedule and Room Directory.

Related Courses: See courses in Nematology.

Courses in Entomology

Lower Division Courses

10. Natural History of Insects (3) II. Dingle, Kay
Lecture—3 hours. Designed for students not specializing in entomology. Not open for credit to students who have had course 100 but students who have taken this course may take course 100 for credit. An introduction to the insects detailing their great variety, structures and functions, habits, and their significance in relation to plants and animals including man.

99. Special Study for Undergraduates (1-5) I, II, If, The Staff (Chairperson in charge)
(PNP grading only)

Upper Division Courses

180. General Entomology (3) I. Granett in charge
Lecture—3 hours. Prerequisite: Biological Sciences 1, Bi-
120. Crop Resistance to Arthropod Pests (2) Il. Leigh Lecture—two hours; three field trips (optional). Prerequisite: course 110 and upper division standing; additional ento-

genetics, general plant pathology or permission of instructor. Introduction to plant resistance as a component of pest management; methods used to identify mechanisms of plant resistance to pests; principles of living in harmony with pests.

15. Management of Medically Important Arthropods (3) Il. Washino Lecture—two hours; laboratory—three hours. Prerequisite: course 100. Lectures and laboratory sessions to consider the practical aspects of arthropod vector control within the framework of a human and domestic animal disease management program. Offered in odd-numbered years.

166. Biology of Parasitism (3) Il. Washino in charge; Thiel (Medical Microbiology), Magrini (Nematology) Lecture—three hours. Prerequisite: Biological Sciences 1 or consent of instructor. Lectures on the biological and ecological aspects of parasitism and host-parasite relationships using selected examples from protozoan and metazoan fauna.

156. Biology of Parasitism Laboratory (1) Il. Washino in charge; Thiel (Medical Microbiology), Magrini (Nematology) Laboratory—three hours. Prerequisite: Biological Sciences 1 or consent of instructor. Laboratory demonstrations using selected examples of protozoan and metazoan organisms among which various parasites used in parasitology classes are examined to illustrate basic theory as in biological control and related approaches.

25. Seminar in Agricultural Entomology (2) I, II. Garlick, Granett, Leigh, Washino Seminar—two hours. Prerequisite: course 110. Discussion of advanced topics relating to the principles of pest insect population management.

26. Seminar in Bee Biology (2) I, II. Thorp, Garlick, Payne Seminar—two hours. Prerequisite: course 100 or the equivalent. Discussions of behavior, ecology, management, and general biology of bees (Apodiformes) with emphasis on the honeybee.

27. Seminar in Insect Behavior (2) I, II. Garlick, Payne Seminar—two hours. Prerequisite: course 121. Review and critical analysis of contemporary advances in insect behavior, physiology, developmental biology, and neurobehavioral studies. Emphasis on ecological and evolutionary aspects of insect behavior and neural correlates.

28. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Group study—1, 2, 3, or 4 units. Prerequisite: consent of instructor. (P/NP grading only.)

29. Research (1-12) I, II, III. The Staff (Chairperson in charge) Research—1, 2, 3, or 4 units. Prerequisite: course 121. Research is described in the External Study Programs section. (S/U grading only.)

Professional Courses

30. Design of Scientific Investigations (1) Granett, Dent Lecture—discussion—2 hours every other week. Prerequisite: graduate standing or permission of instructor. (1) 1- to 10-hour talks at scientific meetings, (2) research seminars, (3) class sessions, and (4) impromptu talks.

31. Grantsmanship (2) I, Granett, Dent Lecture—1 hour—15-page research proposal required. Prerequisite: graduate standing; research experience. (1-De-
Environmental Horticulture

(College of Agricultural and Environmental Sciences)

Roy M. Sachs, Ph.D., Chairperson of the Department

Department Office, 140 Environmental Horticulture Building (752-0130)

Faculty

Alison M. Berry, Ph.D., Assistant Professor
David W. Burger, Ph.D., Assistant Professor
Thomas G. Byrne, M.S., Lecturer
Don J. Durzan, Ph.D., Professor
Richard Y. Evans, Ph.D., Lecturer
Seymour M. Golgi, Ph.D., Professor
James A. Harding, Ph.D., Professor
Richard W. Harris, Ph.D., Professor Emeritus
Charles E. Hess, Ph.D., Professor
Anton M. Kofarek, Ph.D., Professor Emeritus
Harry C. Kohl, Jr., Ph.D., Professor Emeritus
Andrew T. Leiser, Ph.D., Professor
J. Heinrich Lieth, Ph.D., Assistant Professor
James D. MacDonald, Ph.D., Associate Professor (Plant Pathology)
John H. Madison, Jr., Ph.D., Professor Emeritus
Jack L. Paul, Ph.D., Professor
Michael S. Reid, Ph.D., Professor
Robert M. Satchell, Ph.D., Professor
Lin L. Wu, Ph.D., Associate Professor

Related Undergraduate Programs and Graduate Study. See the undergraduate majors in Environmental Planning and Management, and Plant Science; and for graduate study, the Graduate Division section.

Related Courses. See Plant Science.

Courses in Environmental Horticulture

Lower Division Courses

6. Introduction to Environmental Plants (3) III, summer. Harding. Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: consent of instructor. Classification, nomenclature, and identification of common trees, shrubs, ground cover plants, turfgrass, bedding plants, and house plants. Characteristics of important plant families. Designed for majors and non-majors.


19. Internship (1-12) II, III. The Staff (Department Chairperson in charge). Laboratory—3-36 hours. Prerequisite: lower division standing, Botany 2 or Plant Science 10 or 2, and consent of instructor. Work experience off and on campus in flower and nursery crop production, and marketing; landscape horticulture; 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 (Sacs in charge). [P/NP grading only.]

Upper Division Courses

105. Taxonomy and Ecology of Environmental Plants (4) I. Leiser. Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 6 or one course in taxonomy. Taxonomy of the important plants used in the western landscape. Emphasis will be placed on the identification, nomenclature, characteristics and uses of woody plants in man's environment.

107. Herbaceous Environmental Plants (4) III. Harding. Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 6 or in plant taxonomy (Botany 108). Examination of the characteristics, distribution, uses, and cultural practices of herbaceous plants and annuals. [P/NP grading only.]

NOTE: For key to footnote symbols, see page 131.

Environmental Design

(College of Agricultural and Environmental Sciences)

Victoria Z. Rivas, M.A.C.T., S.C.T., Chairperson of the Department

Department Office, 144 Walker Hall (752-6223)

Faculty

Richard Berteaux, B.Arch., M.G., Associate Professor
Frances Butler, M.A., Professor
Kerry J. Dawson, M.L.A., Associate Professor
Mark Francis, M.L.A., Professor
Dolph Geitell, M.A., Associate Professor
Patricia Harrison, M.Arch., Assistant Professor
Gyulgy Lakay, M.A., Professor
Gregory Lynn, M.A., Lecturer
E. Byrn McCulley, B.S.L.A., Adjunct Associate Professor
Edward S. Michiel, M.L.A., Assistant Professor
Helge B. Olsen, Senior Lecturer, S.O.E.
Susan Palmer, M.A., Lecturer
Victoria Z. Rivas, M.A.C.T., S.C.T., Professor
Valentine G., M.L.A., Lecturer
Katherine W. Rossbach, M.A., Professor
Emeritus

Barbara Shawcroft, M.F.A., Professor
JoAnn C. Stabn, M.A., Senior Lecturer, S.O.E.
Robert L. Thayer, Jr., M.A., Professor

Related Courses. See Design and Landscape Architecture course lists.

Environmental and Resource Sciences

See Atmospheric Science; Range and Wildlands Science; Resource Sciences; Soil Science; Water Science; and Wildlife and Fisheries Biology.
cultural practices using visual symptoms and circumstances for determining probable cause and laboratory methods for confirmation. Offered in odd-numbered years.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge).
Seminar—1 hour. Discussion by Departmental faculty of design, philosophy and interpretation of ongoing specific research areas which include plant morphology, floriculture, greenhouse production and modeling, landscape plant ecology, arboretic and turf culture, post harvest, plant breeding, etc. (SU grading only.)

Discussion—1 hour. Prerequisite: students in a plant science graduate program. Research conference conducted by Departmental faculty to discuss design, philosophy and interpretation of ongoing specific research areas which includes plant morphology, floriculture, greenhouse production, landscape plant ecology, arboretic and turf culture, post harvest, and plant breeding relative to environmental horticulture. (SU grading only.)

297T. Tutoring in Environmental Horticulture (1-4) I, II, III. The Staff (Chairperson in charge).
Tutoring—4 to 8 hours; discussion—1 hour. Prerequisite: graduate student standing; completion of course to be tutored (or the equivalent) and consent of instructor. Leading discussion sessions, conducting laboratory exercises and lecturing in Environmental Horticulture classes under faculty guidance. Weekly conference on subject matter and instructional techniques. May be repeated for credit by tutoring in different courses.

298. Group Study (1-5) I, II, III. (Chairperson in charge).
Prerequisite: graduate standing. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge).
Prerequisite: graduate standing. (SU grading only.)

Environmental Planning and Management

(College of Agricultural and Environmental Sciences)

Faculty

See under the Division of Environmental Studies.

The Major Program

The Environmental Planning and Management major emphasizes a fundamental program of education in the natural sciences, especially ecology, together with courses in management and public policy analysis courses. Students completing the program will understand the scientific basis for environmental decision making, and the legal, economic, and political issues involved in management of the environment in the United States and worldwide. The curriculum draws on a wide variety of scientific disciplines for its theoretical basis and analytical skills. Chemistry, physics, mathematics, biology, and earth sciences are studied and tied together by courses in ecology. Computing, statistics, and other methods courses give the student basic quantitative research skills. Economic, political science, and techniques of quantitative management formulations dominate the management and public policy requirements. The major prepares students to enter careers in management of natural resources, agriculture, forestry, and public lands, as well as basic ecological research.

A moderate degree of specialization is permitted in two upper division options. Students in the Environmental Biology option take course work in population ecology, physiology, and other biological specialties, as well as quantitative analysis. These courses prepare them for graduate or professional training and, eventually, careers working for public agencies and governments specializing in environmental quality, natural resources, or ecological research. Students interested in professional schools, e.g., medicine, should consult an adviser early to plan for their special requirements, e.g., organic chemistry. Students in the Environmental Management option take courses in recreation, resource economics, planning and public policy, and, especially, quantitative management techniques. The option emphasizes the management of public lands and natural resources and rural and urban areas. Students are prepared for jobs primarily in public agencies at the federal, state, or local levels. Practical courses in field level planning and management are featured. Students interested in urban problems and/or legislative options should examine the Environmental Policy Analysis course and Planning major.

Environmental Planning and Management

B.S. Major Requirements:

(The usual courses taken to satisfy requirements are shown parenthetically. Equal or more comprehensive courses may be taken with the adviser's written approval. Courses shown without parentheses are required.) Students will be required to plan their course selection with their adviser.

Preparatory Subject Matter: 46-51
Chemistry, Chemistry 1A-1B or 4A-4B 10
Physics, Physics 6A-6B or 8A-8B 8
Environmental Studies, Environmental biology 3
Ecology, Biology 11-12 5
Biology, Biological Sciences 1 5
Mathematics, Mathematics 21A-B 6-8
Environmental/Public Policy Analysis: Environmental Studies 1, Political Science 1, or Economics 1A 5
(Choose Economics 1A if the Environmental Management option is selected.)
Ecology of biosphere, Environmental Sciences 30 3
Computer, Computer Sciences 21A 3
Management, Management 21, Computer Science Engineering 10, or Engineering 5 3

Depth Subject Matter: 28-33
These units must be taken for a letter grade at a minimum overall grade-point average of 2.0 or higher.
Ecology, Environmental Studies 100 4
Survey of environmental science, Environmental Studies 110 4
Environmental sciences (Soil Science 100, 118, Resources Science 131, Atmospheric Science 120, Environmental Studies 150A, Geology 134, 153, 154, 175, Water Sciences 130, 141) 4-8
Environmental Policy Making/Resource Economics, Environmental Studies 160, 161, or 165 8
Agricultural Economics 147, 178; or Economics 123 3-4
(Choose one course: the Environmental Management option is selected.)
Management, Public Lands, Environmental Studies 172 4
Statistics, Statistics 102 or Agricultural Sciences 202 3
Research methods (Environntmental Studies 123, 128, 178, Mathematics 22A, upper division computing, mathematics, or statistics) 5-5
(Students may substitute Biologival Sciences 115, 15 units, or Environmental Studies 124, 10 units.)

Unrestricted Electives: 32-57

Breadth Subject Matter: 22-24
English and their literatures and Communication or Dramatic Art 10; see also College requirement
English composition, English 102 (continuing with Environmental Studies 1, 103A, 103E, or 1024, 104) 3-4
Humanities 12

Areas of Specialization: 31-44

Environmental Biology Option
Population and community biology (Environmental Studies 121, Zoology 149, Wildlife and Fisheries Biology 122) 4
Behavioral ecology (Environmental Studies 125) 4
Evolution (Genetics 103, Zoology 107, Zoology 146) 3-4

Quantitative analysis (Mathematics 22A-22B, upper division mathematics or statistics) 6-8
Taxonomy, including laboratory experience (Biology 102, 108, 112, 119, 113; Entomology 103, Wildlife and Fisheries Biology 110, 111, 111L, 120, Zoology 112-112L, 133, 133L) 6-8
Physical science, including natural history, field and rural areas (Environmental Studies 129, 129L) 4-7
Biological systems, two courses from one of the following two groups. (Environntmental Studies 129, 129L)
Terrestrial ecology: Wildlife and Fisheries Biology 100, 130, Animal Sciences 100, Botany 101, 102, 117, 141, Geography 173.

Environmental Management Option
Recreation, Environmental Planning and Management 127, Environmental Studies 162 4
Microeconomics, Economics 106 5
Policy evaluation, Environmental Studies 168A 4
Bureaucratic Policy Making, Environmental Studies 160, 166, or Political Science 162 4
Quantitative Resource Management, Agricultural Economics 155, 157, or Environmental Studies 168B 4
Environmental Management, Environmental Planning and Management 171 or 179 3-4
Engineering Planning, Civil Engineering 159, 160, or 175 3-4
Statistical Analysis, Sociology 106, Statistics 108, or Agricultural Economics 106 4
Management of a natural resource, two courses from one of the following three groups. 5-8
Animal Resources: Range Sciences 135, or Wildlife and Fisheries Biology 119, 121, 151, or Resource Science 101, or Environmental Studies 123.
Forest and Range Land/Resource: Resource Science 2 or Range Science 133, 134, 145

Total Units for the Major: 32-57

Major Adviser: T. M. Powell (Environmental Studies)

Minor Program Requirements:

The faculty for Environmental Planning and Management offers a minor in Recreation for students in Landscape Architecture. This minor will emphasize recreation area design, Physical Education, Psychology, Sociology, Human Development, and Applied Behavioral Sciences wishing to work in educational and therapeutic recreation; Environmental Policy Analysis and Planning seeking careers in public recreation policy analysis and management; Agricultural and Managerial Economics wishing to go into the administration of commercial recreation enterprises; and those in Plant Science interested in park landscape construction and maintenance.

UNITS

Leisure behavior, Environmental Planning and Management 118 or 121 4
(Course is not suitable to Environmental Planning and Management 102 or 134; Course is not suitable to Environmental Planning and Management 102 or 134; Course is not suitable to Environmental Planning and Management 102 or 134; Course is not suitable to Environmental Planning and Management 102 or 134; Course is not suitable to Environmental Planning and Management 102 or 134; Course is not suitable to Environmental Planning and Management 102 or 134; Course is not suitable to Environmental Planning and Management 102 or 134)
Environmental Policy Analysis and Planning 223

Course 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, 2132 Wickson Hall.

Lower Division Courses

98. Directed Study Group (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. For transfers and upper division courses.

99. Special Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. For transfers and upper division courses.

Upper Division Courses

116. Natural and Regional Planning (4) II. Gold (Environmental Horticulture)
Lecture—3 hours; discussion—1 hour; one Saturday field trip.
Prerequisite: course 110. Examination of the social and environmental impacts of urbanization and the role of urban planning. Analysis of the effects of urbanization on the natural environment and the development of sustainable planning strategies. 4 hours.

117. Urban Geography (4) II. Gold
Lecture—3 hours; discussion—2 hours; laboratory—1 hour.
Prerequisite: course 110. Application of geographic principles to the analysis of urban phenomena, including land use patterns, transportation networks, and urban systems. 4 hours.

120. Advanced Study in Environmental Planning (4) II. Gold
Lecture—3 hours; discussion—2 hours; laboratory—1 hour.
Prerequisite: course 110. Advanced study in environmental planning, focusing on specific issues such as environmental policy, sustainability, and urban development. 4 hours.

Environmental Policy Analysis and Planning

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 a variety of fields related to environmental quality. This major is designed to provide students with a broad background in the natural sciences and related fields. It is also appropriate for students interested in careers in government, non-profit organizations, or private industry. The program requires a minimum of 18 units at the upper division level and completion of a comprehensive examination. 8 units.

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 advisor. Courses shown without parentheses are required.)

Biological Sciences (5 units)
- Environmental sciences (5 units)
- Hydrology (5 units)
- Geology (5 units)
- Soil science (5 units)
- Aquatic systems (5 units)
- Meteorology and air pollution (5 units)
- Science policy (Environmental Studies 65B) (5 units)
- Recreation policy (Environmental Studies 127) (5 units)

Chemistry (4 units)
- General chemistry (4 units)
- Organic chemistry (4 units)
- Analytical chemistry (4 units)
- Physical chemistry (4 units)

Physics (4 units)
- Mechanics (4 units)
- Electricity and magnetism (4 units)
- Quantum mechanics (4 units)

Mathematics (4 units)
- Calculus (4 units)
- Linear algebra (4 units)
- Differential equations (4 units)

Economics (4 units)
- Microeconomics (4 units)
- Macroeconomics (4 units)
- Environmental economics (4 units)

Geography (4 units)
- Urban geography (4 units)
- Environmental geography (4 units)
- Physical geography (4 units)

Environmental studies (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Geological sciences (4 units)
- Structural geology (4 units)
- Economic geology (4 units)
- Geophysical methods (4 units)
- Geomorphology (4 units)

Geography (4 units)
- Human geography (4 units)
- Cultural geography (4 units)
- Environmental geography (4 units)
- Urban geography (4 units)

Natural resources (4 units)
- Forest management (4 units)
- Wildlife management (4 units)
- Aquatic resources (4 units)
- Environmental impact assessment (4 units)

Environmental studies (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Policy (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Law (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Ethics (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Science (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Economics (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Planning (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Policy Planning (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Law Planning (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Ethics Planning (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Science Planning (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Economics Planning (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Planning Planning (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Law Planning (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Ethics Planning (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)

Introduction to Environmental Science Planning (4 units)
- Environmental policy (Environmental Studies 127) (4 units)
- Environmental law (Environmental Studies 127) (4 units)
- Environmental ethics (Environmental Studies 127) (4 units)
- Environmental science (Environmental Studies 127) (4 units)
Environmental Studies

Courses in Environmental Studies

Lower Division Courses

1. Environmental Analysis (4) I. The Staff
   Lecture—3 hours; discussion—1 hour. Prerequisite: English 1, English 102, Economics 1A, 1B, Biological Sciences 1, and Political Science 1 recommended. Analysis of the biological, physical, and social interactions which constitute environmental problems, such as land use, pollution, climate change, development and conservation, pollution, and the conservation of natural environments. Emphasis on analysis of problems and the consequences of proposed solutions.

2. Introduction to Environmental Studies (4) I. The Staff
   Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology recommended. Survey of the importance of ecological and systems behavior for man-environment relationships and management problems. Resources, environmental quality, urban dynamics, environmental perception, and the conservation and restoration of natural systems. Case studies, and features individual reading in environmental problems. Not open for credit to those who have had course 1. General Education credit: Contemporary Societies/Introductory.

3. The Global Ecosystem (3) II, III, Richerson
   Lecture—3 hours. Prerequisite: Biological Sciences 1 or Geography 1 or consent of instructor. Focuses upon how the interaction of climate and biotic adaptation produces ecological systems. It will then examine the limits and opportunities for human use of these different natural environments, as well as more general questions of human utilization for the earth’s biotic resources. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10.

4. Internship (1-12) II, III. The Staff (Department Chairperson in charge)
   Laboratory—3-56 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences, internship supervised by member of the faculty. (P/NP grading only).

5. Directed Group Study (1-6) II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only)

Upper Division Courses

100. General Ecology (4) I. Quinn
   Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology (including botanical and zoological elements); elementary calculus. Ecological principles of biological systems, emphasizing populations and ecosystems. Principles of growth, regulation, distribution, structure, energetics, and mineral cycles related to the evolution of biological systems and applications to selected human ecological problems.

101. Human Ecology (4) II. Richerson
   Lecture—3 hours; discussion—1 hour. Prerequisite: one course from course 30, Anthropology 1, 2, Genetics 10, or the equivalent. Critical variables in the processes that relate humans and their environment. Emphasis on the biological, cultural, social, and psychological forces which encourage stability or change in human-environmental relationships. (Same course as Anthropology 101.) General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Environmental Studies 1, 30, Anthropology 1, 2, Biological Sciences 10, Geography 2, or Sociology 2.

(a) Environmental Science

110. Principles of Environmental Science (4) I. The Staff
   Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 1A or 6A, Mathematics 1B or 21B, and Biological Sciences 1. Application of physical and chemical principles, ecological concepts, and systems approach to policy analysis of atmospheric environments, freshwater and marine environments, land use, energy supplies and technology, and other resources.

114A-114B. Integrative Environmental Systems Analysis (5-5)
   Lecture—3 hours; discussion—1 hour; individual or group project—1 hour. Prerequisite: Biological Sciences 1 or Economics 1B; sophomore standing. Exploration of environmental problems in terms of scientific principles and systems theory, and provides training in computer modelling of systems performance. (Same course as Zoology 114A-114B.)

115. Bioenvironmental Consequences of Nuclear Technology (3) III. M. Goldman
   Lecture—3 hours; field trip to nuclear power station. Prerequisite: a course in biology. Biophysical implications of

NOTE: For key to footnote symbols, see page 131.
116. The Oceans (3) II. Powell Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. Introductory survey of the marine environment; oceanic physical phenomena, chemical constitution of the ocean's bio-, and utilization of marine resources. (Same course as Geology 116.) General Education credit with concurrent enrollment in course 116G. Natural Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10, Chemistry 10, or Geology 1.


(b) Ecological Analysis

121. Population Ecology (4) II. Hastings Lecture—3 hours; discussion—1 hour. Prerequisite: Botany 2, Zoology 2-22, Mathematics 16A-16B. Development of exponential and logistic growth models for plant and animal populations. Emphasizes critical factors of population structure and genetic composition of competition and predator-prey systems. Emphasis is on developing models and using them to make predictions and solve problems. Offered in odd-numbered years.

122. Introduction to Field and Laboratory Methods in Ecology (4) III. Hamilton Lecture—2 hours; laboratory—6 hours: two weekend field trips (Summer Session). Prerequisite: course 120 (major concurrently), or the equivalent. Prerequisites include knowledge of methods used for collecting ecological data in field and laboratory. Emphasis on discipline and community ecologists are included and emphasized will be placed on experimental design, statistical writing and data analysis.

124. Marine and Coastal Field Ecology (10) Extra-session summer. Chow Lecture—6 hours; discussion—4 hours; seminar—1 hour, and laboratory—18 hours (Summer Session). Prerequisite: Biological Sciences 1; Statistics 13; course 100. Full-time study at Bodega Marine Laboratory. Intensive lecture-laboratory-field study of current ecological theory and problems with emphasis on marine populations and communities; techniques and evaluation of quantitative field research.

125. Social Systems of Animals and Humans (4) III. Hamilton Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in statistics and upper division standing. Methods and contemporary issues in environmental and occupational epidemiology. Effects of carcinogens, reproductive hazards, lifestyle factors, air and water pollution, infectious agents, and other hazards on human populations. Discussion of epidemiologic study designs, biases, and risk assessment.

127. Contemporary Problems in Environmental Health (3) III. The Staff Lecture—2 hours; discussion—1 hour. Prerequisite: Environmental Science 1. Discussion of modern problems and issues in environmentally dependent aspects of health. Diseases and injuries from environmental cancer, contaminants, biological, physical, noise, radiation, consumer products, stress phenomena, and heavy metals are considered.

128. Analysis and Simulation of Complex Systems (3) III. Poit Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 150 or 151A, Statistics 102, and upper division standing in the biological or social sciences. Analysis of systems and construction of several models of ecological systems using DYNAMO; evaluation of models. Logical and scientific reasoning is stressed.

128L. Laboratory in Modeling Complex Systems (2) I. Poit Laboratory—12 hours. Prerequisite: course 128. Laboratory in model building. Students use material from course 128 to complete a number of exercises and small term projects. Simulation is in DYNAMO.

128R. Laboratory in Modelling Complex Systems (2) I. Poit Lecture—12 hours. Prerequisite: course 128. Laboratory in model building. Students use material from course 128 to complete a number of exercises and small term projects. Simulation is in DYNAMO.

129. Physiological Ecology (4) I. Patterson Lecture—3 hours. Prerequisite: Chemistry 10, Physiology 10, and Geology 1 or Zoology 1 or Botany 1 or Zoology 2. Comparative and evolutionary study of the physiological responses and adaptations of various groups of animals. Body temperature, metabolism, size and metabolism, gas and nutrient exchange, thermo-regulation, biomechanics, locomotion, and selected topics in current research.

129L. Physiological Ecology Laboratory (3) I. Patterson Laboratory—6 hours. Prerequisite: course 129 may be taken concurrently or the equivalent. Methods for monitoring physiological and psychological responses to different environments and animal responses to them. Water balance, respiration and thermoregulation are demonstrated and a broadly comparative approach is considered. Enrollment limited to eight students.

(c) Cultural Ecology

132. Cultural Ecology (4) III. Orlove Lecture—3 hours; discussion—1 hour. Comparative survey of the interaction between diverse human cultural systems and the environment. Primary emphasis given to people in rural and relatively undeveloped environments as a basis for interpreting more complex environments. (Same course as Anthropology 132.) General Education credit. Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2.

(d) Aquatic Ecosystems Analysis

150A. Physical and Chemical Oceanography (4) III. Powell Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies/Geology 116, Physics 8C, Mathematics 250, and Chemistry 114. 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. Offered in odd-numbered years. (Same course as Geology 150A.) Offered in odd-numbered years.

150B. Geological Oceanography (5) III. McClain (Geology) Lecture—3 hours. Prerequisite: Geology 50 or 116. Introduction to the origin and geologic evolution of ocean basins. Composition and structure of ocean crust; marine volcanism; formation and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (Same course as Geology 150B.)

150C. Biological Oceanography (8) III. I. Goldman Lecture—3 hours. Prerequisite: Biological Sciences 1 and a course in general ecology, or consent of instructor. Survey of the ecology and biogeography of the marine 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 of and impact on the ocean. Offered in even-numbered years. (Same course as Geology 150C.)

151L. Limnology (4) III. J. Goldman Lecture—3 hours. Prerequisite: special project. Prerequisite: Biological Sciences 1 and junior standing. The biology and productivity of inland waters with emphasis on the physical and chemical environment.

151L. Limnology Laboratory (3) III. J. Goldman Laboratory—6 hours: two weekend field trips. Prerequisite: course 151 (may be taken concurrently). Junior, senior, or graduate students. Lakes, streams, and reservoirs with interpretation of aquatic ecology.

(e) Environmental Policy Analysis

160. Environmental Decision Making (4) III. Sabatier Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1; Economics 1A; introductory statistics: one course in environmental science. Alternative models of environmental policy-making, and application to case studies of decision-making in the U.S. and California.

161. Environmental Law (4) II. Vandeventor-Smith Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and one course in environmental science (course 1, 116A, 124, or 129), and one course in environmental science such as Toxicology 10, or Resource Sciences 100); English 1 and Political Science 1 recommended. Introduction for non-Law School students to some of the practical issues in environmental law and the judicial interpretation of some important environmental statutes, e.g., NEPA. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 1.

162. Recreation Policy Analysis (4) III. Loomis Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 Agriculture 124, 147 or 170; Environmental Planning and Management 127; introduction to major issues and evaluative techniques in the analysis of outdoor recreation policy. Principles of political science and economics are applied to the analysis of recreation demand and provision; and the resolution of conflicts between recreation and other uses.

NOTE: For key to footnote symbols, see page 131.
Environmental Toxicology

(College of Agricultural and Environmental Sciences)

Takayuki Shibamoto, Ph.D., Chairperson of the Department
Office Address: 4138 Meyer Hall (752-1142)

Faculty
Richard G. Burau, Ph.D., Professor (Environmental Toxicology, Entomology)
Donald G. Crosby, Ph.D., Professor (Environmental Toxicology, Entomology)
Bruce D. Hammock, Ph.D., Professor (Environmental Toxicology, Entomology)
Dennis P. H. Hale, Sc.D., Professor (Environmental Toxicology, Entomology)
Theodore L. Hurlin, Ph.D., Professor (Environmental Toxicology, Entomology)
Wendell W. Kligle, Ph.D., Professor (Environmental Toxicology, Entomology)
Marion G. Miller, Ph.D., Assistant Professor (Environmental Toxicology, Entomology)
Ming-yu Li, Ph.D., Lecturer (Environmental Toxicology, Entomology)
Fumio Matsumura, Ph.D., Professor (Environmental Toxicology, Entomology)
James N. Seiber, Ph.D., Professor (Environmental Toxicology, Animal Physiology)
Takayuki Shibamoto, Ph.D., Professor (Environmental Toxicology, Animal Physiology)
Wray W. Witterlin, M.S., Lecturer (Environmental Toxicology, Animal Physiology)
Dorothy E. Woolley, Ph.D., Professor (Environmental Toxicology, Animal Physiology)

The Major Program

Environmental Toxicology deals with the properties, fate, biological effects, detection and regulation of natural and man-made toxicants present in the environment. Toxicants studied in the major include pesticides, pollutants, industrial chemicals, and pol- luts produced by microbes, plants, and animals. The objective of the major is to provide training which will enable students to apply the principles and methodology of the physical and biological sciences to the study of toxicants in the environment of the study of toxicology as a basis for solving problems occasioned by the presence of toxicants in the environment. Through the appropriate choice of electives, students have the opportunity to special- ize in any one of several areas of environmental toxicology. Students electing to emphasize the application of the physical sciences to the study of toxicants would qualify for positions in chemical analysis, environmental monitoring and forensic toxicology. Those electing to emphasize the application of the biological sciences would qualify for positions in animal toxicology, environmental health and safety, and pest control. The major can also serve as preparation for graduate or professional school.

Environmental Toxicology

B.S. Major Requirements:

(For convenience in program planning the major satisfies the requirements are shown in parentheses where possible; equivalent or more comprehensive courses may be substituted with advisor’s approval. Courses shown without parentheses are required.)

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>85-72</td>
</tr>
<tr>
<td>Biological sciences (Biological Sciences 1)</td>
<td>5</td>
</tr>
<tr>
<td>Other biological sciences (entomology, zoology, botany, microbiology, physiology)</td>
<td>10-12</td>
</tr>
</tbody>
</table>

NOTE: For key to footnote symbols, see page 131.
101. Principles of Environmental Toxicology (4) I. Metsumura (Chairperson in charge)
 Lecture—4 hours. Prerequisite: Chemistry 88 or 128C (or the equivalent); Biochemistry 101A recommended. Principles governing pollutant actions, and assessment of toxicants in environmental and biological systems; classes of environmental toxicants discussed include pesticides, air pollutants, radionuclides, mycotoxins, food-borne toxicants, and heavy metals.

112A. Toxicants in the Environment (3) I. Crosby, Seiber
 Lecture—3 hours. Prerequisite: course 101 or consent of instructor. Chemistry of toxic substances which influence their distribution and transformations; action of environmental forces which effect toxicant breakdown, movement, and accumulation; sources and occurrence of major classes of environmental toxicants.

112B. Toxicants in the Environment (4) III. Burau, Shibamoto
 Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 101A (or equivalent); consent of instructor. Continuation of 112A. Toxic chemicals—primarily pollutants—in the environment; concepts and techniques of sampling, detecting, and measuring toxicants of current concern; collection, interpretation, and use of analytical data. Limited enrollment. Environmental Toxicology majors will be given preference for enrollment.

114A. Biological Effects of Toxicants (3) II. Byard
 Lecture—3 hours. Prerequisite: Biochemistry 101B (may be taken concurrently); course 101 and Physiology 110 recommended. Course designed to illustrate the biological effect of toxic substances in living organisms. Topics to be covered: fate and mechanisms of representative toxins, types of effects, symptoms, and antidotes.

114B. Biological Effects of Toxicants: Comparative Aspects (4) III. Klug, Miller
 Lecture—3 hours. Prerequisite: course 114A and consent of instructor. Course designed to illustrate basic principles of toxicology and to acquaint students with laboratory techniques for evaluating potential toxicity of chemicals. Continuation of course 114A. Limited enrollment. Environmental Toxicology majors will be given preference for enrollment.

128. Food Toxicology (3) III. Shibamoto, Guansawed (Food Science and Technology)
 Lecture—3 hours. Prerequisite: Biochemistry 101A or 101B. Chemical and biological toxic substances occurring in food, including plant and animal toxins, intentional and unintentional food additives. The assessment of food safety and toxic hazards. (Same course as Food Science and Technology 128.)

130A-E. Selected Topics in Environmental Toxicology (3) I, II, III. The Staff (Chairperson in charge)
 Lecture—4 hours. Prerequisite: consent of instructor; course 101 recommended. Selected topics of current interest in environmental toxicology. Topics will vary each time course is offered, and will emphasize areas such as the microbiology of toxic substances, poisonous plants and animals, chemical ecology, toxic substances in food, and toxic plants.

131. Air Pollutants and Inhalation Toxicology (3) III. Hashb, Last (Internal Medicine)
 Lecture—3 hours. Prerequisite: Chemistry 88 (may be taken concurrently). Same course as course 101; Biochemistry 101A recommended. Toxicology of air pollutants in the ambient and occupational environments. Environmental factors, biological effects, air-quality criteria and standards, and pulmonarv responses to these pollutants. Offered in even-numbered years.

132. Chromatography for Analytical Toxicology (4) II. The Staff (Chairperson in charge)
 Discussion—1 hour; laboratory—8 hours; slide demonstration and extensive library assignments. Prerequisites: Chemistry 88 or the equivalent (may be taken concurrently); consent of instructor. Application and theory of basic chromatography techniques such as thin-layer, gas-liquid, and pressure liquid and column chromatography useful for analvsticaltoxicology: residue analysis comprises one third of course.

133. Legal Aspects of Environmental Toxicology (3) I, II, III. The Staff (Chairperson in charge)
 Lecture—3 hours. Prerequisite: consent of instructor; courses 10 and 101 recommended. Federal and California legislation concerning aquatic and water pollution, pesticide use, and federal and state laws governing the control of hazardous waste and environmental toxicity. Reports and discussion concerning oral and written presentations, literature sources and career opportunities. (PINF grading only.)

190C. Research Group Conference (1) I, II, III. The Staff
 Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference of advanced research methods and the interpretation of research results. (PINF grading only.)

190T. 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 College of Agriculture, Cultural and Environmental Sciences. Internships supervised by a member of the faculty. (PINF grading only.)

197. Tutoring in Environmental Toxicology (1-5) I, II, III. The Staff (Chairperson in charge)
 Hours and duties will vary depending upon course being tutored. Prerequisite: previous advanced experience 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. (PINF grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
 Prerequisite: consent of instructor. (PINF grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
 Prerequisite: consent of instructor. (PINF grading only.)

Graduate Courses

203. Environmental Toxicology (4) I. Crosby
 Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 128C (or the equivalent), or Chemistry 128B and consent of instructor. Biochemical and physiological mechanisms underlying toxicity and detoxification.

219A. Analytical Techniques (4) I. Seiber
 Lecture—3 hours. Prerequisite: course 101 and consent of instructor; course 203 recommended. Techniques for the isolation, separation, detection, and quantitative determination of toxicants using chemical and instrumental methods.

220. Analysis of Toxicants (I) I. Seiber
 Lecture—3 hours. Prerequisite: course 101 and consent of instructor; course 203 recommended. Techniques for the isolation, separation, detection, and quantitative determination of toxicants using chemical and instrumental methods.

226. Gas Chromatography/Mass Spectrometry of Toxic Chemicals (3) I. Shibamoto
 Lecture—1 hour; laboratory—3 hours. Prerequisite: course 220 and Chemistry 219B; or consent of instructor. Application of GC/MS techniques to investigate toxic chemicals with particular emphasis on their identification and structural elucidation. Practical application of GC/MS in current research. Offered odd-numbered years.

234. Neurophysiological Basis of Neurotoxicology (3) I. Woolley
 Lecture—2 hours; discussion—1 hour. Prerequisite: Physiology 110 (or the equivalent) and basic understanding of neurophysiology. 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 (1-5) I, II, III. The Staff (Chairperson in charge)
 Seminar—1 hour. Current problems in environmental toxicology. (SU grading only.)

290C. Advanced Research Conference (1) I, II, III. The Staff
 Lecture-discussion—1 hour. Prerequisite: consent of instructor. Presentation and critical discussion of advanced research methods and interpretation of research results. Designed primarily for graduate students. (SU grading only.)

297T. Tutoring in Environmental Toxicology (1-5) I, II, III. The Staff (Chairperson in charge)
 Hours and duties will vary depending upon course being tutored. Prerequisite: previous advanced experience 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 (Chairperson in charge)

NOTE: For key to footnote symbols, see page 131.
202. Sampling in Health-Related Research (3) I. Farver Lecture—3 hours. Prerequisite: course 403 or the equivalent; consent of instructor. Theorized coverage of simple random sampling and systematic sampling and additional sampling. Emphasis is on applied sampling techniques but includes measurement and survey execution. Offered in even-numbered years.

203. Selected Topics in Medical Statistics (3) I. Farver Lecture—2 hours; laboratory—2 hours. Prerequisite: course 404 or the equivalent; consent of instructor. Selected topics in medical statistics with emphasis on the design and data analysis used in epidemiological research. Possible topics (chosen to suit students in each class) include: regression analysis; cross-sectional techniques; life tables; survivorship functions. Offered in odd-numbered years.

212. Epidemiology of the Zoonoses (3) II. Lecture—1 hour; discussion—2 hours. Prerequisite: course 405 or consent of instructor. Biological and ecological features of infections shared by man and other animals with particular attention to those perceptual in nature by wildlife and those which are of greater public health and economic significance.

216. Immunodiagnostic Techniques (3) II. Yamamoto, Lam Lecture—3 hours. Prerequisite: enrollment in MFPVM degree program or permission of instructor. Consideration of immuno-diagnostic techniques for screening of animal populations for disease. Emphasis on rapid, simple and inexpensive procedures for mass screening.

218. Immunodiagnostic Techniques Laboratory (2) II. Ya-
mamoto, Lam Discussion—1 hour; laboratory—2 hours. Prerequisite: course 216 or permission of instructor. Application and interpretation of serological techniques for diagnosis of animal diseases. (SU grading only). Limited enrollment.

217. Evaluation of Screening Tests (1) III. Yamamoto Discussion—2 hours (alternate weeks). Prerequisite: consent of instructor. Evaluation of screening tests (biochemical, serological, etc.) with reference to the context of the population in which the test is performed to demonstrate how changes in various population parameters will influence test efficacy. Offered in odd-numbered years.

219. Mycoplasmas as Agents of Disease (2) II. Yamamoto, Lam Lecture—2 hours. Prerequisite: Veterinary Microbiology 127 or the equivalent or consent of instructor. Mid-term and final examination. Offered in even-numbered years.

220. Advanced Avian Medicine (3) III. Yamamoto, Lam Lecture—3 hours. Instruction on the methods of prevention of the major poultry diseases.

222. Epidemiological Modeling (2) III. Carpenter Lecture—1 hour; discussion—2 hours. Prerequisite: courses 403 and 406 (may be taken concurrently). Techniques of modeling for infectious diseases in human populations and avian medicine. Epidemiological modeling principles, construction and evaluation were emphasized.

225. Therapeutically Avian Medical Practice (3) III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: enrollment in avian medicine option of MFPVM program, third- or fourth-year 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 preventative 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. Schwebke Lecture—2 hours; discussion—1 hour. Prerequisite: 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 efforts to promote humane values and mental health.

242. International Veterinary Medicine: The World Food/Population Problem (3) II. Schwebke Lecture—3 hours; discussion—1 hour. Prerequisite: professional veterinary or graduate standing or consent of instructor. Survey of the world food-population problem, emphasizing crop diseases and their control upon production of foods of animal and plant origin; comparisons of important Third World and other situations; discussion of current and future perspectives.

254. Public Health Aspects of Meat and Meat Products Technology (3) III. Genengrice Lecture—3 hours. Prerequisite: consent of instructor. Study of the influence of techniques and procedures for processing meats and meat products upon their wholesomeness as food.

255. Animal Health Economics (3) II. Carpenter Lecture—3 hours. Prerequisite: consent of instructor. Basic concepts of microeconomics (production and cost functions, firm decision making, and the market place) as they relate to animal health are considered. Application of economic decision making techniques which may be used in veterinary medicine are also presented.

290. Current Topics in Avian Medicine (1) I, II, III. Lam, Ye-
mamoto Seminar—1 hour. Prerequisite: consent of instructor. Topics from the current scientific literature will be assigned to students for discussion and interpretation.

291. Seminars in Epidemiology (1) III. Seminar—1 hour. Participants will present and discuss ongoing or published research in epidemiology. Emphasis will be on study design and data analysis. (SU grading only.)

298. Group Study (1-9) I, II, III. The Staff (Chairperson in charge)

Research (1-12) I, II, III. The Staff (Chairperson in charge)

Professional Courses

400. Orientation to Statistics (4) I. Lecture—40 hours total. Prerequisite: enrollment in MFPVM degree program or permission of instructor. Review to the concepts basic to biostatistics and epidemiology. (SU grading only.)

401. Biomedical Information Resources and Retrieval (3) I. Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: Medical Library course or permission of instructor. Use of bibliographic tools for retrieval of biomedical literature; sources of epidemiological and statistical data; computerized retrieval of information; preparation of queries. (SU grading only.)

2 Medical Statistics (3) I. Lecture—2 hours; laboratory—2 hours. Prerequisite: course 400 or Statistics 13 (or the equivalent); consent of instructor. Use of statistics in clinical, laboratory, and population medicine; graphical and tabular presentation; probability; binomial, normal, t-, f-, and Chi-square distributions; elementary non-
parameteric methods and introductory methods in regression and correlation; life tables.

403. Medical Statistics II (3) II. Lecture—2 hours; laboratory—2 hours. Prerequisite: course 402 or consent of instructor. Continuation of course 402. Analysis of variance in biomedical sciences; nonparametric methods; problems in sampling and surveys; time dependent variation and trends; biomedical applications of statistical methods.

404. Medical Statistics III (3) III. Lecture—2 hours; laboratory—3 hours. Prerequisite: course 403 or consent of instructor. Continuation of course 403. Multiple regression; discriminant analysis; analysis of covariance; analysis of multivariable frequency tables; biomedical applications.

405. Principles of Epidemiology (5) I. Herd Lecture—2 hours; discussion—2 hours; laboratory—2 hours. Prerequisite: course 400 or the equivalent; a degree in veterinary medicine, medicine or dentistry, or consent of instructor; I Combination of lectures, class discussions, and problem solving; introduction to methods of investigating outbreaks, quantifying disease in populations, medical ecology survey methods, an introduction to epidemiological study design and animal disease surveillance.

406. Epidemiological Study Design (3) II. Herd Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 403 (may be taken concurrently) and 405, or consent of instructor. I Design and interpretation of cross-sectional, case-control, and cohort studies (including controlled clinical trials) pertinent to veterinary medicine. Critical review of published epidemiological studies. Principles of association and causality.

407. Analytical Epidemiology (3) III. Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 404 and 406 (may be taken concurrently). Uses of multiple regression, discriminant analysis, factor analysis, path analy-

sis and other multivariate techniques in epidemiology. Approaches for handling the analysis of large data sets.

408. Research Methodology and Research Reports (3) I. Lecture—1 hour; discussion—2 hours. Prerequisites: enrolled in MPH degree program; consent of instructor. Application of the scientific method to solving specific epi-

demiological field problems including disease of animals. Students must prepare and present their work at the annual meeting in a format similar to the professional literature and complete all work preparatory to the actual field collection of data or specimens.

409A-409B. Topics in Data Analysis (2-3) II-III. The Staff (Chairperson in charge) Discussion—2 hours (409A); discussion—3 hours (409B).

NOTE: For key to footnote symbols, see page 131.

410A-410B. Topics in Applied Epidemiology (3-2) II-III. The Staff (Chairperson in charge) Discussion—3 hours (410A); discussion—2 hours (410B). Prerequisite: course 406 (may be taken concurrently) or consent of instructor. Collection of data and/or specimens from field studies, serum banks or data banks. Laboratory examination of specimens and recording of results. Alternative approaches to presentation of data and conclusions and formulations of recommendation for further investigations. (Deferred grading only, pending completion of course.)

411. Disease Control and Eradication (3) III. Riemann, Car-
penter Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 405, 255, and 222 (the latter may be taken concurrently). Studies of various approaches to control or eradicate disease in animal populations. Design and economic analysis of control programs.

412A. Use of Microcomputers: Level 1 (3) I. Stevens, Riemann Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Introduction to and development of skills on modern microcomputers for students involved in epidemiological studies and research. Level I topics include microcomputer anatomy, operating systems, file handling, fundamentals of word processing, spreadsheet, and statistical analysis software.

412B. Use of Microcomputers: Level 2 (3) II. Stevens, Riemann Lecture—2 hours; laboratory—3 hours. Prerequisite: course 412A or consent of instructor. Development of advanced skills on modern microcomputers for students involved in epidemiological studies and research. Level II topics include advanced use of word processing and spreadsheet software, and introduction to database management programs.

412C. Use of Microcomputers: Level 3 (3) III. Stevens, Riemann Lecture—1 hour; laboratory—4 hours. Prerequisite: course 412B or consent of instructor. Development of advanced skills on modern microcomputers for students involved in epidemiological studies and research. Level III topics include advanced use of graphics for microbiological data, and development of application programs to facilitate the students’ research efforts.

Family Practice

See Medicine, School of

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 use of 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 preservation of the environment, are further opportunities for study.

Students are selected by the department for this major. Graduates qualify for supervision, technical, re-

search, 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 and en-

vironmental chemistry or biochemistry.
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 will be accepted.)

UNITS
Preparatory Subject Matter .......................... 84-70
Biochemistry (Biochemistry 101A, 101B) ........ 6
Biology (Biological Sciences 1) .................. 5
Chemistry (Chemistry 1A-19-1C, 5, and 8A-68; or 4A-4B-4C and 129A-129B, 129A) . 21-25
Mathematics (Mathematics 16A-16B or 21A-21B) .............................................. 6-8
Statistics including analysis of variance (Agricultural Science and Management 150 or Statistics 108) ........ 4
Microbiology (Microbiology 2, 3) ................. 4
Physics (Physics 6A, 6B) ............................. 8
Computer science (Computer Science Engineering 10, 30, Agricultural Science and Management 21, or Engineering 5) ......... 3
English (see College requirement) .................. 7

Depth Subject Matter ................................ 40
Choose from: Viticulture and Enology 5, 125, 124, 125, 126, 127, 130, 140, 217, 219, 235; Food Science and Technology 102, 102L, 104 (or Epidemiology and Preventive Medicine 150, 104L, 108, 109, 110A, 110B, 150, 150L, 200, 235, 290, 290L, Microbiology 105, 130A, 130B, 130L, 177, 270, Biochemistry 101I, or 123, 123L; Chemical Engineering 161, 206, Chemistry 107A, 107B, 130, Epistemology and Preventive Medicine 150 (or Food Science and Technology 104), Environmental Toxicology 128, Genetics 100 (No variable-unit 150, 190, 196, 200 courses allowed toward depth requirements). (Courses in depth subject matter may not be taken on the P/NP grading basis.)

Restricted Electives .................................. 20
Selected according to student's educational goals and upon approval by adviser. Only 6 units of 192 or 6 units of 190, 199, or 298 may be counted; or a total of 8 units of these courses combined.

Breadth Subject Matter .............................. 24
Social sciences and humanities or others as approved by adviser including General Education units (see General Education Requirement).

Unrestricted Electives .............................. 18-24
Total Units for the Major .......................... 180

Major Adviser, R. E. Kunkee (Viticulture and Enology).

Graduate Study. Refer to the Graduate Division degree programs in Agricultural and Environmental Chemistry, Biochemistry, Chemical Engineering, Food Science, Genetics, and Microbiology.

Fisheries

See Animal Science; and Wildlife and Fisheries Biology.
Food Science (A Graduate Group)

Norman F. Haard, Ph.D., Chairperson of the Group
Group Office, 1480 Chemistry Annex (752-1415)

Faculty. Includes members from twelve departments in the Colleges of Agricultural and Environmental Sciences and Engineering, and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The interdepartmental Graduate Group in Food Science offers programs of study leading to the M.S. degree under both Plan I (thesis) and Plan II (comprehensive oral examination). Detailed information regarding graduate study is available through the Group Chairperson or by obtaining the Graduate Announcement.

Graduate Advisers. Contact the Graduate Division for the list of advisers.

Food Science and Technology (College of Agricultural and Environmental Sciences)

R. Larry Merson, Ph.D., Chairperson of the Department
Department Office, 126 Cruess Hall (752-1465)

Faculty

Everett Bandman, Ph.D., Associate Professor
Ercka L. Barnett, Ph.D., Professor
Richard A. Bernhard, Ph.D., Professor
John Bruhn, Ph.D., Lecturer
Edwin B. Collins, Ph.D., Professor Emeritus
Richard L. Dunkley, Ph.D., Professor Emeritus
Robert E. Feeney, Ph.D., Professor Emeritus
J. Bruce German, Ph.D., Assistant Professor
Dieter W. Gruenwede, Ph.D., Professor
Norman F. Haard, Ph.D., Professor
Jerald M. Henderson, D.Engr., Professor (Food Science and Technology, Mechanical Engineering)

Walter G. Jennings, Ph.D., Professor Emeritus
John M. Krophol, Ph.D., Professor (Food Science and Technology, Agricultural Engineering)
Michael J. Lewis, Ph.D., Professor
Bor S. Lu, Ph.D., Professor Emeritus
George L. Marsh, M.S., Professor Emeritus
Mendi Mazzali, Ph.D., Professor
Kathryn L. McCarthy, Ph.D., Assistant Professor (Food Science and Technology, Agricultural Engineering)

Michael J. McCarthy, Ph.D., Assistant Professor (Food Science and Technology, Agricultural Engineering)

R. Larry Merson, Ph.D., Professor (Food Science and Technology, Agricultural Engineering)

Martin W. Miller, Ph.D., Professor Emeritus
David M. Ogrodzialek, Ph.D., Associate Professor
Michael A. O'Mahony, Ph.D., Professor
Rose Marie Pangborn, M.S., Professor
Herman J. Phaff, Ph.D., Professor Emeritus
Chester W. Price, Ph.D., Associate Professor
Robert J. Price, Ph.D., Lecturer

David S. Reid, Ph.D., Professor

Thomas Richardson, Ph.D., Professor (Peter J. Shields Professor in Dairy Science Food Science and Technology, Agricultural Engineering

Gail D. Russo, Ph.D., Professor
Barbara O. Schneeman, Ph.D., Professor (Food Science and Technology, Internal Medicine, Nutrition)

Benjamin Schweigart, Ph.D., Professor
C.F. Shoemaker, Ph.D., Associate Professor
R. Paul Singh, Ph.D., Professor (Food Science and Technology, Agricultural Engineering)
Gary M. Smith, Ph.D., Associate Professor
Lloyd M. Smith, Ph.D., Professor Emeritus
Clarence Sterling, Ph.D., Professor Emeritus
Aloys L. Tappel, Ph.D., Professor
John R. Whitaker, Ph.D., Professor
Gideon Ziedler, D.Sc., Lecturer

Major Program and Graduate Study. See the major in Food Science; and for graduate study, refer to the Graduate Division section in this catalog.

Related Courses. See courses in Biochemistry and Biophysics, Consumer Science, Engineering, Nutrition, and Viticulture and Enology; Environmental Toxicology; Food Science and Technology 150, Plant Science 112 and 111L.

Courses in Food Science and Technology

Lower Division Courses

1. Food Science and Society (3) I. Bernhard, Schweigart Lecture—2 hours; discussion—1 hour. Nature and scope of world food problem; food composition; scientific and technological aspects of converting animal and plant products into a variety of prepared foods; improvement and evaluation of acceptability and nutritional value of foods. Not open for credit to students who have received credit for course 100A, 100B, or 111.

2. Introductory Food Science (3) II. Lewis, O'Mahony, Schweigart Lecture—3 hours. Nature of scientific method, the world food problem, food composition, nutritional and sensory aspects of food, food preservation, food safety, environmental consequences of food technology. Not open to students who have received credit for course 101, 100A, 100B, or 111. General Education credit: Nature and Environment/Introductory.

20. Food and Culture: An Introduction to Culture, Diet, and Calorie (4) II. Bielli, Nutrition, Geography Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 2, Geography 2 and Nutrition 10 recommended. Historical and contemporary overview of culture, food, and diet; exploration of the major themes in food habit research: minority food habits, origins and development of dietary practices.

49. Processing Plant Studies (1) III. Discussion—1 hour; field trips—3 hours. Field trips to observe processing, distribution, quality control and regulatory control of foods and related materials.

36. Public Issues in Nutrition and Food Science (3) I. Schweigart, Schneeman Seminar—1 hour. Faculty and invited guest speakers will present topics in 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 83.)

39. Special Study for Undergraduates (1-5) I, II, III. The Staff (P/NP grading only)

Upper Division Courses

100A. Principles of Food Composition and Properties (3) I. Shoemaker Lecture—3 hours. Prerequisite: Chemistry 8A-8B. Fundamental chemical, physical, and sensory aspects of food composition as they relate to physical properties, acceptability, and nutritional value of fresh and processed foods.

100B. Principles of Food Composition and Properties (3) I. Russell, Schneeman Lecture—3 hours. Prerequisite: Chemistry 8A-8B. Fundamental chemical, physical, and sensory aspects of food composition as they relate 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—3 hours. Prerequisite: course 100A (may be taken concurrently). Course designed to give laboratory experience with the food systems and properties described in course 100A.

101B. Principles of Food Composition and Properties Laboratory (2) I. Shoemaker Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100B (may be taken concurrently). Course designed to give laboratory experience with the food systems and properties described in course 100B.

102L. Malting and Brewing Science (3) I. Lewis Lecture—3 hours; optional field trip. Prerequisite: Biochemistry 101A. Technology of the malting, brewing and fermentation processes is integrated with the chemistry, biochemistry, and microbiology that determine industrial practices and product quality.

102L. Malting and Brewing Science Laboratory (3) I. Lewis Discussion—1 hour; laboratory—3 hours. Prerequisites: courses 102, 103, Chemistry 5. Laboratory experience in the use and application of standard brewing methods of analysis. Data collection on beer materials and application of these data in pilot-scale malting and brewing exercises. Processing studies and influence of process variables on product attributes.

103. Physical and Chemical Methods for Food Analysis (5) I. Gruenwede, G. Smith, Tappel Lecture—3 hours; laboratory—4 hours. Prerequisite: Chemistry 8B and Biochemistry 101A. An introduction to the theory and application of physical and chemical methods for determining the constituents of foods. Emphasis on instrumentation and instrumental analysis techniques are stressed.

104. Food Microbiology (3) II. Barret Lecture—3 hours. Prerequisite: Microbiology 2, Biochemistry 101A. Microorganisms in food safety, spoilage, and production. Food-borne disease agents and their control. Growth parameters of food spoilage agents. Destruction of microbes in food. Food fermentation and development of microbes as a resource for the food industry.

104L. Food Microbiology Laboratory (3) III. C. Price Lecture—1 hour; laboratory—6 hours. Prerequisite: Microbiology 2 and 3. Course begins in fundamental characteristics of microorganisms involved in food spoilage, in food-borne disease, and food fermentation. Analysis of microbiological quality of foods.

107. Principles of Sensory Analysis of Foods (4) II. Pengborn Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Agricultural Science and Management 150 or the equivalent course in statistics. Nature of sensory responses with emphasis on aroma, taste, and texture of foods; critical use of analytical laboratory methods; relation of sensory data to chemical and instrumental characteristics; collection and statistical analysis and interpretation of sensory data.

108. Food Processing Plant Sanitation (3) I. York Lecture—3 hours. Prerequisite: Chemistry 6B and Microbiology 2. Discussion of factors relating to sanitary control of food processing including water treatment, chemical and physical sanitizing agents, principles of cleaning and hard surface detergency, metal corrosion, concepts in the disposal of wastes and the perilance of government control agencies.

108L. Principles of Quality Assurance in Food Processing (3) I. Merson in charge Lecture—2 hours; discussion—1 hour. Prerequisite: Statistics 13 or Agricultural Science 150. Quality assurance measurement techniques applied to selected food processed products emphasized. Rationale for establishing valid quality assurance programs for selected food samples at critical points. Statistical problems in quality assurance programs used by the food industry.

108A. Physical Principles in Food Processing (3) I. Merson Lecture—2 hours; laboratory—3 hours. Prerequisites: Chemistry 8A-8B or the equivalent. Recommended. Not open for credit to students enrolled in College of Engineering. Applications of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, and problem solving.

108B. Heat and Mass Transfer in Food Processing (3) II. McCarthy Lecture—3 hours. Prerequisite: course 110A or the equivalent. Agricultural Engineering Thermodynamics: principles recommended (may be taken concurrently). Rate processes: conduction, convection, and radiation heat transfer; microwave heating, freezing, freeze-drying, psychrometrics; mass transfer during drying, and storage.

111. Introduction to Food Processing (4) II. Miller, Singh Lecture—3 hours; discussion—demonstration—2 hours. Prerequisites: Microbiology 2, Chemistry 8A-8B, and Physics 8A-8B, or the equivalent. Food processing from farm to package. Characteristics of raw materials, fresh produce handling, overview of food processing and packaging unit operations, chemical additives. Demonstration and field trips.

117. The Senses, Sensorial Measurement, Psychophysics and Food (4) I. O' Mahony Lecture—4 hours. Prerequisite: Biological Sciences 1, Statistics 13 or Agricultural Science and Management 150 (may be taken concurrently). Structure and function of sensory receptors and psychophysical techniques affecting sensory responses. Critical examination of modern psychophysical methods for the investigation of the mechanisms of human senses, hedonic, and sensorial measurement and their relation to food flavor.

NOTE: For key to footnote symbols, see page 131.
The Major Program

The major program is designed to assure proficiency in all four of the language skills—speaking, understanding, reading, and writing—and to acquaint students with the intellectual and cultural contributions of the French-speaking world through the study of its literature, traditions, and institutions.

A major in French is excellent preparation for those contemplating careers in government, business, teaching, or other professions. As the major program provides not only training in a foreign language, but also cultivates critical and analytical thinking, clear expression, effective writing, an historical perspective, and an appreciation of cultural differences, it is not surprising that graduates of the department have achieved success in the most diverse careers. Foreign language teachers, a cardiologist, a veterinarian, a naval commander at the Pentagon, a professor of Political Science, lawyers, sales representatives, journalists, an anesthesiologist, a law professor, translators, a senior application programmer, travel agents, independent business owners, a senior museum preparator, nurses, financial managers, stock brokers, and an industrial attaché for a French Trade Commission, all graduated with an A.B. in French from UC Davis and represent the diverse career possibilities the department sponsors in the current job market.

The department is strongly committed to undergraduate education. It encourages its students to work closely with the academic advisor in designing a major tailored to their needs and interests within the broad requirements prescribed by the program and to avail themselves of the guidance of an excellent teaching faculty. The program places great emphasis on clear and effective writing in all of its courses, in the firm belief that good writing needs to be practiced throughout a student’s career and in the context of genuine academic courses. While the department feels strongly that the study of the language and the rich tradition of French literature should form the core of the major program, it also recognizes the increasing importance of more practical applications such as business French and offers access to contemporary French politics and civilization through the study of French newspapers and magazines and the viewing of French television reports. The department sponsors an active French Club and a chapter of Delta Phi, the National French Honor Society. Each year, a substantial number of students with a good preparation in French participate in the university’s very popular Education Abroad Program which maintains centers at seven French universities.

French

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<th>A.B. Major Requirements:</th>
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<td><strong>UNITS</strong></td>
</tr>
<tr>
<td>Preparatory Subject Matter</td>
</tr>
<tr>
<td>French 1, 2, 3, 5 (or the equivalent)</td>
</tr>
<tr>
<td>French 21, 22, 23</td>
</tr>
<tr>
<td>Linguistics 101</td>
</tr>
<tr>
<td>French 45 recommended.</td>
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<tr>
<td>Depth Subject Matter</td>
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<tr>
<td>French 100</td>
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<tr>
<td>French 101, 102</td>
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<tr>
<td>French 104</td>
</tr>
<tr>
<td>French 160</td>
</tr>
<tr>
<td>Two additional electives</td>
</tr>
<tr>
<td>French literature courses</td>
</tr>
<tr>
<td>Elective courses in French literature, language, or civilization to be chosen in consultation with undergraduate adviser</td>
</tr>
</tbody>
</table>

**Total Units for the Major** 53-60

**Recommended:**
French 101, 102, 103, 104, 107, 135, and 160 plus other upper division courses for a total of 45 units for students interested in obtaining a "single subject" teaching credential in California.

**Major Adviser:** G. Herman.

Minor Program Requirements:

- **UNITS**
  - French 100: 4
  - French 101, 102, 103: 12
  - Two elective courses in French language, literature, or civilization to be chosen in consultation with undergraduate adviser: 8

**Prerequisite Credit:** Credit will not normally be given for a course if it is the prerequisite of a course already successfully completed. Exceptions can be made by the department chairperson only.

**Honors Program:** Candidates for high or highest honors in French must write a senior thesis under the direction of a faculty member. For this purpose, honors candidates must enroll in at least six units of French 194H distributed over two quarters. Normally, a student will undertake the honors project during the first two quarters of the senior year; other arrangements must be authorized by the department chair. Only students who, at the end of the junior year (135 units), have attained a cumulative grade-point average of 3.6 in courses required for the major will be eligible for the honors program. The requirements for earning high and highest honors in French are in addition to the regular requirements for the major in French.

**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 program is available to students who complete an undergraduate major in French or the equivalent. Students, in special circumstances, may make work done in the major requirements and then continue with an advanced degree. Candidates will be recommended for admission to graduate studies in French provided they meet the requirements of the Graduate Division and the Department of French and Italian have been met. Basic requirements for the M.A. are: a minimum residence of three quarters, 36 quarter units, and a passing score in the comprehensive examination, or 30 quarter units and the acceptance of a written thesis.

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 a qualifying examination, completion of an acceptable dissertation, and one year of teaching in the department as a Teaching Assistant.

**Graduate Advisers:** Maria I. Manea-Manoloiu (M.A. degree); M. E. Blanchard (Ph.D. degree).

**Teaching Credential Subject Representative:** M. R. Kaufman. See also under the Teacher Education Program.

**Courses in French**

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 3 and those with three years take French 5 and those with four years take French 21.

**Lower Division Courses**

1. **Elementary French (5)** I, II, III. The Staff: Discussion—5 hours, laboratory—5 hours. Students who have successfully completed (C— or better) French 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 grade is specified.

2. **French for Graduate Students (8)** Extra-session summer. The Staff (Chairperson in charge):
106. French in Business and the Professions (4) I. Herman Lecture—2 hours; discussion—2 hours; course paper assignment. Prerequisites: course 100 or consent of instructor. The French language as used in the commercial sphere. Emphasis on proper style, length, and construction, as well as non-literal composition. Technical terminology in such diverse fields as government and world business.

107. Contemporary France (4) III. Preper Lecture—3 hours; discussion—3 hours. Prerequisite: course 100 or 103 and consent of instructor. Introduction to aspects of French culture and institutions of the contemporary period such as art, architecture, music, literature. Provides a background in French contemporary history, sociology, and institutions.

108. Advanced French Conversation (2) I, II, III. The Staff Discussion—2 hours, laboratory—2 hours. Prerequisite: course 22. Practical course in speaking French: weekly quizzes and an oral and written final examination. Open to native speakers only.


214. Introduction to French Literature in Translation (3) II. The Staff Discussion—2 hours. Open to students interested in the study of French literature and culture. Intended for the non-major. General Education credit: Civilization and Cultural Institutions.

35. Explication and Dissertation (2) III. The Staff (Chairperson in charge) Discussion—2 hours. Prerequisite: course 22. Theory and practice of French explication de texte and dissertation. Especially recommended for those students planning to study abroad in French-speaking countries.

36. Intermediate French Conversation (2) I, II, III. The Staff Discussion—2 hours. Prerequisite: course 22. Practice in speaking French: weekly quizzes and an oral and written final examination. Open to native speakers only.

45. Introduction to French Literature (4) I, II, III. The Staff Lecture—3 hours; term paper. Prerequisite: course 22. Selected topics in French literature.

89. Directed Group Study (1-5) I, II, III. The Staff Prerequisite: consent of instructor. [P/NP grading only.]

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) [P/NP grading only.]

Upper Division Courses

100. Composition in French (4) I, II, III. The Staff Lecture—3 hours; several longer essays. Prerequisite: course 23. Instruction and practice in expository writing in French, with emphasis on organization, correct syntax, and vocabulary-building.

101. Introduction to French Poetry (4) II, III. Abraham, Blachman Lecture—3 hours; short papers—30 minutes minimum. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of works representing the main types of French poetry from the Middle Ages to the present.

102. Introduction to French Drama (4) I. Abraham Lecture—3 hours; short papers—30 minutes minimum. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of plays representative of the main types of French drama, with emphasis on dramatic structure and techniques.

103. Introduction to French Prose (4) I, II. Laub, Kuchar Lecture—3 hours; short papers—30 minutes minimum. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of works representing the main types of French prose, with emphasis on narrative structure and techniques.

104. Translation (4) I, II. The Staff Lecture—3 hours; short translations—30 minutes minimum. Prerequisite: course 100 or consent of instructor. Practice in translation from French into English and a variety of texts illustrating different problems and styles.

105. French and the Novel (4) II. Kuchar Lecture—3 hours; short stories—30 minutes minimum. Prerequisite: course 100 or consent of instructor. Readings from Montaigne, Voltaire, Diderot, Rousseau, and the 19th-century novelists.

118B. The Novel in the Eighteenth Century (4) II. Kuchar Lecture—3 hours; short stories—30 minutes minimum. Prerequisite: course 100 or consent of instructor. Readings from the 18th-century novelists.

119A. The Nineteenth Century (4) I. Hannon Lecture—3 hours; term paper. Prerequisite: courses 100 or 102 and consent of instructor. Romantisme in the drama and novel. Plays of Hugo and Musset, novels of Stendhal, Nerval, Flaubert, Mérimée, and Chateaubriand.

119B. The Nineteenth Century (4) I. Hannon Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. Realism and Naturalism: Balzac, Flaubert, Maupassant, Zola.

119C. Nineteenth Century Poetry (4) II. B. Fournier Lecture—3 hours; term paper. Prerequisite: courses 100 and 101 or consent of instructor. Poetry from the Pre-Romantics to Baudelaire.

120A. Twentieth-Century Drama (4) I. The Staff Lecture—3 hours; term paper. Prerequisite: courses 100 and 102 or consent of instructor. Representative plays from Brecht to Ionesco.

120B. Twentieth-Century Drama (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: courses 100 and 102 or consent of instructor. Representative plays from Anouilh to Artaud.

121. Twentieth-Century Novel (4) I. Blanchard Lecture—3 hours; short papers—30 minutes minimum. Prerequisite: course 100 and 103 or consent of instructor. Sartre, Sisley and novels of André Gide and novels of Marcel Proust.

122. Twentieth-Century Novel (4) II. Preper Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. From Maupassant to the Nouveau Roman, including such novels as Sartre, Camus, de Beauvoir, Bensaci, Mauriac, Céline, Robbe-Grillet, Simon, Buto.

133. Twentieth-Century Poetry (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. From Apollinaire to the present, including such poets as Saint-John Perse, Breton, Aragon, Reverdy, Eluard, Desnos, Ponge, Char, Michaux, Bontemps.

135. Advanced Composition (4) III. Preper Lecture—3 hours; short papers—30 minutes minimum. Prerequisite: course 100 or consent of instructor. Practice in advanced composition, using the French dissertation as model, with occasional explications de texte.

138. Advanced Literary Translation (4) I. Bloom Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. Translation from Apollinaire to the present, including such poets as Saint-John Perse, Breton, Aragon, Reverdy, Eluard, Desnos, Ponge, Char, Michaux, Bontemps.

140. Study of a Major Writer (4) II. The Staff (Chairperson in charge) Lecture—3 hours; term paper—30 minutes minimum. Prerequisite: courses 100 and 101 or 102 or 103 as appropriate to selected topic, or consent of instructor. Concentrated study of works of a single author. May be repeated once for credit as author-subject changes.

141. Selected Topics in French Literature (4) II. The Staff Lecture—3 hours; short papers—30 minutes minimum. Prerequisite: courses 100 and 101 or 102 or 103 as appropriate to the selected topic or consent of instructor. Subjects and themes include the history of the Middle Ages, poetry of the Pleiade, theater of the eighteenth century, pro-romantic poetry, etc. May be repeated once for credit in different subject area.

150. Masterpieces of French Literature in Translation (3) III. Blanchard Discussion—3 hours; short papers. Prerequisite: course 25 and either 112, 113, or 114, or consent of instructor. Masterpieces of French literature. Works to be analyzed in broad general, philosophical, and historical contexts. Emphasis also on literary techniques.


161. Modern French Syntax (3) I. Maneu-Manolou Lecture—3 hours; short papers—30 minutes. Prerequisite: course 160. Presentation of basic concepts of contemporary approaches to French syntax. Consideration of historical and sociological explanations of so-called "irregular" phenomena in current language models.

162. History of French Language (4) II. Maneu-Manolou Lecture—3 hours; term paper. Prerequisite: course 160. Modern trends in development of the language, from Latin to contemporary popular aspects, with emphasis on relationship between socio-cultural patterns and evolution of the language.
Freshman Seminar Program

192. Internship (1-12) I, II, III. The Staff Seminar—3 hours. Prerequisite: upper div- 
ision standing and consent of instructor. Practical application of the French language 
through work experience in government or industry, culminating in an analytical term 
paper on a topic approved by the sponsoring instructor. (P/ 
NP grading only.)

197T. Tutoring in French (1-4) I, II, III. Kaufman Seminar—3 hours. Prerequisite: upper divi-
sion standing and consent of Chairperson. Tutoring in undergraduate courses including leadership in small vol-
untary study groups and participation in departmental events. May be repeated for 
credit for a total of 6 units. (P/ NP grading only.)

197T. Tutoring in the Community (2-4) I, II, III. Kaufman Seminar—1 hour: labora-
tory—1 hour. Prerequisite: upper division standing and consent of Chairperson. Tutoring in 
public schools under the guidance of a regular teacher and supervised by a departmental faculty member. May be 
repeated for credit for a total of 6 units. (P/ NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff Prerequisite: consent of instructor. (P/ NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. Students in charge. 
(P/ NP grading only.)

Graduate Courses

200. Literary Analysis II (2) I. Blanchard Proseminar—12 hours; short papers. Prerequisite: graduate 
standing. Required of all graduate students in French, this prerequisite is designed to acquaint students with basic prin-
tiples of applied literary theory.

201. History of French: Phonology and Morphosyntax (4) III. Mann-Maucholz Seminar—4 hours; term paper. Prerequisite: courses 159, 160, 250A, or consent of instructor. Presentation of the main char-
acteristics of the phonetic and grammatical structures of French, from Latin to contemporary spoken aspects.

202A. Medieval French Literature: The Epic Tradition (4) II. Herman Seminar—3 hours. Prerequisite: course 201 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 Romanic Tradition (4) I. Herman Seminar—3 hours. Prerequisite: course 201 recommended. Chansons de Troyes and the doctrine of courtly love. Literary 
and stylistic study of Chrétien’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) I. Blanchard Seminar—3 hours. French humanism in its main varied forms. Attention is given in particular to Montaigne and his teachers. The works of such authors as Rabelais, Descartes, Mme de La Fayette, etc. May be repeated for credit with consent of instructor when different topics are studied.

205B. Sixteenth-Century Literature: Prose (4) I. Abraham Seminar—3 hours; term paper and/or exposure. Works of such as Rabelais, Descartes, Mme de La Fayette, etc. May be repeated for credit with consent of instructor when different topics are studied.

206B. Seventeenth-Century Literature: Prose (4) I. Abraham Seminar—3 hours; term paper and/or exposure. Works of such as Rabelais, Descartes, Mme de La Fayette, etc. May be repeated for credit with consent of instructor when different topics are studied.

206C. Seventeenth-Century Literature: Poetry (4) II. Abraham Seminar—3 hours; term paper and/or exposure. Works of such as Rabelais, Descartes, Mme de La Fayette, etc. May be repeated for credit with consent of instructor when different topics are studied.

207A. Eighteenth-Century Literature: Philosophes (4) II. Kusch Seminar—3 hours; term paper and/or exposure. Not a course in philosophy, but an examination of the role of philosophers in the design and context of literary works. Study of one or more philosophers. May be repeated for credit with consent of instructor when different topics are studied.

207B. Eighteenth-Century Literature: Novel (4) II. The Staff Seminar—3 hours. Rise of the novel. Study of narrative experiments in the context of the philosophical climate and novelistic avant-gardes. May be repeated for credit with different topics are studied.

208A. Nineteenth-Century Literature: Fiction (4) I. Hannoosh Seminar—4 hours. Study of the works of one or several novelists and/or short-story writers 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. Blanchard 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) II. Coe, III. The Staff 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 when different topics are studied.

209C. Twentieth-Century: Poetry (4) III. 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 when different topics are studied.

210. Studies in Narrative Fiction (4) I. Preager Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

211. Studies in Criticism (4) I. Blanchard Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

212. Studies in the Theater (4) I. The Staff 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 The Staff Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

220. Advanced Literary Translation (3) II. Blomberg Seminar—3 hours; term paper. Various amounts of translation lessons. Designed to acquaint students with the basic principles of applied translation theory. Translation of texts chosen for their theoretical interest. Open to native French speakers only with consent of instructor.

250A. French Linguistics: Morphosyntax (4) I. Mann-Maucholz Seminar—4 hours. Prerequisite: courses 159, 160, or consent of instructor. Theoretical approach to French grammar, with emphasis on paradigms, in contemporary structuralist terms. May be repeated for credit with different topic.

250B. French Linguistics: Transformational Syntax (4) I. Mann-Maucholz Seminar—4 hours. Prerequisite: course 250A or consent of instructor. Presentation of French syntax exemplified by a course on transformational grammar. The topics covered include: grammatical relations, word order, and phrase structure. May be repeated for credit with different topic.

251. Trends in French Contemporary Linguistics (4) I. Mann-Maucholz Seminar—3 hours; term paper. Prerequisite: course 250A or 250B or consent of instructor. Development of new trends in contemporary French linguistic thought and their relationship to the development of theoretical linguistics. Topics such as pragmatics, semantics, symbolic logic, speech acts, etc. are explored for students in French linguistics or those interested in applying linguistic models to literature.

255. Current Issues in Modern French Syntax (4) I. Mann-Maucholz Seminar—3 hours; term paper. Presentation of contemporary approaches to French syntax. Explanations of various texts regular phenomena, with reference to on-going changes in modern spoken French.

260. Research Methods (2) I. Abraham Proseminar—2 hours. Prerequisite: graduate student standing. Required of all graduate students in French. Introduces students to tools of research and to the various critical methods. (SU grading only.)

267. Individual Study (1-5) I, II, III. The Staff (SU grading only.)

268. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Seminar—1.5 hours. May be repeated for credit with consent of instructor.

295. Research (1-12) I, II, III. The Staff (SU grading only.)

295D. Dissertation Research (1-12) I, II, III. The Staff (SU grading only.)

NOTE: For key to footnote symbols, see page 131.

Professional Courses

300. Teaching of a Modern Foreign Language (S) III. Kaufman Lecture-discussion—3 hours. Prerequisite: senior or graduate standing in a major or minor in a modern foreign language.

309A. The Teaching of French in College (2) I. Wagnon Lecture-discussion—2 hours. Prerequisite: graduate standing or consent of instructor. 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.)

309B. The Teaching of French in College (2) II. Wagnon Lecture-discussion—2 hours. Prerequisite: graduate standing or consent of instructor. 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.)

309C. The Teaching of French in College (2) III. Wagnon Lecture-discussion—2 hours. Prerequisite: graduate standing or consent of instructor. 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.)

Freshman Seminar Program

Jay Mechiing, Ph.D., Program Director
Program Office, 17 Wellman (Teaching Resources Center) (752-6050)

Committee in Charge

Stephanie Beardsley, Ph.D. (Residence Life)
Erin Braddock (Student Representative, ASUCD—Academic Affairs)
Alan Jackman, Ph.D. (President’s Chair in Undergraduate Education)
Robert Powell, Ph.D. (College of Engineering)
David Robertson, Ph.D. (Committee on Educational Policy)
Harry Walker, Ph.D. (College of Agricultural and Environmental Sciences)
Carolyn Wall, Ph.D. (College of Letters and Science)
Dan Wick, Ph.D. (Teaching Resources Center)

Course in Freshman Seminar

Questions pertaining to the following course should be directed to the instructor or to the Teaching Re-
sources Center.

1. Freshman Seminar (2) I, II, III. The Staff Seminar—20 hours total (8 weeks). Prerequisite: open only to students who have completed less than 44 quarter units. Investigation of a special topic through shared readings, discussions, written assignments, and special activities (such as fieldwork, site visits, laboratory work, etc.) emphasis upon student participation in learning.

Genetics

(College of Agricultural and Environmental Sciences)

John A. Kiger, Jr., Ph.D., Chairperson of the Department
Department Office, 357 Briggs Hall (752-0200)

Faculty

James B. Boyd, Ph.D., Professor
Kenneth Burtis, Ph.D., Assistant Professor
Gordon J. Edin, Ph.D., Professor
John H. Gillaspie, Ph.D., Professor
Leslie D. Gottlieb, Ph.D., Professor
Melvin M. Green, Ph.D., Professor Emeritus
John A. Kiger, Jr., Ph.D., Professor
Timothy Probst, Ph.D., Professor Emeritus
(2021-2022)
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 and for 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. Further information can be obtained from the Division of Biological Sciences office, 376 Mrak Hall.

Genetics

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."

<table>
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<tr>
<th>Restrictive Electives</th>
<th>18-30</th>
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<tbody>
<tr>
<td>Six upper division courses in biological sciences, mathematics, chemistry, or other fields relevant to the student's interest chosen in consultation with the advisor. At least two different areas are to be represented, such as agricultural biology, biochemistry, cell biology, genetics, microbiology, plant biology, physiology, or systematics. No more than 4 units of 192, 198, or 199 units can be used in this category.</td>
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Unrestricted Electives

<table>
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<th>Total units for the Major</th>
<th>180</th>
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Genetics

190C. Introduction to Genetics Research (1) I, II, III. Summer.

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)

197T. Tutoring in Genetics (1-3) I, II, III. The Staff (Chairperson in charge)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Graduate Courses

202. Plasmids, Recombinant DNA, and Genetic Engineering (3) I. Rodriguez Lecture—4 hours. Prerequisite: course 102A or Microbiology 130A-B. Recommended. Prerequisite for current and prospective students in the graduate and professional programs in the School of Biological Sciences and in the Department of Molecular and Cell Biology. (SU grading only.) Offered in odd-numbered years.

190A. Seminar in Genetics (4) I, II, III, 190B. Lecture—4 hours. Prerequisite: course 190A or by arrangement with the instructor. Recommended. Prerequisite for current and prospective students in the graduate and professional programs in the School of Biological Sciences and in the Department of Molecular and Cell Biology. (SU grading only.) Offered in even-numbered years.

190C. Introduction to Genetics Research (1) I, II, III. Summer.

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)

197T. Tutoring in Genetics (1-3) I, II, III. The Staff (Chairperson in charge)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Graduate Courses

202. Plasmids, Recombinant DNA, and Genetic Engineering (3) I. Rodriguez Lecture—4 hours. Prerequisite: course 102A or Microbiology 130A-B. Recommended. Prerequisite for current and prospective students in the graduate and professional programs in the School of Biological Sciences and in the Department of Molecular and Cell Biology. (SU grading only.) Offered in odd-numbered years.

203. Advanced Evolution (3) III. Gottlieb Lecture—1 hour; discussion—2 hours. Prerequisite: graduate status. Adaptation and speciation, and biochemical and morphological evolution in plants and animals with emphasis on the appropriateness of different methods of analysis.

205. Theoretical Population Genetics (4) I. Turelli, Gillespie Lecture—4 hours. Prerequisite: course 105. Mathematics 22A, and Statistics 130A or 131A, and permission of instructor. Mathematics 22B recommended. Mathematical theory of population genetics wth emphasis on the assumptions underlying the standard models and the mathematical techniques used to derive conclusions. Take-home examination. (SU grading only.) Offered in odd-numbered years.

209. Molecular Evolution (3) III. Gillespie, Gottlieb, Turelli Lecture—3 hours. Prerequisite: course 109B. Recommended. Prerequisite: course 109A. Evolution from the molecular standpoint, including the evolution of genome structure and the organization of single genes and gene clusters, evolution of enzymes and metabolic pathways, molecular clocks, transcriptional and other regulatory elements of genes, and molecular polymorphism. Offered in even-numbered years. (SU grading only.)

290C. Research Conference in Genetics (1) I, II, III. The Staff (Chairperson in charge)

298. Research (1-12) I, II, III, The Staff (Chairperson in charge)

Professional Course

300. Methods in Teaching Genetics (1) I, II, III. The Staff (Chairperson in charge)

302. Job Orientation—1 hour. Prerequisite: graduate standing in Genetics and consent of instructor. Experience in methods and problems of teaching genetics, including analysis of tests and other materials, learning techniques, preparing for and conducting discussion and laboratory sections, preparing examinations. May be repeated for credit. (SU grading only.)
Genetics (A Graduate Group)

G. Eric Bradford, Ph.D., Chairperson of the Group
Group Office, 565 Briggs Hall (752-9091)

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 Advisers: Consult Genetics Graduate Group Office.

Courses in Genetics

Graduate Courses

220. Advanced Genetics Laboratory (5) III, IV, V. The Staff Laboratory—15 hours. Prerequisites: Genetics 100 or the equivalent; enrollment in Genetics Graduate Group. Student is assigned to genetics research laboratory. Individual research projects with emphasis on methodologies/ experimental design. May be repeated twice with credit, in different laboratories. (SuG grading only.)

221. Transmission Genetics (3) I. Goga Lecture—3 hours. Prerequisite: Genetics 100, introductory statistics, and calculus. Study of segregation, linkage, and mapping and the modification of Mendel's original genetic model.

222. Cytogenetics (3) II. Dorak, Murray Lecture—3 hours. Prerequisite: course 221. Study of karyotypes including metaphase, recombinatons, chromosomes, haploidy, aneuploidy, histone, monosomes, autopolyploids, and intra- and inter-specific manipulation.

291. Seminar in History of Genetics (2) III. Griesemer (Philo) Seminar—2 hours. Prerequisite: Genetics 100. The development of modern genetic theories beginning with Mendel. (SuG grading only.)

292. Seminar in Molecular Genetics I (1-3). I. The Staff Seminar—1-3 hours. Prerequisite: course 221. Topics of current interest related to the structure, function, and expression of genes.

293. Seminar in Cytogenetics I (1-3). II. The Staff Seminar—1-3 hours. Prerequisite: course 221. Related to the deletion, duplication, and rearrangement of chromosomal regions.

294. Seminar in Quantitative Genetics (1-3) I. The Staff Seminar—1-3 hours. Prerequisite: course 221. Topics of current interest related to the inheritance of continuous characters.

295. Seminar in Developmental Genetics I (1-3). III. The Staff Seminar—1-3 hours. Prerequisite: course 221. Topics in the area of cell-specific control of genes in development.

296. Seminar in National, Evolutionary, and Ecological Genetics I (1-3). II. The Staff Seminar—1-3 hours. Prerequisite: course 221. Topics related to the analysis and prediction of genetic changes in populations.

298. Group Study I (1-5). II, III. Members of the Group (Chairperson in charge) Prerequisite: consent of instructor. Group study of selected topics in Genetics. (SuG grading only.)

299. Research I (1-12). II, III. Members of the Group (Chairperson in charge) (SuG grading only.)

Geography

(College of Letters and Science)

Stephen C. Jett, Ph.D., Chairperson of the Department
Department Office, 280 Kerr Hall (752-0970)

Faculty

Conrad J. Bahro, Ph.D., Associate Professor
Mary B. Cunha, M.A., Lecturer
Robin E. Date, Ph.D., Lecturer
Dennis J. Dingemans, Ph.D., Associate Professor
Deborah L. Elliott-Fak, Ph.D., Assistant Professor
Howard F. Gregor, Ph.D., Professor
Louis G. Gruette, Ph.D., Professor (Geography, Nutrition)

Stephen C. Jett, Ph.D., Professor
Deryck O. Lodick, Ph.D., Lecturer
Mary莲 L. Shelton, Ph.D., Associate Professor
Kenneth Thompson, Ph.D., Professor Emeritus

The Major Program

Geography is a multifaceted discipline defined by its concern with place. Since antiquity, geography has embraced four traditions: spatial; area studies; Man-and-environment earth sciences. Geographers strive to answer spatial questions regarding the earth's surface and adjacent atmosphere and to describe and explain the character of regions; to ascertain the ways in which humans, historical and contemporary, have utilized and shaped the earth's surface; and to understand the physical, biotic, and human systems of our global environment and their mutual interactions.

The curriculum of the major permits students to pursue a program of study suitable with individual needs, interests, and objectives. In the Bachelor of Arts program, the student may choose a general program, or specialize in cultural/historical geography, economic/urban geography, physical geography (including biogeography), or regional planning and analysis. The Bachelor of Science program is for students with strong science backgrounds who are interested in some aspect of physical geography. Both degree programs include opportunities for developing skills in cartography, field techniques, quantitative methods, and remote sensing, and for planning consultation with the major adviser.

Geography is an essential component of a liberal education, and the major is intended to provide an opportunity for broad intellectual enrichment. Students trained in geography have advantages in pursuing careers in international trade, travel, and politics; environment- and resource-oriented government employment; cartography and remote sensing; primary and secondary education; and urban and regional planning.

A.B. Major Requirements:

Preparatory Subject Matter

Geography 1, 2, and 3

Depth Subject Matter

Geography 105 or 106, 151, and one UCD regional course from Geography 121A, 122A, 123A, 124A, 125A, 126B, 126, 127

Choose one emphasis from the following five:

Emphasis I (Cultural/Historical)

Geography 170A, 170B, 170C

Emphasis II (Economic/Regional)

Geography 110, 141, 155

Emphasis III (Biogeography)

Geography 170, 171, one course from 106, 115, 141, 155.

Four additional courses from:

Geography 110, 141, 155

Emphasis IV (Physical)

Geography 104, 142, 143, 156, 160, 161, 162

Emphasis V (Regional Planning and Analysis)

Geography 108, 110, 115, 162, 173, one course from 141, 142, 170, 171.

One additional course from Geography 102, 116, 117, 161.

Emphasis VI (Regional Planning and Analysis)

Geography 155 or 156, 110, one additional course from 121-127, and one course from 201, 160, 161, 162, 170, 173.

Environmental Planning and Management 150, 152, 154, Environmental Studies 171; Political Science 107 or Environmental Studies 161, plus one course from Economics 115A, Agricultural Economics 148, or Geology 134.

Total Units for the Major

45-54

Recommended: Geography 4.

Geography

B.S. Major Requirements:

Preparatory Subject Matter

Geography 1, 2, and 3, and 5

Statistics 13 or the equivalent

Mathematics 16A, 16B, and 16C, or Mathematics 21A, 21B, and 21C

Computer Science Engineering 10 or 30

Chemistry 1A, 1B, 1C or 4A, 4B, 4C

Biological Sciences 1

Zoology 2-2L, or Botany 2 or Geology 60-60L or Physics 6A and 6B

Depth Subject Matter

Geography 105, 106, 108, 115, 151

Two courses from Geography 102, 110, 119, 116, 117, 162, 173

One course from Geography 121A, 122B, 123A, 125A, 125B, 128B, 129, 127

Four additional upper division, letter-graded units in Geography

Nine additional upper division units chosen in consultation with the undergraduate adviser

Total Units for the Major

100-109

Recommended

Geography 4; Physics 6A, 6B; and Chemistry 6A and 6B

Addendum

The B.S. major provides a wide variety of possible themes, including geomorphology, climatology, zoogeography, plant geography, nutritional 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. When choices of individual courses are required, these must be made in consultation with the major adviser.

Geography

Minor I (Geological)

Geography 151, plus one course from each of the following four groups:

Geography 108, 115, or 173

Geography 170 or 171

Geography 105, 106, or 161

Geography 121, 122A, 123B, 124, 125A, 125B, 126, or 127

Minor II (Physical)

Geography 102, 108, 115, and 173, plus one course from 121, 122A, 123B, 124, 125A, 125B, 126, or 127

Minor III (Cultural)

Geography 176, 171, and 173, plus one course from each of the following two groups: Geography 121, 122A, 123B, 124, 125A, 125B, 126, or 127, and Geography 145, 172, or 175

Minor IV (Economic)

Geography 110 and 141, plus one course from each of the following three groups:

Geography 142, 143, or 156

Geography 160, 161, 162, or 170

NOTE: For key to footnote symbols, see page 131.
Courses in Geography

Lower Division Courses

1. Physical Geography (4) I. Elliott-Fisk; II. Jett
Lecture—3 hours; laboratory—2 hours. Basic physical elements of the earth, especially climate, landforms, soils, and natural vegetation.

2. Introduction to Cultural Geography (3) I. II. Simmons

3. Climate and Weather (4) I. II. III. Shelton
Lecture—3 hours; discussion—1 hour. Basic concepts of climate and weather; energy and moisture exchanges, atmospheric pressure, global circulation and winds; instruments for obtaining climatological data; weather maps; severe storms; climate and weather; and climate; climate change of climate; climate change.

4. Map and Map Interpretation (3) I. Bahre
Lecture—3 hours. Properties and components of maps; Major classes of projections; Types of maps; emphasizing relief, cartographic, thematic, and modern trends in mapping. History and development of cartography.

5. Introduction to Urban and Economic Geography (3) I. Lodrick; III. Gregor
Lecture—3 hours. The location of economic and urban activities; spatial organization of economic activities; development, agricultural and manufacturing regions, urban systems, and urban structure. General Education credit with concurrent enrollment in course 50: Contemporary Societies/Introduction.

6. Economic and Urban Geography: Discussion (1) Lodrick; III. Gregor
Discussion—1 hour; short papers. Prerequisite: course 5 concurrently. Small group discussion of topics and readings assigned for course 2. Preparation and discussion of short papers. General Education credit with concurrent enrollment in course 50: Contemporary Societies/Introduction.

7. Human Impacts on the Landscape (4) I. Jett; II. ———.
Lecture—4 hours. Local and global aspects, through time of human occupation, economics, and technologies on wild and domesticated flora and fauna; soils; water; landforms; climate; Emphasis on landscape modification. Not intended for students planning to take course 161 or 170.

10. The World Regions (3) I. Jett; II. Lodrick; III. Dinges-nara
Lecture—3 hours. The major geographic regions of the world; their political, economic, cultural, and ecological differences and global roles. Designed for non-majors.

10. Geography and Environmental and Regional Planning (3) Dinges-nara
Lecture—3 hours. Principles of spatial planning for regional change. Policies for environmental, economic, and social modifications. Illustrated case studies include: U.S. city planning; USSR industrial and population shifts; European regional plans; Chinese agricultural and environmental programs.

11. Field Work Group Study (1-5) I.-III. Staff (Chairperson in charge) Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only)

10. Upper Division courses

102. Field Course in Physical Geography (4) III. Elliott-Fisk and field trip—normally one week per quarter. Prerequisite: courses 1 and 2 and consent of instructor. Research methodologies for physical geography study. Synthesis of physical and regional mapping and analysis of elements of the natural landscape.

104. Field Course in Urban Geography (4) III. Dinges-nara
Lecture—1 hour; field study—full day per week. Field analysis of selected urban problems in California. Special attention to regional interrelationships, functional structure, and land-use changes as specifically related to the core of the city, changing residential patterns, and urban emergence of agricultural lands.

105. Cartography (4) II. Bahre
Lecture—1 hour; laboratory—8 hours. Prerequisite: course 4 or consent of instructor. Introduction and generalization of base-map data; symbolism and processing of map data; cartographic design and lettering techniques; map reproduction.

106. Aerial Photo Interpretation and Remote Sensing (4) III. Bahre
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or 2, consent of instructor. Remote sensing applications and image interpretation.

107. Advanced Cartography (4) III. Cunha
Lecture—1 hour; laboratory—8 hours. Prerequisite: course 105. Advanced principles and techniques of cartographic representation. Emphasis on geocoding, plate-making, process photography, color reproduction, and cartographic design. Use of contemporary cartographic and photographic equipment utilized in producing maps.

108. Analysis of Landforms (4) III. Elliott-Fisk
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to landforms and geomorphic processes. Topics include structural landforms, rock weathering and soil genesis, fluvial processes, and glacial, coastal, and landscape.

110. Quantitative Spatial Analysis (4) I. Dinges-nara
Lecture—3 hours; term paper. Prerequisite: courses 1, 2, or 5, and statistical methods. Use of quantitative techniques and computer graphic research and location planning; quantitative summary and analysis of spatial data patterns and trends; optimal location solutions; includes computer laboratory.

112. Coastal Landforms and Landscapes (4) III. Elliott-Fisk
Lecture—3 hours; discussion—1 hour. Prerequisite: course 148 or consent of instructor. Examination of the landforms and geomorphic processes found along coasts. Analyses of deltas in a variety of lithologic, tectonic, and wave-climate settings. Emphasis on the Quaternary history of coastal landscapes. Offered in even-numbered years.

115. Mesoclimatology (4) II. Shelton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Air energy and moisture exchanges at the earth-atmosphere interface: physical controls, spatial and temporal variations, methods for measuring, historical processes, classification of mesoclimates. Climatic and related processes in aerial systems. Human alteration of mesoclimates. Offered in odd-numbered years. (P/NP grading only)

116. Climate Change (4) I. Elliott-Fisk; Shelton
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 3. Nature, magnitude, timing, and causes of climate change. Spatial and temporal climatic variations within the Quaternary. Emphasis on even-numbered years.

117.Quaternary Environments (3) I. Elliott-Fisk
Lecture—3 hours. Prerequisite: course 1 or Biological Science 64. Emphasis on continental scale. Emphasis on the interaction of climate, timing, and magnitude of environmental changes during the Quaternary. (P/NP grading only). Analysis of methods of paleo-environmental reconstruction. Survey of the Quaternary record for selected regions.

120. Deserts of California and the Southwest (3) II. Jett
Lecture—3 hours. Prerequisite: courses 1 and 2, or consent of instructor. Emphasis on the desert region of California, Arizona, and New Mexico. Emphasis is on the desert region of California, Arizona, and New Mexico. Emphasis is on the desert region of California, Arizona, and New Mexico. Emphasis is on the desert region of California, Arizona, and New Mexico. Emphasis is on the desert region of California, Arizona, and New Mexico.

120. Field Excursion to California and the Western Deserts (2) II. Jett
Fieldwork—60 hours minimum (1 week). Field excursion to examine physical and human geography of selected desert areas in California, Arizona, and Utah. May not be repeated for credit. Limited enrollment; preference given to students having completed course 120. (P/NP grading only) Offered in odd-numbered years.

121. North America (4) II. Gregory
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Landscapes and lifeways in the United States and Canada, and the ways in which physical and human factors have been affected by Global Regional stresses within and between the two regions.

122. Mexico and Central America (4) III. Bahre
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Environment, culture, and economy from Mexico to Panama and in the Caribbean. Emphasis on understanding the evolution of the diverse natural and cultural landscapes of the Western Hemisphere. Offered in odd-numbered years.

128. South America (4) II. Bahre
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Mother land, energy, culture, and economy in the South American countries. Emphasis on understanding the evolution of the diverse natural and cultural landscapes of South America. The course will be cultural-historical and ecological. Offered in even-numbered years.

201. Europe (3) I. Darnell
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 Western Europe.

204. The Soviet Union and Eastern Europe (4) I. Dinges-nara
Lecture—3 hours; discussion—1 hour. Prerequisite: an Introduction to course in the social sciences is recommended. Human use of the land in the Soviet Union and Eastern Europe, location and nature of resources, agriculture, industry, and cities. Emphasis on land modification and resultant landscapes by the Soviet model of planning for regional development. General Education credit: Contemporary Social Science 11-Introductory. Also offered as Geography 2, 5, Economics 1A-18, Anthropology 2, or Political Science 2.

250A. North Africa and the Middle East (4) I. Grivetti
Lecture—4 hours. Prerequisite: courses 1 and 2 or consent of instructor. Geography of the Islamic world of North Africa and Southwest Asia; climatic and physical features; cultural and settlement patterns; and influence of Islamic economic and cultural development.

250B. South Africa (3) I. III. Simmons
Lecture—3 hours. Prerequisite: courses 1 and 2 or consent of instructor. Physical, cultural, and historical geography of Africa south of the Sahara.

250C. Southern Asia (3) III. Simmons
Lecture—3 hours. Prerequisite: courses 1 and 2 or consent of instructor. Physical, cultural, and historical geography of Southern Asia. Offered in even-numbered years.

270. Contemporary Asia (4) I. Dinges-nara
Lecture—3 hours; discussion—1 hour. Prerequisite: Introductory course in the social sciences; courses 200 or 2 recommended. Human use of the earth in East Asia. Location and nature of resources, agriculture, industry, and cities. Emphasis on land modification and resultant landscapes by the Chinese and Japanese as contrasting parts to economic development.

310. California (4) III
Lecture—3 hours; discussion—1 hour. The regional nature and variety of California: landforms, climates, vegetation, and population densities. Water, agriculture, and the cities. Ecological problems caused by increasing population and technological pressures on these environments.

141. Organization of Economic Space (4) I. Gregory
Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. Survey of the principal environmental, social, political, and cultural forces contributing to the regionalization of the world's economic activities. Outline of the more important regional patterns resulting from the interaction of forces; some future trends may also be put on these aspects as they pertain to the problems of regional disparities both within and between nations.

142. Geography of Agriculture (4) II. Gregory
Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. Distribution and areal variety of the world's food-producing areas, and the ways physical, historical, and economic factors have influenced these aspects of agriculture. Current and future trends and associated resource problems.

143. Political Geography (4) I. Lodrick
Lecture—3 hours; term paper. Prerequisite: differentiation of major natural and cultural phenomena affecting the world's political organization.

151. History of Geographic Thought (4) III. Simmons
Lecture—3 hours; term paper. Prerequisite: a political division in courses 2. The geography of geography: objectives, subdivisions, and development of the subject.

155. Urban Geography (4) I. Dinges-nara
Lecture—3 hours; term paper. Prerequisite: course 5 or
consent of instructor. Geography of land use within cities. The processes of change, and theories of economic and social organization of urban space. The urban landscape as a product of history, planning, and transportation systems. Prerequisite: Junior standing. 3 cr.

*156. The Urban Region (4). J. Lingeman
Lecture–4 hours. Term paper. Prerequisite: course 5 or consent of instructor. Location and functional interdependence of cities. Relations between city and hinterland, including labor mobility, service area, and economic base. Role of urbanization in regional development.

160. World Resource Patterns (3) III. Gregor
Lecture–3 hours. Prerequisite: upper division standing. Prerequisite: course 2. Resource distribution, concentrations and voids, and their significance for economic development and the welfare of the state. Focus on both natural and human components of the geographic complex. Resources; status of main economic regions.

161. Conservation of Resources and Environment (4) III. Lingeman
Lecture–4 hours. Principles of natural resource and environmental-quality conservation. Land use conflicts between forestry, agriculture, mining, municipal, and recreational interests. Roles of industry, government, and society in creating and resolving resource and environmental problems.

162. Water Geography (3) I. Shelton
Lecture–3 hours; discussion–1 hour. Prerequisite: course 1. Nature of water on the land; water use; and possible opportunities for water-resource development and conservation. Historical solutions to water needs of specific areas; and choice of models associated with current and future water requirements.

172. Animals and Culture History (4) III. Simoons
Lecture–4 hours. Prerequisite: course 2, Anthropology 2, or consent of instructor. Theory of animal domestication: spread of domesticated animals in Old and New Worlds; contrasting roles of domesticated animals in human ecology through time; pastoral nomadism and other animal-based economies.

173. Humans and Vegetation Change (4) III. Bahne
Lecture–3 hours; term paper. Prerequisite: course 1 or Biological 3. Consideration of human populations; patterns of environment-man relations. Ecological relation of gatherers, fishermen, hunters, cultivators, and urbanites; their environmental impacts; their domesticated plants and animals. General Education credit. Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2 or Geography 2.

177. Cultural Geography (4) II. Jett
Lecture–3 hours; term paper. Prerequisite: course 2 or consent of instructor. Consideration of principal concepts and approaches in cultural geography in modern times, and links and parallels in other disciplines. General Education credit. Contemporary Societies/Non-Introductory. Recommended GE preparation: Geography 2 or Anthropology 2.

178. Animals and Culture History (4) III. Simoons
Lecture–4 hours. Prerequisite: course 2, Anthropology 2, or consent of instructor. Theory of animal domestication: spread of domesticated animals in Old and New Worlds; contrasting roles of domesticated animals in human ecology through time; pastoral nomadism and other animal-based economies.

179. Geography of Food and Diet (4) I. Grivetti
Lecture–4 hours. Prerequisite: course 2 or Anthropology 2. Nutrition 20 recommended. Consideration of the cultural and environmental factors that influence dietary practices; historical development of food habits; food use in different economic systems, both traditional and contemporary. Offered in even-numbered years.

182. Student Internship in Geography (2-4) II, III. The Staff Internship–15-15 hours; grading options; term paper. Prerequisite: consent of undergraduate Geography major advisor and consent of instructor. Supervised program of study and investigations dealing with geographical problems. The application and evaluation of theoretical concepts through work experience with a variety of assignments and work schedules. (P/NP grading only.)

185. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

188. Special Study for Advanced Undergraduates. (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

201. Sources and General Literature of Geography (4) I, II, III. H. Schifferman
Seminar–4 hours. Prerequisite: graduate status in geography; consent of instructor. Designed for students preparing for higher degrees in geography. May be repeated for credit in one or more of the following subfields: physical, cultural, economic, urban, historical, political, conservation, and regional geography.

202. Seminar in Selected Regions (4) III. Simoons
Seminar–3 hours. Region to be announced annually.

204. Seminar in Cultural Geography (4) III. Simoons
Seminar–3 hours.

205. Seminar in Cultural Geography (4) III. Gregg
Seminar–3 hours. Prerequisite: graduate standing. Examination of that aspect of cultural plant geography dealing with human impacts and vegetation change in the earth's major biomes. Particular emphasis on the World's savannas, deserts, and grasslands. Offered in odd-numbered years.

206. Seminar in Political Geography (4) I. Lingeman
Seminar–3 hours.

208. Seminar in Climatology (4) I. Shelton
Seminar–3 hours.

209. Seminar in Urban Geography (4) III. Lingeman
Seminar–3 hours.

210. Seminar in Agricultural Geography (4) I. Gregor
Seminar–3 hours. Prerequisite: 2.

212. Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor.

213. Individual Study (1-12) I, II, III. The Staff
Prerequisite: graduate student status in Geography and consent of instructor. (SU grading only.)

Geology

(College of Letters and Science)

Eldridge M. Moores, Ph.D., Chairperson of the Department, Office, 174 Physics-Geology Building (752-0350/0351)

Faculty

Sandra J. Carlson, Ph.D., Lecturer
Richard Cowen, Ph.D., Professor
Robert E. Criss, Ph.D., Associate Professor
Howard W. Davis, Ph.D., Professor
James A. Doyle, Ph.D., Professor (Botany)
Anthony A. Finnerty, Ph.D., Assistant Professor
Harry W. Gear, Ph.D., Professor
Charles G. Higgins, Ph.D., Professor
James A. Hofmeister, Ph.D., Assistant Professor
Stanley V. Margolis, Ph.D., Professor
Robert A. Matthews, A.B., Lecturer
Kenneth L. Verosub, Ph.D., Professor

Graduate Courses

202. Research Trends in Geography (1). I. The Staff (Chairperson in charge)
Seminar–1 hour. Major current research themes and trends in geography. (SU grading only.)

203. Major Programs

*Civilization exists by geological consent—subject to change without notice.*

WILL DURANT

Geology is a science that has the whole Earth and other planetary bodies as its laboratory. In effect, it is an extension of history and archaeology to a much longer time scale and less well-preserved record. Geology involves the application of biology, chemistry, and physics to the study of the past and present Earth and its neighbors in space. Geologists appreciate Earth and other planets from three different perspectives—scientific, human, and aesthetic. The scientific perspective involves an understanding of the planets and how and why they change and evolve. The human perspective involves the responsibility for Earth hazards such as earthquakes, volcanic eruptions, landslides, the concentration of mineral resources, and the ever-increasing problems of air and water supply. The aesthetic level involves enjoyment of the natural beauty of the subjects we study, such as the mountains, the lakes, the river valleys, the seashores, or even crystals in a microscope.

Geologists practice their profession in a variety of settings—resources and environmental industries, government organizations and research laboratories, and colleges and universities. In addition, there is a growing need for earth science teachers at all public school levels. As a degree in geology from Davis provides the student with an excellent preparation for graduate study or for professional employment.

Students interested in becoming professional geologists or continuing their geological studies at the graduate level should elect the Bachelor of Science degree program. The Bachelor of Arts program is designed for students interested in an interdisciplinary program of study, or who plan to go into teaching. Requirements for both programs include a number of elective courses that provide students opportunities to emphasize different aspects of the field. Courses to fulfill these elective requirements must be chosen to provide a coherent and integrated program of study and must be approved by an undergraduate advisor before they are taken. In either program, additional courses may be elected to conform to depth or breadth, or to fulfill other special requirements.

High school students should note that the preparation for either program requires high school chemistry and four years of mathematics or the equivalent. Transfer students applying to the B.S. degree program will find it helpful to have completed a course in physical geology with laboratory or mineralogy with laboratory and the equivalent of either Chemistry 1A-1B-1C or Physics 6A-6B-6C, as well as Mathematics 21A-21B-21C.

Geology

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 1A-1B-1C</td>
<td>4-4-5</td>
<td>Minimum hours.</td>
</tr>
<tr>
<td>Mathematics 1A-1B-1C</td>
<td>4-4-5</td>
<td>Minimum hours.</td>
</tr>
<tr>
<td>Chemistry 1A-1B</td>
<td>1-4</td>
<td>Minimum hours.</td>
</tr>
<tr>
<td>Physics 6A-6B-6C</td>
<td>12</td>
<td>Minimum hours.</td>
</tr>
</tbody>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology 105, 106, 110, 111, 114, 120</td>
<td>12-13</td>
<td>Minimum hours.</td>
</tr>
<tr>
<td>Geology 105, 106, 110, 114</td>
<td>12</td>
<td>Minimum hours.</td>
</tr>
</tbody>
</table>

27. Additional upper division electives chosen from selected courses in geology and related fields approved in advance by the major advisor (see advisor for list of approved courses)

Total Units for the Major

83-84

Recommended

Chemistry 1C or 4C, Geology 3, Statistics 13 or 102.

Geology

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>56</td>
<td>Minimum hours.</td>
</tr>
<tr>
<td>Geology 3, 5L, 50L, 60L</td>
<td>14</td>
<td>Minimum hours.</td>
</tr>
<tr>
<td>Mathematics 21A-21B-21C</td>
<td>12</td>
<td>Minimum hours.</td>
</tr>
<tr>
<td>One course chosen from Mathematics 22A, 22B, 22C, Statistics 32, 102.</td>
<td>3</td>
<td>Minimum hours.</td>
</tr>
<tr>
<td>Chemistry 1A-1B-1C, or preferably 4A-4B-4C</td>
<td>12</td>
<td>Minimum hours.</td>
</tr>
<tr>
<td>Physics 5A-6B-6C or 6A-6B-6C</td>
<td>12</td>
<td>Minimum hours.</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>54</td>
<td>Minimum hours.</td>
</tr>
<tr>
<td>Geology 102, 105, 106, 110, 111, 114, 120, 123</td>
<td>35</td>
<td>Minimum hours.</td>
</tr>
<tr>
<td>Geology 190 (repeat course for lab)</td>
<td>2</td>
<td>Minimum hours.</td>
</tr>
<tr>
<td>One course chosen from Geology 124, 125</td>
<td>5</td>
<td>Minimum hours.</td>
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</tbody>
</table>

Additional upper division electives chosen from selected courses in geology and related

Minor Program Requirements:

Students in other disciplines may elect to complete a minor in Geology by choosing a geological subject emphasized below. On transcripts the minor will appear as a minor in Geology.

General Geology...22
Geology 50 and 50L (or 1, 1G, and 1L) 5
Geology 105, 106L, 106 5
Geology 108 and 108L (or 107 and 107L) 5
Geology 113, 115, or 116 5


Economic Geology emphasis...18-20
Geology 115, 117A, 117B, 130, 170 5
One course chosen from Economics 123, Engineering 160, Geology 152, S181 5

Minor Adviser: R.E. Criss.

Engineering Geology emphasis...19-22
Geology 50 and 50L 5
Civil Engineering 171, 172 5
Three courses chosen from:
Geology 117A, 117B, 134, 175 5
Soil Science 118, 120 5
Water Science 142, 146 5

Minor Adviser: R.A. Matthews.

Environmental emphasis...23-24
Geology 130, 134, 152, 173 13
Soil Science 118 4
Water Science 141 or Civil Engineering 142 3
One course chosen from Environmental Studies 160, 171, 179, Geology 154 5

Minor Adviser: R.A. Matthews.

Geochemistry emphasis...18-20
Chemistry 110, 110C 6
(Chemistry majors must substitute one of the elective courses for Chemistry 110)
Geology 60, 60L, 115, 160 9
One elective course chosen from Chemical Engineering 151, Chemistry 156, Engineering 130, 134, Geology 150A, Soil Science 152, Water Science 180 5

Minor Adviser: R.E. Criss.

Geomorphology emphasis...20-22
Geology 50 and 50L (or 1, 1G, and 1L) 5
Geology 105, 106L, 106 5
Geology 152 or Geography 106 4
At least eight additional units chosen from the following:
Geography 108, 112, 117
Geology 134, 153, 154
Soil Science 120
Water Science 141 5

Minor Adviser: C.G. Higgins.

Geophysics emphasis...21-24
Geology 117A, 117B, 5181 9
Applied Science Engineering 115 3
One course sequence chosen from the following...8-12
(a) Geology 150, 152, Physics 105C;
(b) Geology 128A, 128B, 128C;
(c) Geology 104A, 104B, 105C.

Minor Adviser: J. S. McClain.

Oceanography emphasis...20-28
Geology 106, 116, 117, 170, 175 17
One course chosen from Environmental Studies 100, 111A, 111B, S119, Water Science 180 3-8

Minor Adviser: S. V. Margolis.

Paleobotany emphasis...15-21
Geology 110 and 110L 10 or 107 and 107L 7
Geology 112, 113, 114, 146 5
At least six additional units from the following:
Anthropology 151 or 152 5
Botany 110 5
Genetics 103 3
Geology 111A, 111B, 145, 146, 150C 10
Water Science 105, 112, 125, 148 5

Minor Adviser: P.W. Signor.

Teaching Credential Subject Representative: C.G. Higgins. See also under Teacher Education Program.

Graduate Study. The Department of Geology offers a program of advanced study 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. Day, J.F. Mount, G. Verm.}

Courses in Geology

Lower Division Courses

I. The Earth (3) I. Cowen, III Higgins Lecture—3 hours. Introduction to the study of the Earth for those not majoring in geology or associated sciences. Not open for credit to students who have taken course 50. General Education credit with concurrent enrollment in course 104: Nature and Environment/Introduction.

II. Earth Discussion (1) I. Cowen, III Higgins Discussion—1 hour. Prerequisite: course 1 concurrently. Small group discussions and preparation of short papers for course 1. General Education credit with concurrent enrollment in course 1: Nature and Environment/Introduction.

II. Earth Laboratory (1) I. Cowen, III Higgins Laboratory—3 hours. Prerequisite: course 1 (previously taken concurrently). Introduction to Earth materials (minerals and rocks), crustal deformation (faults and folds), landforms, and the processes that form them. No credit for students who have taken course 50L.

III. History of Life (II) C. Cowen Lecture—3 hours. Prerequisite: course 1 recommended. The history of life during the three and one-half 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. General Education credit with concurrent enrollment in course 3: Nature and Environment/Introduction.


III. History of Life Laboratory (1) C. Cowen Laboratory—3 hours. Prerequisite: course 3 (concurrently). Exercises in linking key details as the core to interpreting ancient life, including their functional morphology, paleoecology, and evolution.

IV. Evolution and Paleobiology of Dinosaurs (2) III. Carteron, C. Cowen Lecture—2 hours. Introduction to evolutionary biology, paleobiology, and paleoecology, using dinosaurs as case studies.

17. Earthquakes and Other Earth Hazards (2) I. Matthews Lecture—2 hours. The impact of earthquakes, volcanoes, landslides and other Earth phenomena. Discussion of the causes, effects, and solution of geologic problems in rural and urban settings.

20. Geology of California (2) I. Matthews Lecture—2 hours. Introduction to the geology of California, the origin of rocks and the environments in which they were formed, the structure of the rocks and the interpretation of the structure, history, mineral resources, and appreciation of the California landscape.

NOTE: For key to footnote symbols, see page 131.
paleoclimates, and applications to the study of earth processes.

"215. Tectonics (3) I. Moores Seminar—3 hours. Prerequisite: course 108 or consent of instructor. Introduction to the study of the interaction of tectonic forces at the Earth’s surface, the relation of tectonics to earth history, and the origin of plate motion, with selected examples from the Earth’s deformed belts.

"217. Topography in Geophysics (3) I. Verosub Lecture—1 hour; seminar—2 hours. Prerequisite: consent of instructor. Detailed evaluation of current research in a given area of geophysics. Topic will change from year to year. May be repeated for credit. Offered in odd-numbered years.

"218A. Structural Analysis I: Macrolithics (5) I. Twiss Seminar—3 hours. Prerequisite: consent of instructor. Geometric and kinematic analysis and interpretation of macroscopic and macroscopic rock textures; structures and fabrics; geometry of folding, superimposed folding, and folded lineations; synthesis of data with the interpretation of fabrics; determination of slip lines of deformation; regional structural synthesis. Offered in odd-numbered years.

"218B. Structural Analysis II: Microlithics (4) I. Green Seminar—3 hours; laboratory—3 hours. Prerequisite: consent of instructor; course 218A recommended. Microscopic structural aspects of deformed metamorphic rocks, emphasizing deformation features and the origin and significance of preferred crystallization orientation. Offered in odd-numbered years.

220. Mechanics of Geologic Structures (3) II. Twiss Lecture—1 hour. Prerequisite: course 162, or consent of instructor and course 105. Application of principles of continuum mechanics to the understanding of the mechanisms of deforming structures such as folds, faults, dike, cleavage, and tectonic. Offered in even-numbered years.

226. Advanced Sedimentation and Sedimentary Petrology (4) III. McClain Lecture—2 hours; laboratory—8 hours. Prerequisite: course 106, 116, 150B or 165, or consent of instructor. Critical discussions and review of selected topics in marine geology such as paleoceanography, biostatigraphic history of the ocean basin, evolution of ocean basins and margins, and sea bed mineral resources. Topics vary yearly. May be repeated for credit. Offered in even-numbered years.

228. Marine Geology (3) I. Margolis Lecture—3 hours. Prerequisite: course 80 or the equivalent; undergraduate background in geology. Petrology and crystallography of the major rock forming minerals. Principles of mineral behavior in odd-numbered years.

231. Mineral Physics Seminar (3) I. Hofmeister Seminar—3 hours. Prerequisite: course 230. Review of selected topics in mineral physics (e.g., the earth’s thermal budget, physical properties and equations of state, phase transitions, mantle and mineralogy). Study of the Earth’s surface and its evolution; transport phenomena in the earth’s interior. May be repeated for credit. Offered in odd-numbered years.

236. Inverse Theory in Geology and Geophysics (3) III. McClain Lecture—3 hours. Prerequisite: consent of instructor. Inversion of data for model parameters. Evaluation of parameter uncertainties. Linear and nonlinear problems for discrete and continuous models. Gauss-Newton iterations. Offered in even-numbered years.

238. Theoretical Seismology (3) II. McClain Lecture—3 hours. Prerequisite: consent of instructor. Elastodynamic wave equation. Greens functions and source representations. Ray theory, plane and spherical waves and boundary conditions. Elastic wave propagation in stratified media. (P/PN grading only.) Offered in odd-numbered years.


"245. Metamorphic Petrology (5) I. Day Lecture—3 hours; laboratory—6 hours. Prerequisite: course 125 or consent of instructor. Metamorphic processes; origin and characteristics of metamorphic rocks; laboratory study of representative rock suites in hand specimen and thin section. Offered in even-numbered years.

246. Physical Chemistry of Metamorphic Processes (3) II. Day Lecture—3 hours. Prerequisite: course 125, Chemistry 110A, or consent of instructor. Physicochemical principles of metamorphic mineral equilibria; determination of the paragenesis of metamorphic rocks. Offered in even-numbered years.

"247. Metamorphic Petrology Seminar (3) II. Day Seminar—3 hours. Prerequisite: course 245; course 246 recommended. Selected topics in metamorphic petrology (e.g., mass transport processes, textural settings, geothermometry, thermodynamic, petrologic belts, regional studies). May be repeated for credit when topic is different. Offered in odd-numbered years.

250. Advanced Geochemistry Seminar (3) I. Cita 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, origin and chemistry of the oceans. Subject varies yearly depending on student interest. May be repeated for credit. Offered in odd-numbered years.

254. Phase Equilibria (3) I. Finney Seminar—3 hours. Prerequisite: Chemistry 1C and Mathematics 22A; physical chemistry recommended. Physicochemical aspects of phase relations in silicate systems and their application to the petrogenesis of igneous and metamorphic rocks.

260. Paleontology (1) I. Carroll; II. Signor; III. Vermeij Seminar—3 hours. Prerequisite: course 111A or 111B, or graduate standing in a biological science. Selected problems in paleontology will be studied to be decided at an organizational meeting.

263. Functional Morphology of Fossil Invertebrates (4) C. Owen Lecture—2 hours; laboratory—6 hours. Prerequisite: course 111A or Zoology 112. Principles and methods of functional analysis of fossils, with special reference to selected problems in invertebrate paleontology. Offered in even-numbered years.

"268. Evolutionary Biology of Protists (3) III. The Staff Seminar—3 hours. Prerequisite: course 111B. Analysis and discussion of selected topics on the evolution of single-celled organisms with emphasis on their fossil record and biology. Offered in even-numbered years.

270. Igneous Petrology (3) III. Finney Seminar—2 hours; laboratory—3 hours. Prerequisite: course 123. Integrated laboratory, field study, and seminar on igneous processes and products.

272. Geological X-Ray Spectrometric Analysis (4) II. Schifman Lecture—3 hours; laboratory—3-4 hours. Prerequisite: course 60, Chemistry 4C; Physics 18D, graduate standing in Geology. Theory of generation and detection of x-rays as applied to analytical chemistry of rocks and minerals. Laboratory sessions on use of the x-ray fluorescence spectrometer, electron microprobe, and x-ray diffractometer.

276. Seminar in Geology (1 I, II, III. The Staff Seminar—1 hour; discussion—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. (SU grading only.)

277. Geology of the Sierra Nevada (1) I. Day, Moores Seminar—one day-long session. Prerequisite: consent of instructor. Short oral presentations by students and faculty concerning results of their past work and plans for future work in the field. The format is required following the format required at professional meetings. (SU grading only.)

"283. Advanced Problems in Geodynamics (3) III. Twiss Seminar—3 hours. Prerequisite: course 105 or consent of instructor. Seminar dealing with problems in geodynamics. Topics will vary (e.g., ductile deformation mechanisms, brittle fracture, earthquake prediction, driving forces for plate tectonics, mantle convection). Emphasis on recent literature. May be repeated for credit. (SU grading only.) Offered in odd-numbered years.

286. Advanced Problems in Tectonics I (3) I. Moores Seminar—3 hours. Prerequisite: course 108 or consent of instructor. Seminar dealing with current problems in tectonics of selected regions. Topics will change from year to year. Emphasis on study of recent literature. May be repeated for credit. (P/PN grading only.)

288. 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.)

NOTE: For key to footnote symbols, please see page 131.
German

Humanities: History 143, Philosophy 170, 175, 176.
Social Sciences: Economics 174, Geography 129, Political Science 117, 137.
Fine Arts: Art 176C, 177A, 177B, Music 110A, 110C, 110D.

Special concentration: German

Social and cultural influences in German literature are as follows:

German Language Emphasis
German 101, 102
Three literature courses chosen from German 102, 120, 121, 122, 123
German 120
German 104A, 104B
Three courses selected from German 105C, 106
107, 108, 109A, 109B, 120
Total Units for the Major
44-70

Minor Program Requirements:
The Department offers a German Language minor and a German Literature minor. In addition, individuated 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.

UNITS
German Language 18-24
Choose courses numbered from German 100A through 109B
18-24

German Literature 18-24
Choose courses numbered from German 101, 102, 120 and above
18-24

One lower division course from German 48 to 52
May be counted.

Major Advisers: G. Finney, P. Schaeffer.

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 the University and College requirements.

Teaching Credential Subject Representative: I. Henderson. See also under the Teacher Education Program.

The Master of Arts Degree. The Department offers programs of study leading to the M.A. degree under both Plan I (thesis) and Plan II (comprehensive final examination). A minimum of 30 units is required for Plan I, and a minimum of 36 units for Plan II. Further information may be obtained by writing to the Department Chairperson or 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 Department Chairperson or the Graduate Adviser.

Graduate Advisers: R. Hoermann, A.K. Kuhn

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 (5) I, II, III. Henderson Lecture-discussion—5 hours. Prerequisite: overall high school GPA of 3.5 or better. German for students with little knowledge of German. Accelerated and considerably expanded introduction to German language, short literary texts, and culture accompanied by computer-assisted grammar instruction.

2. Elementary German (5) I, II, III. Henderson Discussion—5 hours. laboratory—1 hour. Prerequisite: course 1.

3. Elementary German (5) I, II, III. Henderson in charge Discussion—5 hours. laboratory—1 hour. Prerequisite: course 1.


10. Advanced German (4) I, II, III. Henderson Lecture-discussion—5 hours. Prerequisite: course 2.


30. Survey of German Culture (3) I. Henderson Lecture-discussion—3 hours. Prerequisite: course 2.

31. Introduction to Literary Analysis (4) I. Finney Lecture—3 hours. discussion—1 hour. Prerequisite: course 2.

32. Mastersworks of German Literature in English Translation (4) I. Fetzner, Finney Lecture—3 hours. papers. Representative masterworks in English translation. beginning with the baroque period of seventeenth-century (t Religious drama such as comedy, novel, novella, fairy tale, lyric poetry) through the modern epoch. Lectures cover background information on pertinent authors and themes. General Education credit: Civilization and Culture/Introduction.

96. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Privately for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-6) I, II, III. The Staff (Chairperson in charge) (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) I. The Staff (Chairperson in charge) Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

100C. Advanced German Conversation (2) I. 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 4 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 4 or consent of instructor. Practice in short essay writing. Discussion based on readings from a variety of German texts.

103. Advanced Composition and Conversation (4) I, II, III. The Staff Discussion—3 hours. written reports. Prerequisite: course 4 or consent of instructor. Advanced essay writing and discussion of selected texts.

104A. Translation (4) I. Schaeffer Discussion—3 hours. written reports. Prerequisite: course 2 or the equivalent. Exercises in German/English translation using literary and non-literary texts of different styles and linguistic difficulties.

104B. Advanced Translation (4) I. Schaeffer Discussion—3 hours. written reports. Prerequisite: course 2 or the equivalent. Exercises in German/English translation using literary and non-literary texts of different styles and linguistic difficulties.

105. German Phonology-Morphology (4) I. Berwanger Discussion—3 hours. written or oral report. Prerequisite: course 4. Linguistics 1 recommended. Modern German phonology and morphology. Survey of the phonological system. Elementary morphological analysis.

106. History of the German Language (4) I. Berwanger Discussion—3 hours. written reports. Prerequisite: course 2 or the equivalent. Exercises in German/English translation using literary and non-literary texts of different styles and linguistic difficulties. Study of the development of the German language and study of its structure in historical perspective.

107. Modern German Syntax (4) I. Berwanger Discussion—3 hours. term paper. Prerequisite: course 2 or the equivalent or consent of instructor. Linguistics 1 recommended. Class of individual projects on regional differences, including all of the contiguous German-speaking areas of Europe.

109A. Business German (4) I. Henderson Lecture—discussion—4 hours. Prerequisite: course 105 or the equivalent. Business-oriented German-speaking business people and their work. Discussion as the basis for discussions, role-plays, reports, compositions and translations.

109B. Advanced Business German (3) I, II, III. Henderson Lecture—discussion—3 hours. Prerequisite: course 109A or consent of instructor. Specialized advanced language course designed as sequel to German 109B. Expands on previously introduced material and features new topics of interest such as management, computers, and business law.

NOTE: For key to footnote symbols, see page 131.
114. Older German literature in English (4) 1. McConnell Lecture 3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Knowledge of German not required. Reading and discussion in English of German literature from the Middle Ages through the Romanticism of 1800. Literature of Germany, especially including the Middle Ages; the early and late Middle Ages, the Renaissance, and the Romantic Period. Knowledge of German not required. Three modes of the Nibelungen legend: the Medieval epic poem Nibelungenlied, the European Danish saga of Volsunga Saga, and modern works of German and English authors. 

122. The German Novelle (4) 3. Barnd Lecture 3 hours; discussion—3 hours; reports. Prerequisite: course 101 (may be taken concurrently) or consent of instructor. Reading in the works of Germany’s leading dramatists from the seventeenth century to the present day, such as Lessing, Goethe, Schiller, Kleist, Hebbel, Hauptmann, Brecht. Discussion in German and English.

124. Field Work in German (1-12) 1, 2. Ill. III. Henderson Internship 3-6 hours. Prerequisite: 100A. Internship with several German companies. Participation in various business activities where expertise in German is expected and will be rewarded. (P/NP grade only.)

130. Special Study for Honors Students (5) I, II, III. The Staff Prerequisite: open only to honors students. Guided research leading to an honors paper.

175. Tutoring German (2-4) I. Henderson Lecture—2 hours; term paper. Prerequisite: course 102 or consent of instructor. Tutoring and leading of special discussion sessions in first-year language classes. Offers teaching opportunities under guidance of staff after initial observation period. Exposes course participants to all phases of college teaching; instant feedback and discussion. (P/NP grading only.)

189. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

196. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses
Note: Aside from courses 210 and 202 (which are usually offered on a yearly basis), regular graduate course offerings fall into two categories, general and special.

Genral —202-210, 211, 242, 285-296. These are subdivided into the following areas: (1) Germanic linguistics, (2) literary theory, (3) literature to 1400, (4) literature, 1400-1700, (5) literature, 1700-1785, (6) literature, 1785-1830, (7) literature, 1830-1910, (8) literature, 1910-1933, (9) literature, 1933-1965, (10) literature, 1965-present.

Special—240, 241, 252-261, 297. These courses deal with a special topic which frequently transcends the limits of the above General areas.

During any three-year cycle, the Department offers each quarter at least one course not normally part of the nine general areas and one special course (according to expressed student need).

202. Middle High German (4) 2. Berwanger Seminar—3 hours. Outline of grammar; selection of Middle High German epic and lyric poetry.

208. Literary Stylistics (4) 1. Schaeffer Seminar—3 hours; reports. History and meanings of style; levels of diction; analysis of current literary and critical styles. Practice in writing book reviews, articles, lectures and other papers.

210. Techniques of Literary Scholarship (4) 1. I. Petzer Seminar—3 hours. The bibliographic, organizational, and methodological tools and resources for advanced, independent research.

211. Concepts in Literary Theory (4) I. The Staff Seminar—3 hours; reports. Advanced course in contemporary literary theory and criticism. Discussion of the emergence of theoretical concepts and their impact on the understanding and appreciation of literary works. Discussion in German and English, readings in German.

212. Contemporary Approaches to Literary Theory (4) III. Filene Seminar—3 hours; term paper. Study of contemporary theoretical approaches such as structuralism, deconstruction, feminism, Marxism/ Frankfurt School, and reception theory in conjunction with the works of major authors. Offered in odd-numbered years.

240. Forms of German Verse (4) II. Sammern Seminar—3 hours. The development of German verse from the Middle Ages to Gotthold Benn, with special emphasis on different techniques of text analysis and interpretation. May be repeated for credit with consent of instructor.
244 Greek

241. The German Drama (4) Ill. Finney Seminar—3 hours. The major forms of German drama from its origins to the middle of the twentieth century. May be repeated for credit.

242. The German Novelle (4) II. Bernd Seminar—3 hours. The major German Novellisten, with particular emphasis on the flowering of this genre in the nineteenth century. May be repeated for credit with consent of instructor.

243. Fontane and the Rise of the Modern German Novel (4) II. Bernd Seminar—3 hours; term paper: Fontane, the father of the modern German novel and the chief German representative of the European novel at its greatest, in the context of the 19th century’s political and social scene. Offered in odd-numbered years.

252. The Writings of Lessing (4) I. Sammern Seminar—3 hours. Study of Lessing’s theory of literature with particular emphasis upon his critical attacks on French drama.

253. Goethe (4) II. The Staff Seminar—3 hours. Study of the origins of Goethe’s thought in German Pietism, and his principal artistic, autobiographical, scientific, and philosophical works.

254. Schiller (4) III. The Staff Seminar—3 hours. A critical analysis of Schiller’s major works and their impact on the intellectual climate in Germany during the late eighteenth and early nineteenth centuries.

257. Heinrich von Kleist (4) II. Bernd Seminar—3 hours. Kleist’s important dramatic and prose works, with selections from Oedipus, Pippion, and the hero pathos in modern German, French and Anglo-American Kleist criticism.

258. The Novels of Thomas Mann (4) II. Menges Seminar—3 hours. Reading of selected novels with emphasis on aesthetic techniques, originality, political and social influences and on the contemporary literary scene in Germany.

259. Studies in Kafka (4) I. Hoerrmann Seminar—3 hours. Study of Kafka’s narrative techniques with special emphasis on the shorter works on the existential development from its roots in expressionism.

260. The Poetry of Rilke (4) I. Menges Seminar—3 hours. Study of the principal motifs, myths, images and problems in the poetry of Rainer Maria Rilke.

261. Brecht and the Epic Theater (4) III. Sammern Seminar—3 hours. A reading of Brecht’s works with emphasis on the ideas which impelled the development of new literary forms and concepts.

270A. Research in a Period or Topic (4) I, II, III. The Staff (Chairperson in charge)

270B. Basic Research for the Dissertation (4) I, II, III. The Staff (Chairperson in charge)

270C. Basic Research for the Dissertation (4) I, II, III. The Staff (Chairperson in charge)

285. Middle High German Literature (4) Ill. McConnell Seminar—3 hours; report and term paper, Prerequisite: course 270B. Study of the language problems that holds promise of yielding dissertation topics, culminating in a term paper. Required for Ph.D. candidates prior to the Qualifying Examination.

286. The Enlightenment in German Literature (4) I. Schaefner Seminar—3 hours. The parodic and didactic style in German literature during the eighteenth century. May be repeated for credit with consent of instructor.

287. German Language of the Baroque (4) I. Schaefner Seminar—3 hours. The "Elegiastyled" and the varying means employed to portray it in the seventeenth-century German literature. May be repeated for credit with consent of instructor.

290. The Enlightenment in German Literature (4) II. Fietzer Seminar—3 hours. Revisit against the concept of the "Enlightened," and evolution of a new literary basis on reason and wit. May be repeated for credit with consent of instructor.

292. Sentimentality and "Sturm und Drang" in German Literature (4) II. The Staff Seminar—3 hours; written reports. Reaction to overemphasis on Reason; theories of Harsmann and Herder and works of poets such as Lenz, Lessing, the early Goethe and Schiller. May be repeated for credit with consent of instructor.

293. The Classical Age of German Literature (4) II. The Staff Seminar—3 hours. Inquiry into the artistic 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. Fietzer Seminar—3 hours. Survey of the works of every nineteenth-century author 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 1890. Important phases in their development will be treated. May be repeated for credit with consent of instructor.

296. Twentieth-Century German Literature (4) I. Kuhn Seminar—3 hours. Considers the revolt of the Hauptmann generation, symbolism, expressionism, and the chief currents of the contemporary scene. May be repeated for credit with consent of instructor.

297. Special Topics in German Literature (4) I, II. The Staff Seminar—3 hours. Seminar will be given to the peculiar problem of a particular author, demanded to be renewed in each year.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)

300. Special Study for the Doctoral Dissertation (1-12) I, II, III. The Staff (Chairperson in charge)

Professional Courses

305. A Teaching of German (2) I. Henderson Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (SU/Grading only)

306. The Teaching of German (2) II. Henderson Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (SU/Grading only)

307. Teaching of German (3) II. Henderson Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (SU/Grading only)

400. Tutorial and Instructional Internship (1-3) I, II, III. The Staff (Chairperson in charge)

401. Discussion—1 hour. Prerequisite: graduate standing. A seminar in ongoing undergraduate literature courses taught by regular staff, with supplementary weekly critiques sessions, intern leadership of discussion sections under staff supervision. May be repeated for credit.

Greeks

See Classics

Hebrew

See Religious Studies

History

(Collage of Letters and Science)

Roland Marchand, Ph.D., Chairperson of the Department

Department Office, 176 Voorhees Hall (792-0776)

Faculty

Arnold J. Bauer, Ph.D., Professor
William M. Bowesky, Ph.D., Professor
Cynthia L. Brantley, Ph.D., Associate Professor
David Brody, Ph.D., Professor
Daniel R. Brower, Jr., Ph.D., Professor
Daniel H. Calhoun, Ph.D., Professor
Robert O. Crummay, Ph.D., Professor
Manfred P. Fleischer, Ph.D., Professor
John Freeman, M.A., Visiting Professor (Political Science)
Paul Goodman, Ph.D., Professor
William W. Hagen, Ph.D., Professor
W. Turcineau Jackson, Ph.D., Professor Emeritus
Earl H. Kinmonth, Ph.D., Associate Professor
Norma B. Landau, Ph.D., Associate Professor
Kwang-Ching Liu, Ph.D., Professor
Eugene Lunn, Ph.D., Professor
C. Roland Marchand, Ph.D., Professor
Ted W. Margaliant, Ph.D., Professor
Barbara Metcalf, Ph.D., Professor
Rolf E. Pappo, Ph.D., Professor
Don C. Price, Ph.D., Professor
Ruth E. Rosen, Ph.D., Associate Professor
Morton Rothstein, Ph.D., Professor
Vicki L. Ruiz, Ph.D., Associate Professor
Richard N. Schwab, Ph.D., Professor
Morgan B. Sherwood, Ph.D., Professor
James H. Shildler, Ph.D., Professor Emeritus
Michael Smith, Ph.D., Associate Professor
Wilson Smith, Ph.D., Professor
Stylianos Spyridakis, Ph.D., Professor
Clarence E. Walker, Ph.D., Professor
F. Roy Willis, Ph.D., Professor

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 history as part of the major. Students preferring more active engagement in research and writing are encouraged to follow Plan II. The purpose of Plan III is to enable students to study in depth the field of twentieth-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.

NOTE: For key to footnote symbols, see page 131.
A.B. Major Requirements:

Preparatory Subject Matter (Plans I, II, and III)...

Five lower-division courses, including at least two of the following fields...

- a. Western Civilization: History 4A, 4B, 4C, 1, 2, 3, 4, 5...
- b. Asian Civilization: History 8, 9A, 9B, 90A...
- c. United States and Latin America: History 17A, 17B, 22, 72A, 72B, 85, 86...
- d. Africa: History 15...

Total Units for the Major, Plan I...

Depth Subject Matter—Plan I...

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...

At least one course from the following: History 101, or 102 (in field of concentration), or 103 (in field of concentration)...

Total Units for the Major, Plan I...

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...

Total Units for the Major, Plan II...

Depth Subject Matter—Plan III...

History 146A, 146B, 147A, 147C...

At least three upper-division courses chosen from the following twentieth-century courses, classified by area of concentration...

At least one course must be from category A...

- C. Europe: History 137C, 138, 141...

Two additional upper-division history courses selected from courses within a single field of study (e.g., United States, Europe, Africa, Latin America, Asia) which do not cover twentieth-century history...

Total Units for the Major, Plan III...

Fields of Concentration...

- d. African History: History 102O, 115A, 115B, 115C, 116...

Minor Advisers: Same as for major advisers.

Honors and Honors Program: A student may become eligible for graduation with high or highest honors by meeting the minimum grade-point average and coursework requirements established by the College of Letters and Science and by demonstrating unusually imaginative or creative work in history (see the College of Letters and Science section of this catalog). Such 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 description, based on clear evidence of distinction and originality, is a prerequisite for the awarding of high or highest honors.

Teaching Credential Subject Representative: D.L. Jacobson. See also the section on 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 49 courses, including these 17A and 17B, two lower division courses in Western Civilization (1, 3, 4A, 4B, 4C) of which one must be 3 or 4C, one undergraduate seminar (course 175B), 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 Teaching Credential.

Education at Home Program (EHP): In the Winter Quarter of 1990, the UCR campus will continue the Education at Home Program for those students with special interest in early American history and culture. Those selected for participation in the program will spend nine weeks in Williamsburg, one in Philadelphia, and a concluding week in Washington, D.C. This program is open to all undergraduates from any campus in the UC system. With prior approval of their graduate adviser, graduate students may also apply.

Registration (through the Riverside campus) will be made for the following three courses in the Department of History: History 157, 158, and 159. Special arrangements for housing will be made for those students selected for participation in this program. A maximum of 4 units may be taken by the student's home campus. For further information, brochures or application forms, telephone Riverside campus, (714) 778-5820. Preference is given to students who receive their application forms by June 30; the final application deadline is November 1.

Graduate Study: The Department of History offers programs of study and research leading to the M.A., Ph.D., and Ph.D. degree in history. Detailed information may be obtained by writing to the Graduate Adviser, Department of History.


History courses may be used only with the consent of the instructor. (See also under University requirements.)

Courses in History

Lower Division Courses

1. The Bible and Ancient History (4) II. Schwab

Lecture—3 hours; discussion—1 hour. Examination of the Judaeo-Christian tradition as it met ancient Near Eastern and classical ideas and influences over the centuries. Emphasis on the Bible as a historical document and on historical-critical interpretation of scriptures.

2. Ancient Civilizations (4) III. Fleischner

Lecture—3 hours; discussion—1 hour. Growth of ancient civilizations from the Sumerians to the Fall of the Roman Empire.

3. Cities: A Survey of Western Civilization (4) II. Wilke


4A. History of Western Civilization (4) III. The Staff (Chairperson in charge)

Lecture—3 hours; discussion—1 hour. Growth of western civilization from late antiquity to the Renaissance. General Education credit: Civilization and Culture/Introductory. (CAN Hist Seq A)

4B. History of Western Civilization (4) II. The Staff (Chairperson in charge)

Lecture—3 hours; discussion—1 hour. Development of western civilization from the Renaissance to the Eighteenth Century. General Education credit: Civilization and Culture/Introductory. (CAN Hist Seq A)

4C. History of Western Civilization (4) II. The Staff (Chairperson in charge)

Lecture—3 hours; discussion—1 hour. Development of Western Civilization from the Eighteenth Century to the
143. History of Eastern Europe and the Balkans (4) I. Hagen Lecture—3 hours; essay. History of the Baltic, Danubian, and Balkan lands since the Middle Ages. National cultures and conflicts in the Polish Commonwealth and the Habsburg and Ottoman Empires; nationalist movements, 1789-1914; the twentieth century, including an analysis of the contemporary scene.

144. History of Germany since 1648 (4) I. Hagen Lecture—3 hours; essays. Social and political history of Germany in the ages of absolutism and the Enlightenment, industrialization, nationalism, and national unification, the World Wars, and since 1945.

145. War and Revolution in Europe, 1789-1918 (3) I. Mercadant Lecture—3 hours; term paper. Survey of revolutionary movements, international crises, and wars in Europe from the French Revolution to World War I.

146A. Europe in the Twentieth Century (4) I. Wilke Lecture—3 hours; term paper. Survey of the History of Europe from 1919 to 1939.

146B. Europe in the Twentieth Century (4) I. Wilke Lecture—3 hours; term paper. Survey of the History of Europe since 1939.


148. Workers and Politics in Industrial Societies: A Comparative Historical Approach (4) III. Goodman Lecture—4 hours. Comparative analysis of the development of labor parties and socialist movements in Britain, France, Germany and their failure in the United States in the nineteenth and early twentieth centuries. Political cultures, social structures, and historical experiences shaping working-class politics.

150. Ethnic Conflict and Anti-Semitism in Modern Europe (4) I. Hagen Lecture—3 hours; term paper. Prerequisite: course 4A recommended. Origins of Europe to the accession of the Lascars. Survey includes: Impact of Norman Conquest on Anglo-Saxon institutions; rise of the Church, common law, parliament; science, and literature in the age of Chaucer and Wyclif.

151. England: The Middle Ages (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: course 4A recommended. English history from the accession of the Lascars. Survey includes: Impact of Norman Conquest on Anglo-Saxon institutions; rise of the Church, common law, parliament; science, and literature in the age of Chaucer and Wyclif.

152. England: The Early Modern Centuries (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: courses 4A, 4B; 151 recommended. From Lascaux and York to the Glorious Revolution. Emphasis will be on the transformation of one of Europe's most politically unstable kingdoms into the firmly established constitutional monarchy which we now regard as the environment fit to engender the industrial revolution.

153. Eighteenth-Century England (4) I. Landau Lecture—3 hours; term paper. English history from the Glorious Revolution to the Enlightenment. Emphasis on the transformation of one of Europe's most politically unstable kingdoms into the firmly established constitutional monarchy which we now regard as the environment fit to engender the industrial revolution.

154. Industrial England (4) III. Landau Lecture—3 hours; term paper. English history from Waterloo to the Second World War. The rise and culmination of the first industrial nation, the transformation of landed to class society, oligarchy to democracy and bureaucracy, Bentham to Jeremy Bentham, empire to commonwealth.

154. Tudor and Stuart England (5) III. Seminar—3 hours; reports and research paper. Prerequisite: courses 151A, 151B and/or consent of instructor. Intensive investigation of the political, economic, and social history of the Tudor and Stuart eras; emphasis on social problems and the arts and learning.

155. British Foreign Policy Since 1920: The End of the British Empire (4) I. Freeman Lecture—3 hours; term paper. Prerequisite: upper division standing. How and why Britain passed so rapidly and by constitutional means from its imperial power in history to non-imperial, middle-grade status; the background against which the global responsibilities of the U.S. developed with equal rapidity.

155A. British Foreign Policy Since 1920: Britain and the U.S.A. (4) II. Freeman Lecture—3 hours; term paper. Prerequisite: upper division standing. Britain's intimate relationship with the U.S., its modification with changes in power structure and with Britain's EEC membership; the effects on relations with the U.S. of Britain's (and other NATO powers') efforts to achieve independent relations with the U.S.S.R.

155B. British Foreign Policy Since 1920: Britain and Europe (4) III. Freeman Lecture—3 hours; term paper. Prerequisite: upper division standing. Britain's efforts after 1920 to replace the European balance of power with collective security and then, briefly, after World War II, with economic cooperation. Britain's final, contentious entry to the EEC and its consequences for western Europe.

156A. Latin American History (4) I. Baur Lecture-discussion—3 hours; term paper. Pre-requisite: Pre-Colombian civilization of Middle America and the Andean region (mainly Aztec and Inca); the impact of European conquest and colonization; the formation of a hybrid culture. Extensive use of photographic slides.

156B. Latin American History (4) II. Baur Lecture-discussion—3 hours; term paper. Pre-requisite: Pre-Colombian civilization of Middle America and the Andean region (mainly Aztec and Inca); the impact of European conquest and colonization; the formation of a hybrid culture. Extensive use of photographic slides.

156B. Latin American Social Revolution (4) I. Poppino Lecture—3 hours; written reports. Evolution of modern Latin America: economic, political, agrarian, cultural, religious, social reform and revolution; the difficulties of the twentieth century. Emphasis on Mexico, Cuba, the Andean region, Chile, and Argentina. Photographic slides.

156B. History of the Andean Region (4) II. Goon Lecture-discussion—3 hours; written and/or oral reports. History of the Andean region, the area that now comprises modern Peru, Bolivia, and Chile, from the beginning of human settlement to the present.

156B. History of Brazil (4) III. Poppino Lecture—3 hours; written reports. The history of colonial and imperial Brazil from 1500 to 1889. Offered in odd-numbered years.

156B. History of Brazil (4) III. Poppino Lecture—3 hours; written reports. The history of the Brazilian republic from 1889 to the present. Offered in even-numbered years.

155. Latin American Social Revolutions (4) I. Poppino Lecture—3 hours; written reports. Major social upheavals since 1900 in selected Latin American nations; similarities and differences in social change. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: History 4C, 178B, or Political Science 2.

156A. History of Mexico to 1848 (4) II. Baur Lecture-discussion—3 hours; written and/or oral reports. Political, economic, and social development of Pre-Colombian, colonial and national Mexico to 1848. Offered in even-numbered years.

156B. History of Mexico Since 1848 (4) II. The Staff Lecture-discussion—3 hours; written and/or oral reports. History of Mexico from 1848 to the present. Offered in odd-numbered years.

156B. History of Inter-American Relations (4) II. Poppino Lecture—3 hours; written and/or oral reports. History of Latin America since independence, intra-Latin American relations, the relation of the United States, participation in international organizations, and communism in Latin America.

156A. Mexican-American History (4) I. Ruiz Lecture-discussion—3 hours; written and/or oral reports. Economic, social, religious, cultural and political development of the Southwest and Southwest Mexico. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4B or Philosophy 23.

156B. Mexican-American History (4) II. The Staff Lecture-discussion—3 hours; written and/or oral reports. Role of the Mexican and Mexican-American in the history of the Southwest: economic, political, cultural and social history of the Southwest since 1821. Offered only in even-numbered years.

NOTE: For key to footnote symbols, see page 131.
to about 1900, emphasizing Transcendentalism, Jacksonian democratic thought, the impact of Darwinism, and pragmatism.

175C. Intellectual History of the United States (4) III. W. Smith Lecture—3 hours; oral or written reports on reading; panel discussion credit; prerequisite courses 17A and 17B or equivalent; or a course in modern political theory, philosophy, American literature, or sociological theory. Twentieth-century thought from about 1914. 1960s, emphasizing pragmatic liberalism, naturalism in law and literature, protestant liberalism and neo-orthodoxy, Federalism in social thought and social criticism of the 1960s.

176A. Social and Cultural History of the United States (4) II. Marchand Lecture—4 hours; term paper. Study of social and cultural forces in American society from colonial times through the Civil War with emphasis on social structure, immigration, and race, and rural and urban social movements and changes in social values.

176B. Social and Cultural History of the United States (4) III. Rosen Lecture—discussion—3 hours; term paper and written or oral report. Study of social and cultural forces in American society since the Civil War with emphasis on social structure, immigration, the press, social, economic, and political forces. Trade unionism and radical movements. Offered in even-numbered years.

180A. Growth of American Politics to 1815 (4) I. Goodman Lecture—3 hours; discussion—3 hours; reading. An introduction to the study of American political thought; the growth of American politics from the early years to 1815, focusing on the distribution of power, the changing political culture, and the role of the political system in forming the political culture. Recommended prerequisite: course 17A and 17B. 180B. Growth of American Politics, 1815-1890 (4) II. I. Goodman Lecture—3 hours; weekly reading and supervised writing. Continuation of course 180A. 180C. Growth of American Politics, 1890 to the Present (4) III. Goodman Lecture—3 hours; weekly reading and supervised writing. Continuation of course 180B.

181. Religion in American History to 1900 (4) III. Jacobson Lecture—2 hours; discussion—1 hour; oral and written reports. Religious ideas and institutions from the Puritans to the present. The growth of the social and intellectual life of the nation, and its political and cultural development. 182A. The Frontier Experience: Trans-Mississippi West (4) III. The Staff Lecture—3 hours; written and/or oral reports. The fur trade, western exploration and transportation, the Oregon Country, the Greater Southwest and the Mexican War, the Mormons, mining discovery, and the West during the Civil War.

182B. The Frontier Experience: Trans-Mississippi West (4) II. I. Smith Lecture—3 hours; written and/or oral reports. Spread of the mining kingdom, the range cattle industry, Indian-military affairs, settlement of the Great Plains and Rocky Mountain Regions and political organization of the West.

183A. History of Science in America (4) II. Sherwood Lecture—3 hours; research paper. Survey of the European background. Study of American scientific institutions, ideas, personalities, creative genius, and the relationships between society and science from colonial times to the present.

183B. History of Technology in America (4) III. Sherwood Lecture—3 hours; research paper. Study of American technology, emphasizing biographical approach to historical understanding of technological change, creative processes, institutions, ideas, and relationships between technology and society from colonial times to the present.

187A. American Business History to the 1880s (4) I. Rothstein Lecture—3 hours; term paper. Changes in the role of entrepreneurs, commercial practices from the colonial period to the 1880s, with emphasis on the transition from mercantile capitalism to industrial capitalism, marketing, financial intermediaries, and concentration. Offered in even-numbered years.

187B. American Business History, 1880s to the Present (4) II. Rothstein Lecture—3 hours; term paper. Changes in the role of entrepreneurs, organizations, and management practices from the 1880s to the present, with emphasis on the transition from mercantile capitalism to industrial capitalism, marketing, financial intermediaries, and concentration. Offered in odd-numbered years.

188A. History of Agriculture in the U.S. to 1900 (4) I. Rothstein Lecture—3 hours; term paper. Agricultural settlement and development in the U.S., with emphasis on government policy, economic and social institutions. Offered in even-numbered years.

188B. History of Agriculture in the U.S. since 1900 (4) III. Rothstein Lecture—3 hours; term paper. Agricultural settlement and development in the U.S., with emphasis on government policy, economic and social institutions. Offered in even-numbered years.

189A. History of California (4) I. M. Smith Lecture—3 hours; term reports. Spanish exploration and settlement; the mission as a frontier institution; revolt of the Californias; penetration by Mountain Men; pioneer trails and settlement; Bear Flag Revolt and Mexican War. 189B. History of California (4) II. I. Smith Lecture—3 hours; written and/or oral reports. State constitution; land and grant and Indian policies; Gold Rush; vigilantes; railroad construction; the state: changing economy; social and literary developments; Progressive reform.

190C. History of California (4) II. I. Smith Lecture—3 hours; written and/or oral reports. Impact of World War I; conservation of natural resources; organized labor; the automobile and moving picture industry; New Deal developments; changes with World War II; role of minorities; contemporary politics.

190D. Late Imperial China: Background to Revolution (4) II. Liu Lecture—2 hours; discussion—1 hour; term paper. Patterns and problems of Chinese life as reflected in the Ming and Ching dynasties. Readings include literary materials in English translation (particularly novels) which reflect the social and intellectual trends in China as well as popular culture. Offered in even-numbered years.

190E. Late Imperial China: Background to Revolution (4) II. Liu Lecture—2 hours; discussion—1 hour; term paper. Internal and external pressures in China from the early nineteenth through the early twentieth century. Emphasis on the impact of the West and the beginnings of revolutionary change. Offered in odd-numbered years.

190F. The Chinese Revolution (4) I. Price Lecture—3 hours; term paper. Analysis of China’s cultural and political transformation from Confucian empire into Communist state. Emphasis on emergence and triumph of peasant revolution. Some attention to implications for post-revolutionary political culture and the role of the West in China.

191A. Classical China (4) II. Price Lecture—3 hours; term paper. History of Chinese civilization from its origins through the Tang dynasty, including the flowering of classical philosophy, to the rise and fall of the First Empire.

191B. High Imperial China (4) III. Price Lecture—3 hours; term paper. Political disunion and the influx of Buddhism; reunification under the great dynasties of the Tang, Sung, and Ming with analysis of society, culture, and thought.

192. Internship in History (2-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: enrollment dependent on availability of intern positions, which must be arranged. Research, preparation, and study as historian, archival, curator, or in another history-related capacity, in an approved organization or institution. (P/NP grading only.)

193. History of the People’s Republic of China, 1949 to the Present (4) I, II, III. Liu Lecture—2 hours; discussion—1 hour; term paper. Comprehensive analysis of recent Chinese history, including land reform, Cultural Revolution, the post-Mao era, and China’s foreign relations from 1949 to the present. Offered in even-numbered years.

194A. Aristocratic and Feudal Japan (4) I. Kimnmonth Lecture—3 hours; term paper. Survey of the cultural, social, religious, and political aspects of Japanese history from the seventeenth century emphasizing the development of political thought and organization with which Japan met the challenge of the nineteenth-century Western expansion.

194C. Modern Japan (4) I. Kimnmonth Lecture—3 hours; term paper and/or discussion. Survey of the cultural, social, religious, and economic aspects of Japanese history from the seventeenth century to the present, emphasizing the development of political thought and organization with which Japan met the challenge of the nineteenth-century Western expansion.

194D. Modern Japan (4) II. Kimnmonth Lecture—3 hours; term paper and/or discussion. Survey of labor and management relations in Japan from the mid-eighteenth century to the present. Offered in even-numbered years.

194E. Education and Technology in Modern Japan (4) II. Kimnmonth Lecture—3 hours; term paper. Survey of education and technology in Japan from the mid-eighteenth century to the present. Offered in odd-numbered years.

195. Modern China and the West (4) I. Liu Lecture—2 hours; discussion—1 hour; term paper. History of European and American relations with China, political, cultural and economic, in the context of East Asian international relations and emphasizing the twentieth century. Offered in odd-numbered years.

196A. Medieval India (4) I. Metcalf Lecture—3 hours; discussion—1 hour; weekly reports. Survey of history of India in the millennium preceding arrival of British in the eighteenth century, focusing on interaction of the civilizations of Hinduism and Islam and the changing nature of the state.

196B. Modern India (4) I. Metcalf Lecture—3 hours; discussion—1 hour; weekly reports. Survey of cultural, social, economic, and political aspects of South Asian history from arrival of British in the eighteenth century to formation of modern Indian statehood. Bangladesh and Pakistan in the twentieth century.

1977. Tutoring in History (2) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour; laboratory—3 hours. Prerequisite: enrollment as a history major with standing and consent of Departmental Chairperson. Tutoring of students in lower division courses. Weekly meeting of tutoring groups. Consent of course instructor. Written reports on methods and materials required. May be repeated for credit. For no final examination. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor; upper division standing (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-N. Sources and General Literature of History (4) I, II, III. The Staff Seminar—3 hours. Designed primarily for students preparing for higher degrees in history. (A) Ancient; (B) Medieval; (C) Renaissance and Reformation; (D) Europe since 1515; (E) China to 1800; (G) China since 1800; (H) Britain; (I) Latin America since 1810; (J) American History to 1877; (K) Latin America to 1877; (L) United States 1877 to 1956; (M) Modern Japan. May be repeated for credit when different subject area is studied.

202A-D. Major Issues in Historical Interpretation (4) I, II, III, IV. The Staff Seminar—3 hours; term paper. Prerequisite: graduate standing. Fundamental issues and debates in the study of history. (A) Social Science and the Study of History; (B) Europe; (C) Modern World; (D) India; (E) Africa; (F) China; (G) Japan; (H) United States; (I) Latin America. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied.
Horticulture (A Graduate Group)

Home Economics (College of Agricultural and Environmental Sciences)

Program of Study

If you have declared Home Economics as your major or have begun coursework for the major as an enrolled student before Spring Quarter 1987, you may complete a B.S. degree by following the major requirements as listed in a prior edition of this catalog.

Students who are interested in the field of home economics have several options available to them on the Davis campus. The following major program will allow the student to pursue academic goals with a specific major area of emphasis: Agrarian Studies, Agricultural Education, Agricultural and Managerial Economics, Community Nutrition, Consumer Food Science, Design, Dietetics, Food Science, Human Development, and Textiles and Clothing.

In addition, you may enroll in the College of Agricultural and Environmental Sciences' Exploratory Program to define your academic goals and identify an appropriate major program. The College also offers an Individual major where you can design an academic program which best suits your individual goals and objectives.

NOTE: For key to footnote symbols, see page 131.

Courses in Home Economics

Lower Division Courses

90. Challenges and Opportunities in Home Economics (1) III, Subot in charge Seminar—1 hour. Specializes in selected areas of home economics addresses current issues facing today's professional including challenges, opportunities, and prospecd for appropriately trained university graduates. May be repeated once for credit with consent of instructor. (P/NP grading only) Offered in odd-numbered years.

92. Internship in Home Economics (1-12) I, II, III. The Staff (Subot in charge) Laboratory—3-36 hours. Work-learning experience and on campus in a home economics related area. Internship supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

92. Internship in Home Economics (1-12) I, II, III. The Staff (Subot in charge) Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-learning experience off and on campus in a home economics related area. Internship supervised by a member of the faculty. (P/NP grading only.)

100. Directed Study (1-5) I, II, III. The Staff (Subot in charge) Prerequisite: consent of instructor. (P/NP grading only.)

100. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Subot in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Home Economics Education

See Agricultural and Home Economics Education

Horticulture (A Graduate Group)

Ellen G. Sutter, Ph.D., Chairperson of the Group

Group Office, 1045 Wickson Hall

Faculty. The faculty includes departmental members of Environmental Horticulture, Pomology, and Viticulture and Enology.

Graduate Study. The Graduate Group in Horticulture offers programs of study leading to the M.S. degree under the two master's degree options: thesis or comprehensive examination.

Preparation. A level of competence equivalent to that of a sound undergraduate program in Plant Science is required. This includes coursework in general botany, chemistry, physics, statistics, genetics and introductory plant physiology. A few limited deficiencies in any of these areas can be made up after admission to the graduate program. Specific requirements are outlined in detail and may be obtained from the Group Office.

Graduate Advisers. Information relative to advisers available in each of the three departments above may be obtained from the Department of Pomology or the Group Office.

Related Courses. Pertinent graduate courses in horticulture may be found by reviewing the Catalog under the departmental categories of Environmental Horticulture, Pomology, Viticulture and Enology, Plant Science, and Plant Physiology.
### Human Development

**College of Agricultural and Environmental Sciences**

**Faculty**
Under Department of Applied Behavioral Sciences.

**The Major Program**

Human Development is an appropriate undergraduate major if you want to explore the developmental process in humans throughout the life cycle. Concentrating on the periods between birth and young adulthood, cognitive and personality/social development are studied from various perspectives. The emphasis is on the interrelationships of the person, the family, and the community. It is an appropriate major for those planning to pursue advanced degrees in the behavioral sciences and offers course work useful for persons who will later pursue careers in education, child guidance, social welfare, health science related fields, or research in human development.

Human Development majors observe infants, children, and adults in a variety of situations. You may also participate in study projects with people from different socioeconomic and cultural backgrounds who function in a variety of institutional settings (schools, hospitals, mental health clinics, and group foster homes). Students who anticipate exploring the biological aspects of Human Development should include in their preparatory course work the prerequisites for upper division biological sciences courses.

**Human 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.

#### Practicum (Human Development 140-140L, 141, 142) 
Four additional upper division Development courses, or related courses from list of restricted electives as determined in consultation with faculty adviser.  
14-16

#### Breadth Subject Matter 

19-20

- English or rhetoric to include at least one upper division course in the College requirement.
- American history/American government (political science)

#### Unrestricted Electives 

64-72

Total Units for the Major 180

### Major Program Requirements:

**Human Development**

- 20
- Human Development 100A .................................. 4
- Human Development 100B .................................. 4
- Human Development 110 or 103 or 151 .................. 4
- Two courses from Human Development 101, 102, 130, 131, or 152 .......................... 5

#### Graduate Study

Refer to the Graduate Division section in this catalog.

### Courses in Human Development

**Questions pertaining to the following courses should be directed to the instructor or to the Applied Behavioral Sciences Advising Office, 101 Academic Building Office Building 4 (752-2024).**

#### Lower Division Courses

- **12. Human Sexuality (2) I, II, Ill. Goliaty**
  - Lecture—2 hours. Vocabulary; structure and function of genital system; sexual response; menstruation; fertility; birth, pregnancy and childbirth; sex in religion and law; sex education; homosexuality; masturbation; establishing and maintaining intimate and conjugate communication; attitudes and values; sexual dysfunctions; lovemaking. (P/NP grading only.)

- **15. Family and the Life Cycle (4) II. Weiker**
  - Lecture—4 hours. Prerequisite Psychology 1 or 15 and 16. Scope and methods of human development focusing on aspects of socialization in families throughout life cycle; considering influences of family, social and cultural institutions, exploring sources of strength and help. Not open for credit to students who have completed courses 100A, 100B or 110. General Education credit: Contemporary Society/Interdisciplinary. Recommended GE preparation: Psychology 15-16.

- **19. Life Cycles, Kinship, and Growth in Human Populations (3) I. Carey**
  - Lecture—2 hours; discussion—1 hour. Introduction to concepts and simple techniques for determining human populations at different levels of organization. Topics include life course, fertility, gerontology, life tables, family life cycle, summissae, genealogy, migration, and population traits. General Education credit: Nature and Environment/Interdisciplinary.

#### Observation Techniques in Human Development (4) I, Ill. Stockman

- Lecture—3 hours; laboratory—3 hours. Prerequisite: Psychology 1 and consent of instructor. Observational techniques used in the study of human behavior and development, with focus on ages of 3 months to 5 years; analysis and use of observational data.

- **30. Observational Techniques and Case Study of a Young Child (1, I, II, Ill. Stockman**
  - Seminar—1 hour; Prerequisite: course 30A. Observational techniques. Intensive case study of individual child aged six months to 5 years; analysis and use of observational data. (Dellert grading only; completion of course 30A-30B sequence.) Course 30B is being phased out.

- **89. Directed Group Study for Undergraduates (1-5) I, II, III. The Staff**
  - The Staff (Chairperson in charge)
  - Prerequisite: consent of instructor. (P/NP grading only.)

- **Special Study for Undergraduates (1-5) I, II, III. The Staff**
  - Prerequisite: consent of instructor. (P/NP grading only.)

#### Upper Division Courses

**100A. Infancy and Early Childhood (4) I. Weiker**

- Lecture—4 hours. Prerequisite: Psychology 1 or 15, Biological Sciences 1 or 10. Analysis of the biological, social, and cultural influences in the psychological growth and development of children, precedents in human

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**NOTES:** For key to footnote symbols, see page 131.
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B.S. Major Requirements:

Preparatory Subject Matter .................. (variable) UNITS
Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

Depth Subject Matter .................. 45 UNITS
An individualized program of 45 upper division units taken from two or more areas of study. At least 30 of the 45 units must be taken from courses provided by the College.

Unrestricted Electives .................. (variable) UNITS
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 satisfaction of the General Education Requirement and not less than 7 units in English and/or Rhetoric and Communication courses that emphasize written or oral expression (see College requirement).

Master Adviser, C. L. Keen (Nutrition). The course of study must be developed in consultation with the Master Adviser, and two or more faculty members prior to final approval by the Individual Major Committee for the College.

Incoming transfer students applying for an Individual Major will be admitted into the Exploratory Program.

College of Engineering

(Undergraduate Office)
Program Office, 2132 Bainer Hall (752-0553)

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Subject Areas</th>
<th>(minimum) UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics (calculus, differential equations,</td>
<td>18</td>
</tr>
<tr>
<td>vector analysis)</td>
<td></td>
</tr>
<tr>
<td>Physical and biological sciences (including at</td>
<td></td>
</tr>
<tr>
<td>least 10 units of general chemistry and 12 units</td>
<td></td>
</tr>
<tr>
<td>of physics for engineering and science students)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>26</td>
</tr>
<tr>
<td>Analytic mechanics and strength of materials</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Applied electricity and magnetism</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Properties of materials</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering design (courses selected from a list</td>
<td></td>
</tr>
<tr>
<td>developed for Individual Engineering majors</td>
<td></td>
</tr>
<tr>
<td>by the Undergraduate Studies Committee)</td>
<td>20</td>
</tr>
<tr>
<td>Additional upper division engineering courses,</td>
<td></td>
</tr>
<tr>
<td>exclusive of 199 courses</td>
<td>24</td>
</tr>
<tr>
<td>Written and oral expression (courses equivalent</td>
<td></td>
</tr>
<tr>
<td>to English 1 and either Rhetoric and</td>
<td></td>
</tr>
<tr>
<td>Communication 1 or 3)</td>
<td>8</td>
</tr>
<tr>
<td>Humanities/social sciences (from a list of</td>
<td></td>
</tr>
<tr>
<td>courses and course groups approved by the</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Studies Committee)</td>
<td>24</td>
</tr>
<tr>
<td>Additional upper 80-unit program</td>
<td></td>
</tr>
<tr>
<td>(Unrestricted electives. 10 units maximum)</td>
<td></td>
</tr>
<tr>
<td>Total Units for the Degree</td>
<td>180</td>
</tr>
</tbody>
</table>

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 required by the Committee can be made before the beginning of your senior year. Once your curriculum has been approved, you may make changes only for good cause and with the further approval of the Committee. You may obtain additional information from the Engineering Undergraduate Office. (See College of Engineering degree requirements.)

College of Letters and Science
Program Office, 150 Marck Hall (Dean's Office), (752-0392)

Committee in Charge
Don P. Abbott, Ph.D., (Rhetoric and Communication), (Spring Quarter)

NOTE: For key to footnote symbols, see page 131.

Wesley O. Johnson, Ph.D. (Statistics)
William E. Kleb, D.F.A. (Dramatic Art), (Fall, Winter Quarters)
Jay Meckling, Ph.D. (American Studies), Chairperson
Arnold J. Sillman, Ph.D. (Animal Physiology)
Marian B. Ury, Ph.D. (Comparative Literature)

A.B. and B.S. Major Requirements:

Preparatory Subject Matter .................. (variable) UNITS
Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

Depth Subject Matter .................. 45-54 UNITS
Upper division units must include:
(a) interested 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 a 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 Advisers (selected by student). Principal 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 the junior year, students potentially eligible for high or highest honors at graduation (see College section), 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 final semester 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 a determination of the student's original major program 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.

Integrated Studies

Nora A. McGuinness, Ph.D., Program Director
Program Office, 816 Sprout Hall (752-3377)

Committee in Charge
Daniel R. Brower, Jr., Ph.D. (History)
Richard T. Curlay, Ph.D. (Anthropology)
Gordon J. Edlin, Ph.D. (Genetics)
Bruce M. Hackett, Ph.D. (Sociology)
Kurt Krath, Ph.D., (Mathematics)
Arthur E. McGuinness, Ph.D. (English)
Nora A. McGuinness, Ph.D. (Integrated Studies)
David A. Robertson, Ph.D. (English)
Daniel L. Wick, Ph.D. (Integrated Studies)

Faculty
Thomas A. Cahill, Ph.D., Professor (Physics)
Richard D. Cramer, M.F.A., Professor Emeritus (Art)
The Program of Study

Integrated Studies is a freshman Honors residential program which introduces students to a variety of disciplines in humanities, natural sciences, and social sciences. 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 students fulfill college breadth requirements and many of its courses fulfill the campus General Education requirements. Enrollments are limited. (In 1989-90, 120 students will be admitted to the program. Approximately 25-30 students each year enroll in the program as freshmen.)

Students enroll in at least three Integrated Studies courses during the year, as well as in three Integrated Studies Seminars. Students not admitted to the Program may not enroll for Integrated Studies courses.

Courses in Integrated Studies

Lower Division Courses

1A. Nature and the Environment: Physics (4) I. Cahill Lecture—3 hours; discussion—2 hours. Introductory course on the history, philosophy and methodology of physics from 600 B.C. to the present day. Changes in ideas about the physical universe explored. Problem solving not emphasized. General Education credit: Nature and Environment/Introduc
tory.

1B. Nature and the Environment: Origins of the Universe (4) II. Edin Lecture—3 hours; discussion—1 hour. Knowledge of origins of the universe, of matter, of galaxies, stars, and planets, and of the earth and the variety of life forms that have evolved on this planet. General Education credit: Nature and Environment/Introductory.

1C. Nature and the Environment: Molecules to Humans (4) II. Reid Lecture—3 hours; discussion—1 hour. Prerequisite: high school chemistry. Ideally for liberal arts students. Integrates the principles of chemistry, biochemistry, genetics and molecular biology. Students are expected to achieve a fair scientific literacy in all of the subjects.

2A. Civilization and Culture: Mathematics and Civilization (4) I. Kreith Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra and geometry. Topics from arithmetic, geometry, algebra and probability presented in historical context which illustrates the development of mathematics and its relationship to the world and civilization.

2B. Civilization and Culture: Theology (4) I. Robertson Discussion—4 hours. Major issues in theology, including the existence and nature of God, the nature and destiny of the human species, free will, and morality from both a western and eastern perspective. General Education credit: Civilization and Culture/Introductory.

2C. Civilization and Culture: Origins of Western Civilization (4) III. Rollins Lecture—4 hours; discussion—1 hour. Civilizations of the ancient Near East and Greece; the problem of divine-human relations, problems of law and justice, and development of science and technology. Readings include selections from Near Eastern texts and from Greek literature.

2D. Civilization and Culture: Literature and Writing (4) I. Moran Lecture—3 hours; small-group writing workshop. Prerequisite: completion of Subject A requirement. Exposure to basic methods of literary analysis in cinema, fiction and poetry and concepts that guide literary scholars in making critical judgments. Preparation for training in General Education credit: Civilization and Culture/Introductory.

2E. Civilization and Culture: Playing Shakespeare (4) I. Sambuasy (Dramatic Art) Lecture—3 hours; literature—2 hours. Prerequisite: completion of Subject A requirement. Shakespeare as a theatrical professional: producer, actor, director. His use and development of Elizabethan stagecraft. Objective analysis of how Shakespeare's text actually works on stage. Scene exercises to illustrate effective playing of the text.

3A. Contemporary Societies: History in Our Time (4) I. Birker Lecture—4 hours. The Western World since the second World War covering the Cold War, European recovery and the emergence of Socialist democracies, the spread of Communist regimes in Eastern Europe and their relations with the USSR, and the decline of the 70's. General Education credit: Contemporary Societies/Introductory.

3B. Society Through Literature: Modern Europe (4) I. Wick Lecture—3 hours; discussion—1 hour. Readings and discussion concerning European experience as related to the Russian experience. Course includes the novels of Fedor, Naum, and the decline of Europe as the center of world politics. General Education credit: Civilization and Culture/Introductory.

3C. Society Through Literature: Modern China (4) II. Gibbes (Anthropology) Lecture—3 hours; discussion—1 hour. China's twentieth-century experience: revolution, civil war, isolation, occupation, and the overthrow of ancient values, as reflected in short stories, novels, poetry, and film. General Education credit: Civilization and Culture/Introductory.

3D. Contemporary Societies: Speech, Privacy, and Conscience (4) II. Crookston Discussion—4 hours. Analysis of the constitutional rights of speech, privacy, and conscience as limits on government. Specific topics to be covered include pornography, "taste" speech, broadcast codes, book censorship, sexual and associational privacy, abortion, and euthanasia. General Education credit: Contemporary Societies/Introductory.

3E. Contemporary Societies: Sociology (4) I. Hackett Lecture—2 hours; discussion—2 hours. Introduction to modern sociological research and theory utilizing material drawn from three topical areas: the development of gender identities, the social production of scientific and other forms of knowledge, and the social basis of religious belief.

3F. Colleges of Universities (1, II, III. The Staff (N. McGuinness in charge) Discussion—1 hour. Lectures and films, and readings on the interpretation between the arts and sciences. May be repeated for credit. (P/NP grading only.)

8A. Special Topics in Natural Science and Mathematics (4) II, III, The Staff Lecture—3 hours; discussion—1 hour. Group study of a special topic in Natural Sciences and Mathematics. Course varies with topic, therefore may be repeated for credit. General Education credit: Natural and Environmental/Introductory.

8B. Special Topics in Humanities (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Group study of a special topic in Humanities. Course varies with topic, therefore may be repeated for credit. General Education credit: Natural and Environmental/Introductory.

8C. Special Topics in the Social Sciences (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Group study of a special topic in Social Science. Course varies with topic, therefore may be repeated for credit. General Education credit: Contemp. Societies/Introductory.

9. Seminar (1, I, II, III. The Staff (N. McGuinness in charge) Lecture—1 hour. Lectures, films, and readings on the theme for the year. May be repeated for credit. (P/NP grading only.)

International Medicine

See Medicine, School of Medicine

International Agricultural Development

NOTE: For key to footnote symbols, see page 131.

(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 management 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 opportunities offered by the 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 competencies 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-cultural relationships which characterize developing societies and economies. Graduates concerned with issues and problems in international development may find job opportunities in government service, in private voluntary organizations, with commercial and consultant 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 .................................................... 49-51

(Choose either Social Sciences or Natural and Environmental Sciences core)

Social Sciences core

Physical science (Chemistry 1A, 1B) ........................................ 10
Mathematics (Computer Science Engineering 10, Agricultural Science 10, 150) ........................................ 15

Biology science (Biology Sciences 1, Plant Science 2, Animal Science 2, Botany 2, Zoology 2, Soil Science 10) ............. 12-13

English (see College requirement) ........................................ 8

Social sciences (Applied Sociology 1, Anthropology 1, Political Science 2, Sociology 1, History 4C) .......................... 12

Natural Sciences and Physical Sciences core

Chemistry (Chemistry 1A, 1B, 9A, 8B) .................................. 16
Physics (Physics 6A) ............................................................. 4
Mathematics (Mathematics 16A or 21A) ................................. 4
Agricultural Science and Management 150) ......................... 8

Biology science (Biology Sciences 1, Botany 2, Plant Science 2, Animal Science 2, Zoology 2L, Microbiology 2 and 3, Genetics 100) ................................................................. 19

English (see College requirement) ........................................ 8

Depth Subject Matter .......................................................... 39-40

International Agricultural Development .................................. 10

110A, 110B .................................................................... 9

International agricultural development (International Agricultural Development 101, 102, 103, 141, 190, 191, 195, 198) ........ 12

Agricultural economics and environmental Economics 1A-1B and two upper division courses relevant to development (Agricultural Economics 103, 105, 106, 113 or 136, 157, 140, 145, 150, 176, Economics 100, 100M, 110A, 115A, 115B, 118) ......................... 18

Primary Field of Specialization .............................................. 66

*Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.
Natural Sciences or Social Sciences: A student chosen, with an adviser, in that specialization, to include additional preparation required for a particular specialization, depth subject matter and, supporting disciplines.

Natural Sciences: Students are required to complete some coursework in social sciences appropriate to the geographical area of personal interest (e.g., anthropology, geography, history, or political science area studies courses).

Unrestricted Electives: 29-32

Specialization Adviser: Students not possessing a reading/speaking ability in 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 Adviser: S. B. Brush (Applied Behavioral Sciences)

Minor Program Requirements:

International Agricultural Development (20 International Agricultural Development 10, 101, 102, 103, 110, 110B 16 Minimum: 10 units chosen from International Agricultural Development 141, 190, 195, Economics 115A-115B, Vegetable Crops 150, Agronomy 100, 111 4 Minor Adviser: S. B. Brush (141 Academic Office Building 4)

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 Coordinator of Graduate Recruitment (I.A.D.), Graduate Division, UC Davis

Graduate Advisers: S.B. Brush, (Applied Behavioral Sciences); D.J. Boyd (Anthropology); K.G. Casman (Agronomy and Range Science); L.S. Jarvis (Agricultural Economics).

Related Courses. See Agricultural Economics 148, 215C; Agronomy 111; Animal Science 160; Anthropology 119, 119A-119B, 215A-215B; Biology 126; Cal Agri 142; Nutrition 20; 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, Advising Center in Academic Office Building 4 (752-2244).

Lower Division Courses

10. Introduction to International Agricultural Development (4) I. Brush Lecture—3 hours, discussion—1 hour. Theories, practices and institutions relating to agricultural development; the interaction of social change, cultural and economic organization through successive stages of economic development; impact of agricultural technology on underdeveloped regions. General Education credit: Contemporary Societies/Non-introductory. Recommended: GE preparation: Economics 1A-1B or Anthropology 2

52. Internship (1-12) I, II, III. The Staff (Chairperson 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.)

Upper Division Courses

101. Tropical Crop Agriculture (4) II. The Staff (Agronomy and Range Science) Lecture—4 hours. Prerequisite: Plant Science 2 or Botany 2, and Soil Science 100 or Agronomy 100. Environment and management factors affecting plant agriculture and farming systems in the tropics. Crops are considered in relation to shifting cultivation, rice-based cropping systems, annual cropping, polycropping and monoculture of perennial species.

102. Livestock and Poultry in Developing Nations (4) I. Vohra (Avian Sciences) Lecture—4 hours. Animal production and problems of specific countries in Asia, Africa, and South America; feed resources, pests, diseases associated with animals, domestic cattle, small ruminants and fish. Prerequisite: consent of instructor.

103. Social Change and Agricultural Development (4) II. Brush Lecture-discussion—4 hours. Prerequisite: introductory social science course (Anthropology, Sociology, Economics, International Agricultural Development). How social and cultural factors influence technological change in agriculture; theories of diffusion of innovations; social impact analysis and technology assessment offered in even-numbered years. International Agricultural Development (3) I. Parks Lecture—3 hours. Prerequisite: upper division standing and an agricultural production course. Organization and utilization of human and material resources in low income countries to produce food and fiber for consumption and trade. Emphasis is on farm management.

110B. Agricultural Development: Marketing (3) II. Parks Lecture—3 hours. Prerequisite: course 110A or consent of instructor. Postharvest handling, storage, transportation, processing and trade of agricultural products in low income countries. Emphasis upon food marketing systems and development projects.

141. Technology for Agriculture in Developing Regions (3) I. Chaconterre (Agricultural Engineering) Lecture—2 hours; laboratory-discussion—2 hours. Prerequisite: Physics 1A; upper division standing. Equipment used in tropical agriculture. Man, animal, and engine-powered devices. Energy requirements, site-scale, costs, support infrastructure development, and productivity potentials. (Same course as Agricultural Engineering Technology 141.)

190. Professional Skills in International Agricultural Development (1) I, II, III, Parks Seminar—1 hour. Presentation and discussion of current topics in international agricultural development covered in seminars by visiting lecturers, staff and students. May be repeated for credit. (P/NP grading only.)

191. Topics in International Agricultural Development (3) I, II, III. The Staff Lecture-discussion—3 hours. Prerequisite: consent of instructor. Selected topics dealing with current issues in agricultural development in lesser developed nations. Variable content. May be repeated once for credit.

192. Graduate Internship (1-12) I, II, III. The Staff Internship—3-36 hours. Prerequisite: participation in H. Humphrey Fellow Program or consent from research agency. Individually designed supervised internship, off or on campus. Participation in community, business, or institutional setting. Developed with advice from faculty mentor and Humphrey Coordinator. (S/U grading only.)

195. Directed Group Study (1-5) I, II, III. The Staff (Graduate Group Chairperson in charge) (S/U grading only.)

Research (1-12) I, II, III. The Staff (Graduate Group Chairperson in charge) (S/U grading only.)

International Agricultural Development (A Graduate Group) Lovel S. Jarvis, Ph.D., Chairperson of the Group Office, 106 Academic Office Building IV (752-0770/1926)

Faculty. The Group includes faculty from the College of Agricultural and Environmental Sciences, Engineering, and Letters and Science, and the School of Veterinary Medicine.

Graduate Study. The International Agricultural Development M.S. degree program prepares U.S. and foreign students for careers in agricultural and rural development around the world. Many of its faculty members have had worldwide experience in international development.

The philosophy guiding the IAD program is that graduates must have strong preparation in a specific field within the agricultural and social sciences. Thirty different specializations are offered. In addition, to apply their specializations in developing nations, graduates should be perceptive and understanding of people with a comprehension of how technological, social, economic and political values affect the development process. They should have insight into individual and group motivations and be able to discern ways to initiate changes.

The IAD program provides a multidisciplinary educational design recognized in recognition of these needs. It guides students to the knowledge, skills, and abilities needed to stimulate, assist, or manage agricultural development.

NOTES: For key to footnote symbols, see page 131.

202. Social Systems and Agricultural Development (4) I. Brush, Orito. Lecture—3 hours; discussion—1 hour. Prerequisite: upper division coursework in economic development, cultural anthropology, sociology, or political science (especially comparative politics or public administration), or consent of instructor. Social and cultural factors in agricultural and rural development: adaptation of rural people to development process; agrarian movements and revolution; evaluation of trends of rural development; application of social analysis to design and implementation of rural and agricultural policies and programs.

203. Management Systems for Agricultural Development (4) I, II, III. The Staff (Graduate Group Chairperson in charge) Lecture—3 hours; discussion—1 hour. Prerequisite: course 200 or 201 preferably, or 202, or consent of instructor. Contents of agricultural and rural development: strategies for program implementation; planning, staffing, and financing agricultural development; processes and structures of implementation; delegation, decentralization, devolution, decentralization, and dispersal.

205. Seminar in International Agricultural Development (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: consent of instructor. Discussion and critical evaluation of advanced topics and issues in international agricultural development. (S/U grading only.)

210. Topics in International Agricultural Development (3) I, II, III. The Staff Lecture—3 hours. Prerequisite: consent of instructor. Selected topics dealing with current issues in agricultural development in lesser developed nations. Variable content. May be repeated once for credit.

220. Graduate Internship (1-12) I, II, III. The Staff Internship—3-36 hours. Prerequisite: participation in H. Humphrey Fellow Program or consent from research agency. Individually designed supervised internship, off or on campus. Participation in community, business, or institutional setting. Developed with advice from faculty mentor and Humphrey Coordinator. (S/U grading only.)

290. Directed Group Study (1-5) I, II, III. The Staff (Graduate Group Chairperson in charge) (S/U grading only.)

295. Research (1-12) I, II, III. The Staff (Graduate Group Chairperson in charge) (S/U grading only.)
development and enhance rural life in developing countries. Students are prepared to accomplish technological and biological improvement in agricultural methods and to encourage social innovations where appropriate.

Graduate Adviser. Contact the Group Office.

International Relations

(Development of Letters and Science)

Michael R. Caputo, Ph.D. (Agricultural Economics)

*Denis J. Dingemans, Ph.D. (Geography)

Joyce K. Kailgren, Ph.D. (Political Science)

John F. Lofland, Ph.D. (Sociology)

Michèle Praeger, Ph.D. (French)

Young-Kwan Yoon, Ph.D. (Political Science)

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 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 rewarding 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 major in International Relations requires completion of introductory courses in political science, economics, geography, and history; Upper division work is composed of a core of four courses in economics and political science required of all majors, and an additional set of eight courses chosen from one of four clusters which encompass major topical areas in combination with regional emphases: I. World Trades and Development, II. Imperialism and Self-Determination, III. World Resources, IV. World Politics.

The major requires fluency in English and a working knowledge (approximately 24 to 27 units of course credits or equivalent fluency) of one other modern language of major significance in international affairs. Students may substitute another foreign language only with International Relations Program Committee approval.

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 other countries. Students may obtain academic credit for internships under the sponsorship of the International Relations Program Committee. The work-learning 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.

International Relations

A.B. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics 1A, 1B</td>
</tr>
<tr>
<td>Political Science 3</td>
</tr>
<tr>
<td>Geography 10</td>
</tr>
</tbody>
</table>

Total: 15 units

International Relations

A.B. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics 1A, 1B</td>
</tr>
<tr>
<td>Political Science 3</td>
</tr>
<tr>
<td>Geography 10</td>
</tr>
</tbody>
</table>

Total: 15 units

Approximately 24 to 27 units (or the equivalent) in modern foreign language

Recommends: one course in statistics (e.g., Sociology 46A, 46B, Statistics 13)

Depth Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics 115A or 115B</td>
</tr>
<tr>
<td>Economics 160A-160B (Cluster I or Cluster II, I, II, III, IV)</td>
</tr>
</tbody>
</table>

Choose one from the four clusters shown below. Courses must be in addition to those applied toward requirements above.

Total Units for the Major 70-102

Course List for Cluster Emphasis

Cluster I: World Trade and Development

(Economic emphasis: suitable particularly for students who seek careers in international business or international organizations)

Economics 100
Economics 101
Economics 160A-160B

Economics 160A fulfills one core requirement; Economics 160B fulfills a cluster requirement.

One course to be selected from:

Economics 115A or 115B (whichever course is not used to fulfill the core requirement above), 18

Two courses to be selected from:

Anthropology 123, 124, 131, 135

Geography 141, 142

Political Science 124, 127

Sociology 138, 141, 144, 145

Total: 18 units

Cluster II: Imperialism and Self-Determination

(Provides students with an opportunity to concentrate on problems of development of the Third World in recent times)

One course to be selected from each of four subjects:

Anthropology 123, 124, 127, 131, 135

Politics 124, 125, 127, 128, 176

Economics 110B, 115A or 115B (whichever course is not used to fulfill the core requirement above), 16

Four regional courses focused on Third World:

Select two courses from Group A (History)

Select two courses from Group B (Anthropology, Economics, Geography, Political Science, and Sociology)

Cluster III: World Resources

(Designed to familiarize students with major patterns of resource distribution in the world and the role resources play in international affairs)

Three courses to be selected from:

Agricultural Economics 147, 176
Economics 123
Geography 176

Resources and Society 100

Two additional courses to be selected from at least two of the following groups:

Energy—Agricultural Economics 169, Geology 130, Political Science 171

Food Resources—Geography 142, 175, Sociology 144

Population—Sociology 102, 170

NOTE: For key to footnote symbols, see page 131.
Courses in Italian

Lower Division Courses

Students offering high school language preparation as a prerequisite must take a placement test.

1. **Elementary Italian (I)** I, II, III. Foscari in charge
   Discussion—5 hours; laboratory—1 hour. Introduction to Italian grammar and development of all language skills in a cultural context with special emphasis on communication. (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. 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 Italian (II)** I, II, III. Foscari in charge
   Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in areas of grammar and basic language skills.

3. **Elementary Italian (III)** I, II, III. Foscari in charge
   Discussion—5 hours. Prerequisite: course 2. Continuation of grammar sequence, and practice of all language skills through cultural texts.

4. **Intermediate Italian (III)** I, II, III. Giuri in charge
   Lecture-discussion—3 hours. Prerequisite: course 3 or the equivalent. Review of grammar and syntax through written exercises, and readings of short prose works. Intended to develop the linguistic foundations of students who have completed the first-year language classes.

5. **Intermediate Italian (IV)** I, II, III. Giuri in charge
   Lecture-discussion—3 hours. Prerequisite: course 4 or the equivalent. Review and study of grammar and syntax; readings of short prose works, and written exercises. Intended to prepare students to read, understand and discuss modern Italian.

6. **Italian Conversation (I)** I, II, III. The Staff
   Discussion—3 hours. Prerequisite: course 3 or the equivalent. Course designed to offer practice in speaking Italian. May be repeated once for credit. (P/NP grading only)

7. **Italian Conversation (II)** I, II, III. The Staff
   Discussion—3 hours. Prerequisite: course 6A. Course designed to offer practice in speaking Italian. (P/NP grading only)

8. **Reading Italian (I)** I, II, III. Giuri in charge
   Lecture-discussion—3 hours. Prerequisite: course 5. Reading and study of modern Italian prose, including selections from creative, scientific, and journalistic writings. Introduction to contemporary Italian literature and culture, as well as a means of strengthening the student's command of the Italian language.

9. **Italian Literature in Translation (I)** I, II, III. The Staff
   Lecture—1 hour; discussion—2 hours. Course intended to acquaint the non-major with representative examples of Italian literature. Selected topics will include major authors, genres, literary periods, movements, or special themes.

10. **Directed Group Study (1-6)** I, II. The Staff
    Primarily intended for lower division students. (P/NP grading only)

Upper Division Courses

101. **Advanced Conversation, Composition, and Grammar (I)** I. De Petris
    Lecture-discussion—3 hours; weekly essays. Prerequisite: course 9 or consent of instructor.

102. **Advanced Conversation, Composition, and Grammar (II)** I. De Petris
    Lecture-discussion—3 hours; weekly essays. Prerequisite: course 101 or consent of instructor.

104. **Italian Translation and Style (I)** III. Dutchiev
    Lecture-discussion—3 hours; two research papers; term paper. Prerequisite: course 101 or consent of instructor. Practice in translation from Italian to English and back to Italian, using literary and non-literary texts of different styles. Analysis of linguistic problems and elements of style contained in the translation material.

107. **Survey of Italian Culture and Institutions (I)** III. Foscari
    Lecture-discussion—3 hours; term paper. Assessment of the role of Italian regional autonomy and its history 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.

109. **The Image of Man in the Italian Renaissance (I)** III. De Petris
    Lecture—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Processualization of the concept of man and emphasis upon different perspectives of human autonomy, self-determination and scientific "curiosity." In three parts: (a) Renaissance man and
Japanese

See Chinese and Japanese

Land, Air and Water Resources

(College of Agricultural and Environmental Sciences)

Andrè E. Lauchli, Ph.D., Chairperson of the Department
Michael J. Singh, Ph.D., Vice Chairperson of the Department
Department Office, 139 Hoagland Hall (752-1406)

Faculty

Hoagland Hall Faculty Office
139 Hoagland Hall (752-1406)

Daniel G. Aldrich, Ph.D., Professor Emeritus (Soil Science) Francis E. Broadbent, Ph.D., Professor Emeritus (Soil Microbiology) Richard G. Burau, Ph.D., Professor (Soil Science, Environmental Toxicology) John C. Camoll, III, Prof. (Meteorology) Kinsel L. Coulson, Jr., Professor Emeritus (Meteorology) Randy A. Dahlgren, Ph.D., Assistant Professor C.G. Delwiche, Ph.D., Professor Emeritus (Geology) Emanuel Epstein, Ph.D., Professor Emeritus (Plant Nutrition, Botany) Robert G. Fochini, Ph.D., Professor (Resource Sciences) Richard D. Grotjahn, Ph.D., Associate Professor (Atmospheric Science) Gordon L. Huntington, Ph.D., Lecturer Emeritus (Soil Morphology) André E. Lauchli, Ph.D., Professor (Plant Nutrition) Donald N. Munns, Ph.D., Professor (Soil Science) Leonard O. Mynup, Ph.D., Professor Emeritus (Meteorology) Kyaw Thaw Paw, Ph.D., Associate Professor (Soil Science) H. Michael Reisinger, Ph.D., Professor Emeritus (Soil Science) Victor V. Rendsvold, Ph.D., Professor Emeritus (Soils and Plant Nutrition) Dennis E. Rolston, Ph.D., Professor (Soil Science) Kate M. Scow, Ph.D., Assistant Professor (Soil Science) Roger H. Shaw, Ph.D., Professor (Meteorology) Wendy A. Siltik, Ph.D., Professor (Water Science) Michael J. Singer, Ph.D., Professor (Soil Science) Su-Tzi Soong, Ph.D., Associate Professor (Atmospheric Science) Randal J. Southard, Ph.D., Assistant Professor (Soil Genesis/Morphology) Harry C. Walker, Ed.D., Senior Lecturer, S.O.E. (Resource Sciences) Bryan C. J. Warren, Ph.D., Professor (Meteorology) Lynn D. Whittig, Ph.D., Professor Emeritus (Soil Science) Robert Zea, Ph.D., Assistant Professor (Soil Science)

Veihmeyer Hall Faculty Office
113 Veihmeyer Hall (752-0453)

James W. Biggar, Ph.D., Professor (Water Science)

NOTE: For key to footnote symbols, see page 131.

Landscape Architecture

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Environmental Design.

The Major Program

This major prepares students for entrance into the profession of landscape architecture. Landscape architects are primarily involved in the planning and design of land areas where human use requires adaptation or conservation of the environment. The
curriculum balances creativity, visual and spatial skills with technological expertise and a thorough background in physical, natural, and social sciences. Students develop proficiency at problem-solving relating to design of parks, urban open spaces, energy-efficient buildings, and landscape architecture projects, and landscape planning for wilderness and scenic regions, coastal and riparian environments, and other sensitive land areas. A process-oriented approach to designing is stressed and environmental and community values are emphasized. Graduates may find jobs in private landscape architectural firms or public agencies and corporations employing landscape architects. The Landscape Architecture major provides the student with excellent preparation for graduate school or career development in a wide range of environmental and design-related fields. Students are admitted to the Landscape Architecture major only after submitting a portfolio for review and selection by the faculty. Contact the Environmental Design Advising Center or the Landscape Architecture major adviser for further information.

Landscape Architecture

B.S. Major Requirements:

(For convenience in program planning the usual course and credit requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter

UNITs

Biology (Biology Sciences 1, 10) 4.5
Botany (Botany 2, Plant Science 2) 5
Chemistry (Chemistry 1, 14, 15, 25) 4.5
Physics (Physics 1A, 5A, 10A) 3.5
English (English 1, 20, 103) 4
Public speaking (Public Communication 1) 4
Two-dimensional design (Art 16, Design 21, Engineering 4) 4
Three-dimensional design (Design 121A, 121B, Design 130, 134, 135, 180A, 180C) 4
Earth sciences (Geography 1, Geology 1, Soil Science 10) 4
Economics (Economics 1A, 1B, Agricultural Economics 147) 4
Computer science (Agriculture and Management 21, Engineering 5, Computer Science Engineering 10, 40) 3
Mathematics (Mathematics 26, Statistics 13, Agricultural Science and Management 150) 3.4
Social science (Sociology 4) 3
Psychology 1, 16, Sociology 1 3

Electives 1.5

Humanities elective 3

Depth Subject Matter

UNITs

Introduction to landscape design (Landscape Architecture 43) 12
Landscape architecture studio: introduction, recreational open space, site planning (Landscape Architecture 111, 112, 113) 12
Landscape graphic communication (Landscape Architecture 121) 4
Advanced communication for landscape architecture (Landscape Architecture 122) 3
Introduction to landscape architecture, construction details and drawings (Landscape Architecture 131, 132, 133, 134) 15
History of landscape architecture (Landscape Architecture 140) 3
Introduction to environmental design (Environmental Horticulture 6) 2
Taxonomy and ecology of economic design (Environmental Horticulture 105) 4
Articulature (Environmental Horticulture 133) 4
Plant selection for environmental design (Landscape Architecture 155) 3
Landscape planting design (Landscape Architecture 156) 3
Landscape architecture studio: planning and analysis, urban and community design (Landscape Architecture 157, 160) 3
Senior project in landscape architecture (Landscape Architecture 193) 1.5
Presentation, theory, and practice in landscape architecture (Landscape Architecture 190) 3
Internship (Landscape Architecture 192) recommended.

Breadth Subject Matter

UNITs

Resource sciences, two upper division courses with approval of adviser 6.5
Ecology (Environmental Horticulture 104) 3.5
Biology 117, Entomology 104, Zoology 125 3
Environmental Horticulture 110, 116, 122, 127, Environmental Sciences 125, 161, 171, Agricultural Economics 18, Civil Engineering 1, Design 1 3.5

Related disciplines elective 4

Course to emphasize a discipline supplemental to the student's major in landscape architecture (Environmental Planning and Management 110, 116, 122, 127, Environmental Sciences 125, 161, 171, Agricultural Economics 18, Civil Engineering 1, Design 1) 3

Unrestricted Electives 27.43

Total Units for the Major 180

Major Adviser: M. Francis (Environmental Design). Advising Center is located in 152 Walker Hall (572-1165).

Graduate Study. Refer to the Graduate Division section in this catalog.

Courses in Landscape Architecture

Lower Division Course

40. Introduction to Landscape Architecture (Landscape Architecture 3) 3.0

Course description: Landscape architecture as an art form, technology, and profession. Emphasizes design of gardens and outdoor spaces from prehistoric civilizations to the present. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 1A, 1B, or History 3.

15. Plants in the Cultural Environment (Harold Larson) 3.0


18. Landscape Planning Design (Landscape Architecture 4) 3.5


111. Landscape Architecture Studio: Planning and Analysis (Landscape Architecture 4) 3.5

Course description: Landscape architecture studio to include the solution of large-scale landscape architectural problems with emphasis on landscape planning and analysis methods and environmental concerns. Limited enrollment.

18. Landscape Architecture Studio: Urban and Community Design (Landscape Architecture 4) 3.5

Course description: 18, 18-1st, 18-2nd, 18-3rd, Project work on community urban landscape design problems with emphasis on community and social processes, participatory design methods, and comprehension of behavioral factors relating to urban open space. Limited enrollment.

16. Prosemmer in Landscape Architecture (Landscape Architecture 4) 1.5, 2.0, 2.0

Course description: 1.0—1st, II, III, M. McNeil, 2.0—2nd, II, III, M. McNeil, Thayer 1.0—Seminar—1 hour. Lectures and discussion of critical issues in landscape architecture. May be repeated three times for credit. (P/NP grading only.)

19. Internship in Landscape Architecture (Landscape Architecture 1) 1.5, 2.0, 2.0

Course description: 1.0—II, III, II, III, M. McNeil, Thayer 1.0—Tutoring—3-1/2 hours. Prerequisite: consent of instructor. Tutoring in landscape architecture courses. (P/NP grading only.)

18. Directed Group Study in Landscape Architecture (Landscape Architecture 1) 1.5, 1.5, II, III, II, M. McNeil, Thayer 1.5—Directed Group Study—consent of instructor. Directed group study in landscape architecture. May be repeated for a total of 12 units. (P/NP grading only.)

19. Special Project in Landscape Architecture (Landscape Architecture 1) 1.5, II, III, II, III, M. McNeil, Thayer 1.5—Special Project under supervision of instructor. May be repeated for credit. (P/NP grading only.)

11. Advanced Graphic Communication (II, III, III, II, III, M. McNeil, Thayer 1.5—Consent of instructor. (P/NP grading only.)

197. Tutoring in Landscape Architecture (Landscape Architecture 1) 1.5, II, III, II, III, M. McNeil, Thayer 1.5—Tutoring—3-1/2 hours. Prerequisite: consent of instructor. Tutoring in landscape architecture courses. (P/NP grading only.)

19. Directed Group Study in Landscape Architecture (Landscape Architecture 1) 1.5, II, III, II, III, M. McNeil, Thayer 1.5—Directed Group Study—consent of instructor. Directed group study in landscape architecture. May be repeated for a total of 12 units. (P/NP grading only.)

19. Special Project in Landscape Architecture (Landscape Architecture 1) 1.5, II, III, II, III, M. McNeil, Thayer 1.5—Special Project under supervision of instructor. May be repeated for credit. (P/NP grading only.)

Graduate Courses

201. Theory and Philosophy of the Designed Environment (Landscape Architecture 1) 3.0

Course description: 1.0—II, III, M. McNeil, Thayer 1.0—Seminar—4 hours. Prerequisite: course 140 or the equivalent; graduate standing or consent of instructor. (P/NP grading only.)

19. Special Project in Landscape Architecture (Landscape Architecture 1) 1.5, II, III, II, III, M. McNeil, Thayer 1.5—Special Project under supervision of instructor. May be repeated for credit. (P/NP grading only.)
Latin
See Classics
Law, School of
Florance Batico, B.C.L., LL.M., Dean of the School
Monty A. Schwartz, J.D., LL.M., M.S., Associate Dean (Law Library)
Martha S. West, J.D., Associate Dean (Administration and Student Affairs)
Bruce A. Welt, J.D., Associate Dean (Academic Affairs and Research)
Dean's Office, 1011 Martin Luther King, Jr. Hall (752-0243)

Faculty
Homar G. Angelo, J.D., LL.M., Professor Emeritus
John D. Ayer, J.D., LL.M., Professor
Roger Baron, J.D., Lecturer
Edward L. Barrett, J.D., Professor Emeritus
Florance Batico, B.C.L., LL.M., Professor
Antonia E. Bernhard, J.D., Lecturer
Edgar Bodenheimer, J.D.U., LL.B., Professor Emeritus
Alan E. Brownstein, J.D., Professor
Carol S. Bruch, J.D., Professor
Byron Chell, J.D., Lecturer
Garrett C. Dailey, J.D., Lecturer
Joel C. Dobris, LL.B., Professor
Harrison G. Dunning, LL.B., Professor
Daniel J. Dykstra, LL.B., S.J.D., Professor Emeritus
Floyd F. Fenney, LL.B., Professor
Daniel Wm. Fessler, J.D., S.J.D., Professor
Barbara A. Fitzmaurice, J.D., Lecturer
Arturo Gandara, J.D., Acting Professor
Michael J. Glennon, J.D., Professor
Gary Goodpaster, J.D., Professor
Sarah D. Gray, Ph.D., Professor (Human Physiology)
Louise Haffner, J.D., Lecturer
Thomas W. Hazlett, Ph.D., Professor of Agricultural Economics
Robert W. Hillman, J.D., Professor
James E. Hogan, LL.B., Professor
Joan W. Howarth, J.D., Visiting Acting Professor
Edward J. Inwiewkeird, J.D., Professor
Margaret Z. Johns, J.D., Lecturer and Director of Legal Writing
Kevin R. Johnson, J.D., Acting Professor
Friedrich K. Juenger, J.D., Lecturer
Evelyn L. Kirkland, J.D., Acting Professor
Leilah A. Kurz, M.A., J.D., Professor
Cecilia D. Lannon, J.D., Lecturer
Pierre R. Loeuipse, LL.B., LL.M., Professor
Jean C. Love, J.D., Professor
E. Bradley Nelson, J.D., Lecturer
John B. Oakley, J.D., Professor
Raymond I. Parnes, J.D., LL.M., S.J.D., Professor
Rex R. Pechschabelcher, J.D., Professor
John W. Poulos, J.D., Professor
Edward H. Redin, LL.B., Professor
Montgomery Schwarz, J.D., LL.M., M.S., Professor
Daniel L. Simmons, J.D., Professor
James F. Smith, J.D., Lecturer
Igokwe Tullot, LL.B., Lecturer
Jeanna K. Weinberg, LL.M., Lecturer
Martha S. West, J.D., Professor
Sidney Wolsiny, LL.B., Lecturer
Bruce A. Welt, J.D., Professor
Richard C. Wydick, LL.B., Professor

Courses of Instruction. The following courses for students enrolled in the School of Law are set up

NOTE: For key to footnote symbols, see page 131.
280. Property and Environmental Law (23) (II, IV). Simmons: Discussion—3 hours. This course covers the regulation of property and environmental law, including land use, zoning, environmental permitting, and the legal framework for protecting the environment.

281. Constitutional Law II (3) (III). Browne, Pollock: Discussion—3 hours. This course covers the doctrine of federalism, the First and Fourteenth Amendment rights, and the First Amendment study involving an exercise of freedom of speech and assembly, including political speech and the First Amendment and corporate speech, government speech and regulation of the media, speech and the First Amendment individual's right to privacy, and obscenity. The course also examines freedom of religion, the separation of church and state, and state aid to religious schools. The course considers the First Amendment right to free speech and equal protection, and fundamental rights they imply; rights against religious discrimination. The course also discusses judicial remedies for violations of religious freedom, the First Amendment, and the right to practice one's religion. The course also examines the civil rights movement.

282. Criminal Procedure (2) (II, IV). Simmons: Discussion—2 hours. This course covers the criminal procedure, including the Confrontation Clause, the Fifth Amendment privilege against self-incrimination, the Sixth Amendment right to counsel, the Eighth Amendment prohibition of cruel and unusual punishment, the Fourteenth Amendment equal protection, and the Fourteenth Amendment due process clause. The course also examines the right to a speedy trial, the right to counsel, and the right to an impartial jury. The course also examines the use of evidence at trial, including the exclusion of evidence under the rules of evidence and the admission of evidence under the rules of evidence.

283. Federal Income Taxation (3) (II). Brown: Discussion—4 hours. This course covers the basic principles of federal income taxation, including the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts.

284. Estate Planning (2) (II, IV). Brown: Seminar—2 hours. This course covers the basic principles of estate planning, including the tax liability of estates and trusts, the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts.

285. Consumer Protection (3) (II). Brown: Seminar—3 hours. This course covers the basic principles of consumer protection, including the tax liability of estates and trusts, the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts.

286. Constitutional Law I (3) (II). Brown, Pollock: Discussion—3 hours. This course covers the basic principles of constitutional law, including the tax liability of estates and trusts, the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts.

287. Property and Environmental Law (23) (II, IV). Simmons: Discussion—3 hours. This course covers the regulation of property and environmental law, including land use, zoning, environmental permitting, and the legal framework for protecting the environment.

288. Constitutional Law II (3) (III). Browne, Pollock: Discussion—3 hours. This course covers the doctrine of federalism, the First and Fourteenth Amendment rights, and the First Amendment study involving an exercise of freedom of speech and assembly, including political speech and the First Amendment and corporate speech, government speech and regulation of the media, speech and the First Amendment individual's right to privacy, and obscenity. The course also examines freedom of religion, the separation of church and state, and state aid to religious schools. The course considers the First Amendment right to free speech and equal protection, and fundamental rights they imply; rights against religious discrimination. The course also discusses judicial remedies for violations of religious freedom, the First Amendment, and the right to practice one's religion. The course also examines the civil rights movement.

289. Criminal Procedure (2) (II, IV). Simmons: Discussion—2 hours. This course covers the criminal procedure, including the Confrontation Clause, the Fifth Amendment privilege against self-incrimination, the Sixth Amendment right to counsel, the Eighth Amendment prohibition of cruel and unusual punishment, the Fourteenth Amendment equal protection, and the Fourteenth Amendment due process clause. The course also examines the right to a speedy trial, the right to counsel, and the right to an impartial jury. The course also examines the use of evidence at trial, including the exclusion of evidence under the rules of evidence and the admission of evidence under the rules of evidence.

290. Federal Income Taxation (3) (II). Brown: Discussion—4 hours. This course covers the basic principles of federal income taxation, including the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts. The course also examines the tax liability of individuals, corporations, and partnerships, and the tax liability of estates and trusts.
240. Law of Elections and Political Campaigns (2) I. Fenney Discussion—2 hours. Conceptual foundations; administrative and case law aspects of federal and state elections, including laws relating to primaries, general elections, recounts, recalls, and campaign finance; financial disclosure and conflicts of interest.

241. Legal Accounting (2) Discussion—2 hours. Introduction to accounting for non-accounting students. Includes the accounting background that students may put to other law school courses and in practice. Basic concept will be stressed to assure that non-accounting students are understood and that their legal relations to legal problems may be demonstrated. Students with substantial prior accounting experience (more than six credit hours in this course).

242. Conflict of Laws (Long Course) (4) I. Bruch Discussion—4 hours. Study of transactions with multistate or international contacts. The topics covered include jurisdiction, personal and subject-matter jurisdiction, and the recognition and enforcement of foreign judgments.

243. Debtor-Creditor (3) I. Ayre Discussion—3 hours. Surveys the rights and obligations of debtors in bankruptcy, and of third persons dealing with bankrupt debtors. Major topics include proceedings under the Bankruptcy Code. In the first part of the course, an examination of how and why debtors are permitted to discharge debts, "wiping out the slate." Later, consideration of how the bankruptcy trustee collects and distributes money to pay creditors' claims. Study of the bankruptcy system as it applies to both individuals and corporations.

244. Basic Human Physiology (2) II. Gray Lecture—2 hours. Overview of the anatomy and physiology of the human body. Course outline: skin, muscle, bone, nervous system, cardiovascular system, respiratory system, digestive system, endocrine system, urinary system.

245. Estates and Gift Taxation (3) Discussion—3 hours. Prerequisites: course 220. Study of the federal estate and gift tax laws, and their relationship to probate law and estate planning.

246. Federal Jurisdiction (3) I. Darrow Discussion—3 hours. Study of the subject matter jurisdiction of federal courts. Statutory provisions for the federal district courts and the U.S. Courts of Appeals arising under federal law. Review of separation of powers and the federalism as guidelines in understanding the Supreme Court's leading opinions on the scope of federal jurisdiction.

247. Advanced Federal Income Taxation of Business Entities (3) II. Simmon Discussion—3 hours. Prerequisites: course 220 and 238. Comprehensive, in-depth analysis of advanced tax issues involving the transfer of business assets involving corporate liquidation as an asset acquisition technique; corporate restructuring and the transfer of corporate attributes in a reorganization transaction. Also examines tax planning for affiliated groups of corporations.

248. International Law (3) I. Glannon Discussion—3 hours. Prerequisites: course 217 recommended. This introductory course covers basic international law concepts such as statehood and recognition; treaty law; the law of the sea and customary international law; use of force; human rights and war crimes; and extraterritoriality of certain conduct.

249. Comparative Law (2) Discussion—2 hours. Comparison of methods and sources of common and civil law; background and structure of the principal civil codes; analysis and study of problems arising in international transactions.

250. Jurisprudence (3) I. Ayre Lecture-discussion—3 hours; term paper or final exam. Focuses on the limits of the economic model in law including an examination of the legal reality view of the legal system and a review of various critiques of that model—radical, conservative, and libertarian. No prior exposure to either economics or philosophy is presumed. Term paper or paper option satisfies advanced legal writing requirement.

251. Labor Law (3) I. West Discussion—3 hours. Study of federal and state law, primarily statutory, regulating the employer-employee relationship and the establishment of the collective bargaining relationship; and the negotiation of the collective bargaining agreement; and (3) the exaction of primary or secondary economic sanctions. Federal labor law will be compared with state wrongful discharge law.

252. Gender-Based Discrimination (3) Discussion—3 hours. Course topics may include issues raised by legal and social responses to gender-based discrimination. It explores potential remedies drawn from constitutional law, statutory enactments, and common law developments. Subject matter may vary depending upon administration in family law, educational opportunity, and criminal law.

253. Products Liability (3) I. Hogan Discussion—3 hours. Civil action for harm to the consumer resulting from the use of defective products.

254. Pension Law (3) I. Work Discussion—3 hours. Federal regulation and taxation of private pensions and other forms of deferred compensation and tax-favored retirement benefits. Includes the Employee Retirement Income Security Act of 1974 (ERISA) and will deal with such topics as coverage, vesting, integration with social security, funding, spousal interests (both during marriage and after divorce), retiree health and welfare plans, and restrictions of state labor law. Fiduciary problems will be examined, particularly in the area of corporate tax-exempt and plan investments. Problems surrounding plan terminations will be examined. Also addressed are employee stock ownership plans, Pension Benefit Guaranty Corporation insurance, and the issue of asset reversioners to employers in the case of unfunded plans.

255. Land Use Planning (2) I. Kirkland Discussion—2 hours. Legislative, judicial, and administrative methods used to facilitate the rational use of land. Legal topics considered include land zoning or subdivision regulation, nuisance, eminent domain, general plans, and environmental controls affecting land use.

256. Foreign Relations Law (3) I. Glannon Discussion—3 hours. Prerequisites: course 217 or consent of instructor. Seminar covers subjects such as the war power, the treaty power and executive agreements, arms sales and military assistance, the negotiations of self-defense, the war power, the scope of the appropriations power as a check on executive activities, and other separation of powers issues generated by international law and constitutional law. Class presentation and required seminar paper will satisfy the advanced legal writing requirement. Limited enrolment.


258. Disability Rights Law (2) I. Welschney Discussion—2 hours. Survey of legal issues involving the rights of disabled persons. (SU grading only)

259. Employment Law (3) I. Prepelita Discussion—3 hours. Consideration of employment discrimination based upon race, color, religion, sex, national origin, age, military service, and disability. Various legal prohibiting laws will focus on Title VII of the Civil Rights Act of 1964, and include coverage of Art. 181, Art. 183, the Equal Pay and Age Discrimination Acts. State and local employment laws will also be discussed.

260. Local Government (2) Discussion—2 hours. Examines selected topics of current interest to California cities and counties. The last time this course was given the topics included: (a) California Tort Claims Act, (b) Administrative Procedure Act, (c) antitrust liability of local governments, (d) eminent domain law, and (e) section 1983 (civil rights actions) against local governments. Course is particularly useful for those who may work for city attorneys or county counsels.

261. Antitrust (3) I. Wyckliffe Discussion—3 hours. Study of the federal antitrust laws including price fixing, fixing on distribution, tying arrangements, monopolization and exclusionary practices.

262. Trial Practice I (3) I. Imler/lawley Discussion—2 hours; laboratory—2 hours. Prerequisites: course 219. Introduction to the preparation and trial of cases, featuring: litigating the case, assigning reads and forensic literals. Laboratory will be held on Tuesdays, Wednesdays, or Thursdays (SU grading only). Limited enrollment.

263B. Trial Practice II (2) I. Nelson Discussion—2 hours. Prerequisites: course 262A, Advanced trial practice and litigation skills course featuring student preparation of cases, presentation of cases in court, and occasional class sessions. (SU grading only). Limited enrollment.

264. Water Law (3) I. Durning Discussion—3 hours. Property rights in surface waters, including trespass and riparian rights; federal reserved rights; water administration institutions, including the federal

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265. Nature Resource Law (2) I. Dunninger Seminar—2 hours. Prerequisites: consent of instructor or course 264, 285, or 287. Study of the legal and economic aspects of the use of natural resources. Each student will select one topic for development within the seminar and will be expected to present the results of his research to the class on the topic which would satisfy the advanced legal writing requirement. Limited enrollment.

266. International Wildlife Protection (2) II. Giorno Seminar—2 hours. Examines treaties and customary international law governing the protection of wildlife. Satisfies the advanced legal writing requirement.


268. Corporate Finance (3) I. Ayre Discussion—3 hours. Focuses on how businesses raise money for a combination of two goals: a) study of one elementary "finance theory" and consideration of how this theory is applied by courts and legislatures.

269. International Business Transactions (2) Discussion—2 hours. Consideration of selected problems in international business transactions.

270. Labor Law Seminar (2) I. Bartos Seminar—2 hours. Study of labor controversies from a critical legal studies perspective, including cases pending before the Supreme Court, law reform, impasse resolution in the public and private sectors, under standing and individual rights, the rights of the organized, the assumptions and myths of American labor law, labor relations of multinational corporations, and comparative industrial relations ("paternalism", work councils, codetermination and self-management). Satisfies advanced writing requirement. Limited enrollment.

271. Family Law (Long Course) (3) I. Bruch Discussion—3 hours. Designed for the student with a substantial interest in Family Law. Emphasizes the legal and social aspects of personal relations that involve separate family rights, including decisions concerning medical care,Negligence, dependency, abuse, foster care, termination of parental rights, adoption, artificial insemination, surrogacy, paternity, legitimacy, surrogates, birth control, abortion, child support and child custody. How attorneys, marital health professionals and the judicial process do and should deal with these issues (e.g., interpreting, counseling and mediation) are also considered.

272. Current Issues in Family and Marital Property (2) Seminar—2 hours. Prerequisites: course 220 or 227 or consent of instructor. Examination in depth of important current issues in the fields of family and marital property law including tax explanations and implications, including study and direct observation of the legislative process. Each student will select one issue for development and presentation in the seminar, research paper, and oral presentation. Writing analysis is required. A more lengthy paper with additional unit credit may be arranged with consent of instructor to satisfy the legal writing requirement.

273. Intellectual Property (2) I. Kurns Discussion—2 hours. Study of the protection of intellectual property and unfair competition. Among the topics considered are trade secrets, patents, trademarks, misleading and false advertising, and copyrights.

274. The Juvenile Justice Process (2) I. Pernas Discussion—2 hours. Lecture-discussion of a separate juvenile justice process: police investigation, apprehension and diversion; probation intake and detention; juvenile court hearing and disposition; juvenile corrections. Major emphasis is on the emerging role of counsel at each phase of the process. Guest speakers and field trips.

275. American Indian Law (2) Discussion—2 hours. Prerequisites: consent of instructor. Study of the distinct legal doctrines relating to Indians, Indian tribes, and Indian reservations. Major focus will be on the governmental powers of federal, state and tribal governments. Emphasis will also be on legal issues facing Indians residing on or doing business on Indian reservations. The law on Indian lands, waters, and fishing and hunting rights will also be emphasized.

276. Public Sector Labor Law (2) Seminar—2 hours. Prerequisites: course 251 or consent of instructor. Application of private sector labor law doctrines to public sector. Emphasis on the four California public sector statutes and the impact of constitutional law on public employees. Class presentation and seminar paper will satisfy advanced writing requirement. Limited enrollment.
282. Advanced Legal Writing Seminar (2) II. Wyckoff Seminar for selected legal practitioners in plain English. Writing exercises and outside readings will be assigned weekly. Each student will complete an individual written exam for partial examination. The writing project will satisfy the law school's advanced legal writing requirement. Limited enrollment. (SU grading only.)

283. Children and the Law (2) Discussion—2 hours. Introduction to statutory, administrative and case law aspects of children's issues, including regulation of electric and gas utilities. Water, coal, oil, natural gas, uranium, solar and geothermal fuel cycles will be considered, as well as the aspects of energy conservation.

283. Remedies (3) II. Howarth Discussion—3 hours. Study of common law remedies: damagess, specific performance, injunctions, and restitutionary relief. Focus of course will be on the efficiency, fairness, and practicality of the alternative remedies available to the practitioner and the court.

284. Advanced Criminal Procedure (3) II. Parsons Discussion—3 hours. Study of those who wish to handle criminal cases. In particular, it treats bail, postconviction dilution, plea bargaining, trial by jury, and sentencing. (Course 225 is a prerequisite for this course.)

285. Environmental Law (3) Discussion—3 hours. Introduction to the law dealing with environmental impact, particularly the National Environmental Policy Act and Clean Air Act. Particular emphasis is given to the Clean Water Act and various statutes on toxics in the environment. Introduction to the Clean Air Act is also provided. (SU grading only.)

286. Law and Economics (2) I. Discussion—2 hours. Course will examine a number of legal issues using economic analysis. Possible topics include the economics of monopoly, rule, economic analysis of contract law, theory of the firm and basic economics of corporate law and antitrust, the theory that the common law is efficient. The economics in the context of American legal Anglo-American law such as rights, property, harm, and equality. Prior background in economics is welcome but not necessary.

287. Public Land Law (2) Discussion—2 hours. Legal aspects of federal land management, including the history of public land law, authority over federal lands and specialized law dealing with particular natural resources and uses found on federal lands (mining, timber, range, wildlife, recreation and preservation).

288. Advanced Constitutional Law Seminar (2) II. Goodspeed Seminar in first-draft discussion of major cases or problems in constitutional law and theory. Topical may include public choice theory, the public-private distinction, contemporary issues on the border of constitutional theory, theories of judicial review, theories of the First Amendment, the nature of constitutional law, rhetoric, etc. Problem areas include freedom of speech, substantive due process, equal protection, affirmative action, and constitutional litigation. Questions of advanced legal writing requirement. Limited enrollment.

289. Criminal Justice Administration Seminar (2) II. Feeney Seminar—2 hours. Consideration of current reform efforts in criminal justice administration. Emphasis will be on the pre-trial process. Special focus will include bail reform and pre-trial detention, criminal discovery, and the charging process. Class presentation and regraded seminar paper will satisfy the advanced legal writing requirement.

290. Mexican-American Legal Relations (3) I. Smith Discussion—3 hours; fine examination or research paper on Mexican-American social conditions. Course will include a description and jurisdictional analysis of the differences and similarities of the legal and political systems of the two countries; survey of Mexican and Mexican-AmericanCustoms Committee; foreign investment; Mexico's domestic debt; trade (importing and exporting, of the GATT, technology transfer and intellectual property); and Mexican and subnational treaties, trade agreements and regional international law. Satisfies advanced writing requirement.

291. Immigration Law and Procedure (3) I. Smith Seminar—3 hours. Seminar will survey a brief history of U.S. immigration and policy and compare the policies of other countries; use of primary and secondary sources of immigrants; federal and state case law; nationality and immigration; foreign investment; Mexico's domestic debt; trade (imports and exports, of the GATT, technology transfer and intellectual property); and Mexican and subnational treaties, trade agreements and regional international law. Satisfies advanced writing requirement.

292. Immigration Law and Procedure (3) I. Smith Seminar—3 hours. Seminar will survey a brief history of U.S. immigration and policy and compare the policies of other countries; use of primary and secondary sources of immigrants; federal and state case law; nationality and immigration; foreign investment; Mexico's domestic debt; trade (imports and exports, of the GATT, technology transfer and intellectual property); and Mexican and subnational treaties, trade agreements and regional international law. Satisfies advanced writing requirement.

293. Intellectual Property Law Seminar (2) I. Johnson Seminar—2 hours. Discussion of the major cases in the area of public interest litigation and practice. Includes a survey of legal techniques and problems common to public interest practice.

294. Selected Topics in Private Land Use Planning Arrangements (2) Seminar—2 hours. Study of private land use planning arrangements and the real property policies necessary to implement them. Topics include: a) Alternative land use planning arrangements (Yee, Hess, and constitutional law); b) Environmental impact study and requirement; c) Zoning and land use planning; d) Growth management. Limited enrollment. (SU grading only.)

295. Advanced Civil Procedure (2) Discussion—2 hours. Treatment of in-depth topics introduced in the basic civil procedure course and characteristic of modern multiparty, complex litigation. Focus of this course will be on the operation of the federal court litigation, class actions, discovery, judicial management of litigation, multi-district litigation and federal courts, and preclusion (judicial estoppel and collateral estoppel). Not all topics will be covered in any given spring semester.

296. Copyright and Entertainment Law (3) Discussion—3 hours. Seminar to provide students with practical experience in the area of copyright and entertainment law. The seminar will be offered in a small group setting. Limited enrollment. (SU grading only.)

297. Public Law and Economics (2) I. Discussion—2 hours. Course will examine a number of legal issues using economic analysis. Possible topics include the economics of monopoly, rule, economic analysis of contract law, theory of the firm and basic economics of corporate law and antitrust, the theory that the common law is efficient. The economics in the context of American legal Anglo-American law such as rights, property, harm, and equality. Prior background in economics is welcome but not necessary.

298. Group Study (1-4) I. II. The Staff Group Study—1 to 4 hours. Group Study—limited enrollment. (SU grading only.)

299. Research in Legal Problems (1-4) I. II. The Staff Seminar—1 to 4 hours. Seminar—limited enrollment. (SU grading only.)

300. Professional Courses

410A. Appellate Advocacy (Moot Court) (1) I. Perschbacher Program includes classroom instruction in appellate procedure and speech preparation, and participation in the moot court. Participants in 410A work on three oral advocacy problems and argue six times before a moot court. Both oral and written cases in 410A are judged to qualify for interscholastic competitions. Limited enrollment. (SU grading only.)

410B. Appellate Advocacy (Moot Court) (1) I. Perschbacher Prerequisite: successful completion of course 410A. Participants in 410B research and write an appellate brief and argue the case twice before a moot court. Both oral and written cases in 410B are judged to qualify for interscholastic competitions. Limited enrollment. (SU grading only.)

410C. Inter-scholarship Competition (1-3) I. II. The Staff Prerequisite: consent of appropriate faculty sponsor. Participation in interscholarship and lawyering skills competition. Elimination is limited to students actually representing the School. In the interscholarship competition, a faculty advisor may choose the award of academic credit for any portion of the performance of such additional work as may be reasonable to justify the credit. May satisfy advanced writing requirement. (SU grading only.)

410D. Court Board Seminar (1) I. II. The Staff Prerequisite: successful completion of course 410A. Members of Court Board may receive one credit for each semester of service on the Board. Only up to a maximum of four units may be awarded after certification by Court Board and approval of the faculty advisors to Court Board Limited enrollment. (SU grading only.)

411. Law Review Editor (1-2) I. II. The Staff Writing of an editorship quality law review article under the editorial supervision of editors of the Law Review Minimum of one hour per week in class, with an additional 30 hours to be credited. May be taken with consent of editor-in-chief. Supervision by the Law Review Editors. Law Review may receive two units for each semester of service as an editor, up to a maximum of four units (SU grading only.)

412. Environ Editor (1) I. II. The Staff The Editor-in-Chief of Environ may receive one credit for each semester of service. Credit must be approved by the faculty advisor to Environ. Credit is awarded only after certification by the editor-in-chief and approval of the faculty advisors to the Law Review. Editors of the Law Review may receive two units for each semester of service as an editor, up to a maximum of four units (SU grading only.)

413. Advanced Writing Project (1-4) I. II. The Staff Completion of a writing project under the active and regular supervision of a faculty member satisfies the legal writing requirement. Writing project must be an individually authored work of rigorous intellectual effort of at least 20,000 words, double-spaced pages, excluding footnotes. Project may take any of several forms, for example, a paper, a brief, a memorandum of law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), an or oral or written report (with explanatory comments). Advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirement. Number of units for the writing project shall be approved by the faculty supervisor and will determine the scope of the writing effort. (Grading will be on SU or letter-grade basis at the faculty supervisor's discretion.)

414. Clinical Programs (1-2) I. II. The Staff Includes: Clinical Programs (1 unit) to full time (12 units). Prerequisite: to be arranged with practicing attorneys and public agency of student's choice. Includes: one semester of full-time, individual student's choice of faculty member; relevant substantive and procedural coursework recommended. Clinical must be under appropriate legal supervision and designed to maximize educational benefits. Students planning to arrange in individual clinical in subject matter areas covered by Formal Clinical Programs (i.e., police, juvenile justice, employment relations, legislative, immigration) must enroll in the Formal Clinical Program and attend the required seminars (see courses 234, 410, 455, 470). With exception of a clinical semester away, students may enroll in no more than 8 units in any one semester or any one clinical placement. With full time clinical semester away, enroll in 470, which is a supervised fieldwork or 420 with consent of Dean. (14 semester units maximum total). For complete description of policies and procedures governing students, requirements and limitations of individual clinical, see "Clinical Guidelines" obtainable from Dean's Office in Office of Clinical (SU grading only.) (Completed application and letter from student to Clinical placement must be submitted to Clinical Office one semester prior to beginning of semester in which credit is requested.)

415. Judicial Clinical Programs (1-2) I. II. The Staff Clinical Program—to be arranged. Prerequisite: relevant substantive and procedural coursework. Should include individual judicial clerkship programs with state and federal judges of their choice with the approval of the School. Clinical may award only the sponsorship of individual faculty members. An introductory orientation seminar is required. Otherwise, the requirements for the program are the same as for Individual Clinics (course 433) (SU grading only.)

NOTE: For key to footnote symbols, see page 131.
440. **Clinical Program in Immigration Law** (2-12) I. IL Smith
Discussion—2-12 hours. Client clinic course will include a seminar on immigration law practice, individual weekly case conferences, and practical experience as a law clerk and assigned immigration law cases. Students may represent clients in administrative law hearings in San Francisco. Minimum units for the course are 4. Each unit assumes for four hours work per week, including participation in the seminar, conference, and case research and development. Students who have completed this course may take the clinic for a minimum of 2 units. Limited enrollment. (SU/G grading only.)

450. **Clinical Program in Environmental Law** (2-6) I. Dunning
Clinical Program. Practical experience in environmental law. Students will work under the direct supervision of a government or private attorney engaged in some form of environmental law work for a minimum of 8 hours per week. (For purpose of this course, "environmental law" includes land use control by public means.) Students will be required to prepare a bi-weekly journal, noting, commenting upon, and reflecting upon their clinical experience, and to participate in occasional meetings of students enrolled in program. (SU/G grading only.)

455. **Clinical Program in Employment Relations** (2-12) I, II, III, IV
Clinical Program. Prerequisite: Prior or concurrent enrollment in courses 251 or 260 or consent of instructor. Practical experience in employment relations, private and public sector labor law, or employment discrimination. Students will work under the direct supervision of a government or private attorney for the opportunity to participate in a range of activities associated with their specific office, with emphasis on observation and participation in actual investigation, interviewing, drafting of pleadings, and attendance at hearings. Weekly journals and attendance at monthly group meetings required. (SU/G grading only.)

470. **Clinical Program in the Administration of Criminal Justice** (2-12) I, II, III, IV
Clinical program. Prerequisite: courses 219, 227 and 260A recommended. This program affords students the opportunity to gain practical experience working full or part time in a District Attorney's or 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 legal activities associated with their specific office with emphasis on observation and participation in fact-finding, investigation, interviewing, counseling, negotiating, oral practice, and trials under State Bar rules. Journals and seminar attendance are required. Limited enrollment. May be repeated for a total of 12 units. (SU/G grading only.)

495. **Instruction in Legal Research and Writing Skills** (2)
Bernhardt I. Bernhardt, John
Prerequisite: course 207 or 208. Participants will assist in instructing legal research and writing program for first-year students under the direction of the legal research and writing instructors. Students will engage in the research and writing projects required for enrollment. Participants may assist in legal research and conduct in the legal writing program. (SU/G grading only.)

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**Linguistics**

Course: **Linguistics**

College: **Letters and Science**

Robert VanVlain, Jr., Ph.D., Program Director

Program Office, 922 Sprout Hall (752-9933)

**Committee in Charge**

Wilbur A. Benware, Ph.D. (German)
Caroline Hentson, D.Phi. (Linguistics)
Maria L. Manes-Manoli (French)
Almerindo E. Ojeda, Ph.D. (Spanish)
Lenora A. Timm, Ph.D. (Linguistics)
Robert VanVlain, Jr., Ph.D. (Linguistics)
David P. Wilkins, Ph.D. (Linguistics)

Aram Yengoyan, Ph.D. (Anthropology)

**Faculty**

Wilbur A. Benware, Ph.D., Associate Professor
Nina F. Dronkens, Ph.D., Lecturer
Linnea C. Ehr, Ph.D., Professor (Education)
James Gallant, Ph.D., Associate Professor
Maria L. Manes-Manoli, Ph.D., Professor (French)

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**Barbara J. Merino, Ph.D., Associate Professor**

**Michael T. Moeley, Ph.D., Professor**

**Almerindo E. Ojeda, Ph.D., Assistant Professor**

**David L. Omlin, Ph.D., Professor**

**Wendy O. Sibamoto, Ph.D., Associate Professor**

**Gwendolyn Schweble, M.A., Lecturer**

**Janet S. Silbomato, Ph.D., Associate Professor**

**Lenora A. Timm, Ph.D., Associate Professor**

**Maximo Tombeabich, Ph.D., Professor (Spanish)**

**Robert VanVlain, Jr., Ph.D., Associate Professor**

**Caroline Hentson, D.Phi., Lecturer**

**Benjamin E. Wettaker, Professor**

**Michael V. Wedin, Ph.D., Professor (Philosophy)**

**David P. Wilkins, A.B., Acting Assistant Professor**

**Linguistics**

**Linguistics 1, 109, 139, and 140**

**Minor Adviser.** Same as Major adviser.

**Graduate Study.** The Graduate Linguistics 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.

**Graduate Adviser.** A. E. Ojeda.

**Courses in Linguistics**

**Lower Division Course**

1. **Introduction to Linguistics (4)** I, II, III, Hentson, Benware, Wilkins

Lecture—3 hours; discussion—1 hour. Introduction to the study of language, its nature, diversity, and structure. General Education credit: Civilization and Culture/Introductory.

**Upper Division Courses**

100. **Languages of East Asia (4)** I. Wallacker

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Survey of languages and language families of East Asia, their cultures and distributions.

102. **Historical Linguistics (4)** I. Wilkins

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 100. Description and methods of the historical study of languages; sound change, morphological change, syntactic change, semantic change.

106. **Phonetics (4)** I. Hentson

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to articulatory phonetics with some attention to the fundamentals of acoustic phonetics.

113. **Language, Gender and Society (4)** III, Hentson

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Development of language in society and under different social, cultural, and historical influences. General Education credit: Diversity.

115. **Hispanic Sociolinguistics (3)** III, Illin

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 3 or the equivalent. Study of the varieties of Upper Aymarino spoken in the Southwest. Patterns of Spanish—English bilingualism; attitudes and Spanish and English. Offered in odd-numbered years.

120. **Semantics (4)** I. Wilkins

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Intensive study of the study of meaning: the nature of the linguistic sign, the structure of the lexicon, and the semantics of sentences.

138. **Language Development (3)** Illin

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Theory and research in children's acquisition of the meanings of words. General Education credit: Scientific Method.

139. **Phonological Analysis (4)** I. Hentson

Lecture—3 hours; discussion—1 hour. Prerequisite: course 109. Introduction to and application of phonological theory.

140. **Grammatical Analysis (4)** I. VanVlain, Wilkins

Lecture—4 hours. Prerequisite: course 1. Introduction to the study of language through the detailed study of a major theory of syntax, emphasizing theoretical reasoning, methodology and theory building.

165. **Contrastive Analysis of Spanish and English (4)** III, Illin

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and Spanish 3 or the equivalent. Comparison of the linguistic structures (phonology, morphology and syntax) of Spanish and English; learning problems of both native Spanish and native English speakers will be considered. Offered in even-numbered years.

165. **Introduction to Syntactic Theory** (I, II) Van Vlai

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Intensive study of syntactic theory. A study through the detailed study of a major theory of syntax, emphasizing theoretical reasoning, methodology and theory building.

165. **Introduction to Syntactic Theory** (II, III) Van Vlai

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Intensive study of syntactic theory. A study through the detailed study of a major theory of syntax, emphasizing theoretical reasoning, methodology and theory building.

170. **Language Universals and Typology (4)** III, VanVlain, Wilkins

Lecture—4 hours. Prerequisite: course 1. Intensive study of syntactic theory. A study through the detailed study of a major theory of syntax, emphasizing theoretical reasoning, methodology and theory building.

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**NOTE:** For key to footnote symbols, see page 131.
Linguistics (A Graduate Group)

Lecture—3 hours; term paper. Prerequisite: course 165 (may be taken concurrently). Investigation into common features of all human languages and the classification of languages in terms of their structural features; theories of universal grammar. Detailed discussion of a non-Indo-European language and comparison with English.

175. Biological Basis of Language (4) III. Dronkers Lecture—6 hours; discussion—1 hour. Prerequisite: course 101. Overview of issues in the field of neurolinguistics and techniques used to explore representation of language in the human brain.

192. Internship in Linguistics (1-1/2) I, II, III. The Staff (Timm in charge) Internship—36-39 hours; two written reports. Prerequisite: course 1 or the equivalent; internship with linguistics-related skill to a firm/project in areas such as media, law, or industry, in approved organizations or institutions. Maximum of 4 units applicable toward major. (P/NP grading only.)

194H. Special Study for Honors Students (1-5) I, II, III. Staff (Director in charge) Individual study—1-5 hours. Prerequisite: open only to Linguis- tics majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis. (P/NP grading only.)

197T. Tutoring in Linguistics (1-4) I, II, III. Staff (Chair/ person in charge) Prerequisite: upper division standing with Linguistics majors and approval of Department Chairperson. Loading of small voluntary discussion 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, II, III. Staff (Chair/person in charge) Prerequisite: senior standing in Linguistics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. Staff (Van/Valin in charge) (P/NP grading only.)

Graduate Courses


208. Advanced Phonetics (4) I. Henton Lecture—3 hours; discussion—1 hour. Prerequisite: course 109. Exploration of the physiological basis of speech articulation and an introduction to acoustic phonetics. Offered in odd-numbered years.

215. Computational Linguistics (4) I. The Staff Lecture—3 hours; term paper. Prerequisite: course 105 or computer science 120 recommended. Applications of computers and the computational paradigm to the analysis and description of the syntax and semantics of language. Methods for performance in the use of language. Offered in odd-numbered years.

220. Romance Linguistics (4) II, Maneu-Manoff Seminar—3 hours. Prerequisite: one course from the following: courses 102, 139, 140. The development of the major Romance languages from Proto-Romance to the modern era. Selected topics in the structure of modern Romance languages. Option of focus on phonology, syntax, or historical linguistics.

225A. Modern Linguistic Theory: Structuralism (4) III. Van/Valin Seminar—3 hours; term paper. Prerequisite: courses 119. 140. Survey of the development of structural linguistics from de Saussure's to the 1950's. Offered in even-numbered years.

225B. Modern Linguistic Theory: Generative Grammar (4) III, Van/Valin, Qijia Seminar—3 hours; term paper. Prerequisite: courses 119, 165. Survey of the development of generative grammar and its offshoots from the 1950's to the present. Offered in even-numbered years.

229. Advanced Phonological Theory and Analysis (4) III. Henton Lecture—3 hours; term paper. Prerequisite: course 139. Critical overview of current phonological theories. Offered in odd-numbered years.

250A-250B. 250C-250D. Topics in Linguistic Theory and Method (4-4-4-4) I, II, III. Seminar—3 hours; paper. Prerequisite: graduate standing and consent of instructor. Introduction to current research in various aspects of linguistics.

265. Advanced Syntactic Theory and Analysis (4) III. Van/Valin Lecture—3 hours; term paper. Prerequisite: course 165. Critical survey of contemporary theories of syntax, with con-}

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**Literature in Translation**

The following courses are open to students throughout the campus. The readings can be in English. Refer to departmental listing for the course description.

**Chinese**

10. Modern Chinese Literature

**Classics**

140. Homer and Ancient Epic
141. Greek and Roman Comedy
142. Greek and Roman Novel
143. Greek Tragedy

**Comparative Literature**

1. Great Books of Western Civilization: From Myth to Faith
2. Great Books of Western Civilization: From Faith to Reason
4. The Short Story and Novel
5. Fairy Tales, Fabies and Parables
6. Myths and Legends
7. Literature of Fantasy and the Supernatural
8. Utopias and their Transformations
9. A-N. Master Authors of World Literature
10. Dramatic Literature
11. The Spiritual Quest
12. Man and the Natural World
13. Literature of China and Japan
14. Literature of India and Southeast Asia
15. Women Writers
16. Representation of the City
17. War and Peace in Literature
18. Special Topics in Comparative Literature
19. Modern Novel
20. Modern Drama
21. Tragedy
22. Comedy
23. Biography and Autobiography
24. The Middle Ages
25. The Renaissance
26. Baroque and Neoclassicism
27. The Enlightenment
28. The Epic
29. The Novel
30. Comparative Study of Major Authors
31. Modern Literary Movements and Styles
32. The Avant-Garde

**Dramatic Art**

20. Introduction to Dramatic Art
21. Theatre and Drama: Aeschylus to Machiavelli
22. Theatres and Drama: Shakespeare to Schiller
23. Theatre and Drama: Ibsen to Albee
24. Contemporary Experimental Theatre and Drama

**English**

171A. The Bible as Literature: The Old Testament
171B. The Bible as Literature: Prophets and New Testament
Peter Clark, Ph.D., Professor
Richard C. Dorf, Ph.D., Professor (Management, Computer Engineering)
George Frankel, J.D., Lecturer (Management, Law)
Paul A. Griffin, Ph.D., Professor
Michael Hargety, Ph.D., Associate Professor
Herbert E. Johnson, Ph.D., Associate Professor
Michael Mahler, Ph.D., Professor
Alexander P. McCalla, Ph.D., Professor (Agricultural Engineering)
David M. Rocke, Ph.D., Professor
Arthur M. Sullivan, Ph.D., Associate Professor (Management, Economics)
Jerome J. Stratis, B.S., Ph.D. (Hon.), Senior Lecturer (Management, Electrical and Computer Engineering)
Donald M. Topka, Ph.D., Associate Professor
Gary M. Wolten, Ph.D., Professor (Management, Economics)
William E. Wecker, Ph.D., Professor

Courses in Management
Graduate Courses

200. Introduction to Financial Accounting (3) I. Griffin Lecture—3 hours. Provides an introduction to the concepts, methods, and evaluation of financial and financial reporting. Students prepare basic financial statements, balance sheets, statement of income, statement of cash flow. Students will prepare accounting statements and learn how they are analyzed.

201A. Financial Accounting and Reporting (3) I. Griffin Lecture—3 hours. Introduction to the basic principles of accounting, financial reporting, and policy with special attention to the preparation, analysis, and evaluation of published corporate financial statements. Topics include income measurement and valuation, assets and liabilities, equity and intercorporate investments.

201B. Management Accounting and Control (3) II. Meher Lecture—3 hours. Prerequisite: course 201A. Provides an introduction to management accounting and reporting, analysis, and evaluation data provided by cost accounting for management planning and control, budgeting, performance evaluation, and investment decisions.

202. Organizational Behavior (3) II. Biggart Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Introduction to analysis of social process within organizations. Topics include group dynamics, informal relations, leadership theories, socialization processes, power and conflict, goal setting, decision making, and organizational culture. Consideration will be given to the popular models.

203. Organization Theory (3) III. The Staff Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Introduction to the organizational behavior literature. Course 202. Analysis of structural properties of organizations. Focus on organization design and strategic, alternative structural configurations. Examination of technological and socio-scientific constraints on organizations. Organizational-environmental relations, organizational change.

204. Economic Analysis (3) I. Sullivan Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; introductory knowledge of microeconomics. Economic reasoning applied to resource allocation decisions of consumers, firms, and governmental bodies. Market forces and the price system. Corporate strategy and industrial organization.

205. Economic Analysis II (3) II. Sullivan Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; course 204. Analysis of factors bearing on supply of capital and labor. Examination of market efficiency, externalities, market failure, and public policy responses to market failure.

206. Evaluation of Policies and Programs (3) III. The Staff Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Quantitative procedures for assessing the efficiency, effectiveness, and social impact of policies and programs. Methodology employed include experimental, quasi-experimental, and time series analysis. The advantages and limitations of various kinds of evaluation methods through case studies.

207. Financial Theory and Policy (3) III. The Staff Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; courses 204, 205. Interpretable allocation of scarce resources by individuals, firms, and society. When alternatives are ranked on alternative criteria, effect of varying relative prices or restrictive policies. Risky portfolio, short-run, long-run, and financial assets. Financial policy, financial planning for profit-seeking, and not-for-profit organizations.

NOTE: For key to footnote symbols, see page 151.

208. Marketing Management (3) III. Hagerty Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Marketing management processes, techniques of market opportunities, elements of market research, development of marketing strategies, market planning, implementation, and control systems. Consumer and industrial markets, market segmentation, pricing strategies, distribution channels, promotion, sales.

209. Computers and Information Systems (3) I. The Staff Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Introduces students to computers, developers, programming languages, and computer-oriented use of computers. Topics include standard and nonstandard uses of data, file processing, computer programming, software engineering, computer security.

210A. Statistics for Management (3) I. The Staff Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; course 209. Introduction to statistical methods of analysis. Descriptive statistics, statistical inference, hypothesis testing.

210B. Statistics for Management (3) II. The Staff Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; courses 209 and 210A. Regression analysis and time series. Stresses applications of the techniques to problems in public and private administration.

211. Quantitative Analysis for Decision Making (3) III. Bunch Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; courses 210A-210B. Quantitative decision making. Decision analysis, mathematical models of complex decision processes. Linear programming, optimization, simulation, and simulation. Stresses applications of decision analysis in public and private administration.

(Second-Year Courses)

Students must complete the Management core course requirement before enrolling in any of the following courses, or petition with consent of the instructor.

215. Law and Legal Process (3) I. The Staff Lecture—3 hours. Introduction to law and legal process in the United States. Sources of law, structure and operation of courts, federal-state relationships, fundamentals of administrative law, fundamentals of business law.

220. Public Budgeting and Finance (3) I. The Staff Lecture—3 hours. Fiscal role of government in a mixed economy and democratic society; economics and politics of taxation and resource allocation; intergovernmental financial relations; budgeting activities of local governments.

224. Human Resources Management (3) III. Biggart Lecture—3 hours. Human resource planning and administration, employee training, recruiting, employment, training, ergonomic decisions, downsizing, and labor law.

225. Labor Relations (3) II. Barbash Lecture—3 hours. Courses on labor law, labor management relations, collective bargaining, labor unions, and labor-management relations.

228. Statistical Quality Control and Productivity Improvement (3) I. Rocke Lecture—3 hours. Prerequisite: courses 210A and 210B or equivalent. Introduces concepts of quality and productivity improvement as applied to service and production industries and the public sector. Methodology covered include statistical quality control techniques such as control charts and acceptance sampling. Reliability and graphical tools.

229. Regulation and Public Policy (3) III. The Staff Lecture—3 hours. Identification and application of techniques of policy analysis to public sector issues and activities; emphasis on regulation and government interventions in the public sector.

231. Intergovernmental Systems and Administration (3) III. The Staff Lecture—3 hours. Intergovernmental dimensions of public management, particularly how policies and programs at one level of government shape the activities of other levels of government. Attention given to contracts and regulations, fiscal devices, technical assistance, and to various substantive policy areas.

232. Urban Policy and Planning (3) III. The Staff Lecture—3 hours. Analysis of public policy in an urban setting, focusing on the efficiency, equity of benefits, and distributional effects of such policies. Topics include urban spatial structure, growth management policies, housing, transportation, environmental quality, local government finance, and urban planning.
225. Regulation and Policy in Agriculture (3) I. The Staff Lecture—3 hours. Implications for management or regulation and public policy or agricultural production choices, practices, productivity, and their influence on government and investment strategy. Organization, business practices and resource productivity; foods in regulation and policy and their potential for new approaches and exploration.


228. Managerial Decision Making (3) I. Bunch Lecture—3 hours. Analyzes various quantitative and non-quantitative techniques for evaluating decisions and solving problems in various managerial settings. Emphasizes an problem structuring, decision analysis, and implementation. Course examines individual decision strategies, group processes, and organizational decision making.

229. Competitive Analysis (3) III. Bunch Lecture—3 hours. Applies quantitative and behavioral analysis to the competitive environment and business strategy. Problem areas include competitive analysis of pricing, bidding, and bargaining situations. Course considers aspects of negotiation, decision making, mergers, and regulation.

230. Risk Management (3) III. The Staff Lecture—3 hours. Analyzes managerial problems in which uncertainty and risk are crucial elements in decision making. Problems discussed include the assessment of risks, insurance, financial investments, hedging, and new ventures. Course develops a unified framework for analyzing risk in various contexts.

231. New and Small Business Ventures (3) I. D. Dorf Lecture—3 hours. Emphasizes starting a new business venture or managing a small, ongoing business during its formative years. Legal forms, financial considerations, management team. The entrepreneur. Students develop a detailed business plan.

232. Marketing Strategies (3) III. H. Hagerty Lecture—3 hours. Examines the processes by which organizations develop strategic marketing plans, includes definition of activities and products, marketing audits, appraising market opportunity, developing marketing programs and products, organizing marketing planning function. Applications to problems in private and public sector marketing.

233. Marketing Research (3) III. H. Hagerty Lecture—3 hours. Course addresses the managerial issues and problems of systematically gathering and analyzing information for making private and public marketing decisions. Covers the process of marketing information collection, measuring instruments, data analysis, and marketing research applications.


236. Production and Operations Management (3) III. The Staff Lecture—3 hours. Explores methods of increasing operational efficiency in production and service organizations through planning, control, production scheduling, material management, planning control quality, control, and distribution. Methodologies employed include such techniques as programming, simulation, systems analysis, and network models.

237. Financial Management (3) II. Castanias Lecture—3 hours. Focuses on planning, acquiring, and managing a company's financial resources. Includes decision of financial aspects of mergers and other financial reorganization; analysis of investment, financial, and dividend policy; and theories of optimal capital structure.

238. Investment Analysis (3) I. J. Johnson Lecture—3 hours. Emphasis on information processing and the implications of that theory for the analysis and management of investment and other financial securities. Factors influencing the value of stocks, bonds, options, warrants, and other securities are discussed from the perspective of portfolio fund management.

239. Money and Security Markets (3) I. The Staff Lecture—3 hours. Examines how money, securities markets are organized, how public agencies, businesses, others obtain and invest funds in those markets. Relationship between interest rates, monetary policy, government's role in improving capital market efficiency, and potential for assessing changes in regulation in specific markets.

240. Options and Futures Markets (3) III, Johnson Lecture—3 hours. Studies the behavior of options and futures markets; how these contracts are used. Studies nature of various strategies involving options, commodity, financial futures contracts. Price determination in options and futures is also examined.


242. Theory of Financial Decision Making (3) III. Castanias Lecture—3 hours. Prerequisite: course 207 or equivalent. Theoretical foundation for financial decision making in modern organizations.

243. International Finance (3) II. Castanias Lecture—3 hours. Prerequisite: course 207 or equivalent. Open economy macroeconomics, balance of payments theory, and financial decision making in multinational firms.

244. Corporate Financial Reporting (3) I. Griffin Lecture—3 hours. Analyzes and evaluates contemporary issues in financial reporting and develops implications of those issues for business decision making, investment analysis and capital budgeting. Prerequisite: course 207 or equivalent.

245. Auditing, Internal Control, and Public Accounting (3) III. The Staff Lecture—3 hours. Prerequisites: completion of Management core requirements or by permission of instructor. Concentrates on the audit of public accountants as auditor and consultant. Focuses on the conceptual issues of an enterprise manager. Auditing standards and procedures, and auditing techniques. Emphasis is also given to current issues confronting the accounting profession.

246. Data and File Management (3) I. Topkis Lecture—3 hours. Emphasis on backup and retrieval on digital computers. Emphasis on file structures and the user within organizations. Applications drawn from both the public and private sector.

247. Systems Analysis and Design (3) II. The Staff Lecture—3 hours. Design and specification of computer-based information systems. Applications systems development life cycle, requirements determination and feasibility analysis, physical design, program development and testing, implementation and project management.


249. Seminar in Management (3) III. Seminar—3 hours. Interdisciplinary case study of a real business or government enterprise.

250. Directed Group Study (1-5) I, II, III. The Staff Prerequisite: consent of instructor. (S/U grading only.)

251. Individual Study (1-12) I, II, III. The Staff Prerequisite: consent of instructor. (S/U grading only.)

266. Master of Education (A Graduate Group)

Master of Education (A Graduate Group)

James Grieshop, Ph.D., Chairperson of the Group

Group Office, 103 Academic Office Building, 752-4360, mornings only.

Faculty, This interdisciplinary graduate program consists of a degree from departments such as Agricultural Engineering and Agribusiness, Crop Science, Applied Animal Science, Applied Behavioral Sciences, Community Health, Consumer Science, Environmental Design, Entomology, Horticulture, Nutrition, Plant Science, Textiles and Clothing.

Graduate Study. The Master of Education Graduate Group is housed in the Department of Applied Behavioral Sciences. Areas of study include: health education planning, community services planning and program management; community education; international development education; program design and evaluation; organizational decision making; leadership development, communication, and change; extension education; environmental education; youth; non-formal education; agricultural education and consumer behavior. Generally, Master of Education (M.Ed.) degree students are preparing for leadership and professional roles in community and development education related to planning, organizational change, and evaluation.

Requirements. The M.Ed. degree requires 36 units minimum of upper division and graduate courses. A minimum of 18 of these units must be graduate level courses; and at least 8 units must related to research methods and/or statistics. Students submit a required Program of Study Plan in the area of intended specialization by the end of the first quarter of graduate study. A field project and comprehensive oral examination are required for completion of this degree.

univariate and multivariate ARIMA models and transfer function models. Applications will be in such areas as econometrics, finance, budgeting, program evaluation, and industrial process control.

The Computer Concepts and Software Systems (3) I. The Staff Lecture—3 hours. Prerequisite: course 200. Communication system components; common carrier services; design and operation of computer networks; network management and distributed environment; local area networks; data security in computer networks.

Database Systems (3) II. The Staff Lecture—3 hours. Prerequisite: course 200, Hierarchical, network, and relational models for database systems. Design and implementation of models. Performance evaluation and benchmarking. Query structures and languages. Data security and integrity. Application to managerial decision making and decision support systems.

Special Topics in Management Information Systems (3) I. The Staff Lecture—3 hours. Managerial aspects of information systems. Topics studying applications in organizations chosen from: economics of computer and information systems, decision support systems, management of computer-based information systems, office automation.

Computer Concepts and Software Systems (3) III. The Staff Lecture—3 hours. Prerequisite: course 200. Fundamental concepts of computer operation including computer architecture, machine language, assembly language, systems, and the operating environment for applications programs. Emphasis on microcomputer systems with man-computer application.
Mathematics (College of Letters and Science)

Arthur J. Kremer, Ph.D., Chairperson of the Department
G.D. Chakerian, Ph.D., Vice-Chairperson of the Department (Graduate Matters)
David W. Barnette, Ph.D., Vice-Chairperson of the Department (Undergraduate Matters)
Department Office, 565 Kerr Hall (752-0827)

Faculty

Henry L. Alder, Ph.D., Professor
Hubert A. Arnold, Ph.D., Professor Emeritus
George A. Baker, Ph.D., Professor Emeritus
Dallas O. Banks, Ph.D., Professor
David W. Barnette, Ph.D., Professor
Donald C. Benson, Ph.D., Professor Emeritus
Carlos R. Borges, Ph.D., Professor
Robert J. Buck, Ph.D., Associate Professor Emeritus
Albert C. Burdette, Ph.D., Professor Emeritus
Guilbain D. Chakerian, Ph.D., Professor Emeritus
Angela Y. Chee, Ph.D., Associate Professor
Doyle O. Cutter, Ph.D., Professor
James R. Diederich, Ph.D., Associate Professor
Allan L. Edelson, Ph.D., Professor
Curis M. Fulton, Ph.D., Professor Emeritus
Robert D. Glauz, Ph.D., Professor
Shirley A. Goldstein, M.S., Lecturer
Joel Hass, Ph.D., Assistant Professor
Alan M. Hastings, Ph.D., Professor
Charles A. Hayes, Jr., Ph.D., Professor Emeritus
Frederick A. Howes, Ph.D., Professor Emeritus
Kurt Kreith, Ph.D., Professor
Arthur J. Krener, Ph.D., Professor
Melven R. Krom, Ph.D., Professor
Gary J. Kurkowsk, Ph.D., Professor
Marc S. Mangh, Ph.D., Professor
David G. Mead, Ph.D., Professor
E. O. Milton, Ph.D., Associate Professor
Donald A. Norton, Ph.D., Professor Emeritus
Nikolaos S. Papageorghiou, Ph.D., Assistant Professor
Ashok P. Pfeiffer, Ph.D., Professor
Edward B. Reuss, Ph.D., Professor Emeritus
George Thomas Salie, Ph.D., Professor
Evelyn M. Silvia, Ph.D., Professor
Sherman K. Stein, J.D., Ph.D., Professor
Robert W. Steve, Ph.D., Professor Emeritus
Takayuki Tamura, D.Sc., Professor Emeritus
J. Blake Temple, Ph.D., Associate Professor
Abigail Thompson, Ph.D., Assistant Professor
Craig A. Tracy, Ph.D., Professor
Edward J. Tully, Jr., Ph.D., Associate Professor
Howard J. Weiner, Ph.D., Professor
Roger B. Wets, Ph.D., Professor

The Major Programs

Mathematics includes courses in various departments which provide background in the proposed area of application. Mathematics provides an excellent background for entry into the Schools of Administration, Law, Medicine, or Veterinary Medicine and for graduate study in many other areas. Mathematics is also fine preparation for employment immediately after graduation, since the completion of a mathematics major is looked upon by many employers as evidence that an applicant can think and learn, two attributes highly prized in an employee. Also, as more and more fields become quantified and scientific, a strong background in mathematics will be required of persons to make meaningful contributions and to reach the top.

Mathematics

A.B. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics 11 (or high school equivalent)</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics 21A, 21B, 21C, 22A, 22B</td>
<td>18</td>
</tr>
<tr>
<td>Computer Science Engineering 30</td>
<td>4</td>
</tr>
<tr>
<td>Physics 8A</td>
<td>4</td>
</tr>
</tbody>
</table>

Additional non-Mathematics courses chosen from natural sciences | 8 |

Depth Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics 108 (should be taken prior to junior year)</td>
<td>15A</td>
</tr>
<tr>
<td>Choose one Track from the following two</td>
<td>30-36</td>
</tr>
</tbody>
</table>

Track 1: Secondary Teaching

Mathematics 141

Choose one course sequence from each of (a), (b), and (c)

(a) Mathematics 121A-121B or 121A-121C |
(b) Mathematics 124A-124B or 124A-124C |
(c) Statistics 130A-130B |

Minimum of 36 upper division units (0-0)

Recommended: Mathematics 160, Computer Science Engineering 110, 122 |

Track 2: General Mathematics

Choose one course sequence from each of (a), (b), and (c)

(a) Mathematics 110B-110C or 130A-130B |
(b) Mathematics 110B-110B or 129A-129B |
(c) Mathematics 110B-110C or 129A-129B |

Minimum of 36 upper division units (10-0)

Recommended: Additional units in computer science |

Total Units for the Major | 74-81 |

Mathematics

B.S. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics 21A, 21B, 21C, 22A, 22B</td>
<td>18</td>
</tr>
<tr>
<td>Computer Science Engineering 30</td>
<td>4</td>
</tr>
</tbody>
</table>

Additional non-Mathematics courses chosen from natural sciences | 8 |

Choose according to Track (see Depth Subject Matter selected) | 7-15 |

Mathematics 22C, 22D, 22E, 22F, 22G, 22H |

Physics 8A, 8B, 8C (Tracks 1, 2) |

Mathematics 22C or 22D |

Mathematics 22C or 22D, 22E or 22G |

Mathematics 13 or 32 or 102 (Track 4)

Also strongly recommended that course 36 be taken during the freshman year; course 36 cannot be taken after course 100.

Depth Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
</table>

Additional upper division mathematics to total minimum of 45 upper division units (12)

Recommended: Mathematics 116A, 116B, 119, 141, 147 |

Track 2: Applied Mathematics

Mathematics 108, 167

Choose one course sequence from each of (a), (b), and (c)

(a) Mathematics 121A-121B and 165A, or 127A-127B-127C |
(b) Two courses from Mathematics 129A, 129B, 129C |
(c) Statistics 131A or Mathematics 131 |

Mathematics 139A-139B or 151A-151B-151C |

Mathematics 116A-116B-119, or 145, Computer Science Engineering 110, 122, 128 |

(f) Approved electives (6 units) |

The electives should be chosen, in consultation with an adviser, from approved courses in one of the following areas: engineering, computer science, life sciences, or some other physical science (not mathematics). Note that prerequisites to upper division courses taken should be completed in this student’s program.

Track 3: Mathematics for Secondary Teaching

Mathematics 108, 116A, 141

Choose one course sequence from each of (a), (b), and (c)

(a) Mathematics 121A-121B or 127A-127B |
(b) Mathematics 139A-139B-167 or 151A-151B |
(c) Statistics 130A-130B, Mathematics 131 and 131 Statistics |

Additional upper division mathematics to total minimum of 45 upper division units (11-6)

Recommended: Mathematics 160, Computer Science Engineering 110, 122 |

Track 4: General Mathematics

Mathematics 108, 116A, 141

Choose one course sequence from each of (a), (b), and (c)

(a) Mathematics 115B or 139A-139B |
(b) Mathematics 116A-116B or 121A-121B or 127A-127B |
(c) Two courses from Mathematics 114, 118, 125, 126, 145, 147 |

Additional upper division mathematics to total minimum of 45 upper division units (0-0)

Recommended: Mathematics 131, 185A, 185B; additional units in computer science |

Total Units for the Major | 81-101 |

Recommended Language Preparation

Bachelor of Science degree candidates are advised, but not required, to satisfy the same language requirement as that for a Bachelor of Arts degree candidate, and to fulfill it in French, German, or Russian.

Depth Subject Matter Requirements

Certain mathematically 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, 190C, 192, 197FC, 199, and 199 courses are not appropriate for application towards this requirement; and any such courses must be approved by the Department’s Undergraduate Program Committee.

Statement of Objectives

As early as possible, but no later than the last quarter of the sophomore year, each prospective mathematics major should choose, in consultation with an adviser, one of the tracks as suggested by the adviser, prepare a statement of his or her mathematics objectives, and have a proposed program satisfying the requirements of the chosen track. 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. Prospective mathematics majors transferring to the University at the upper division level should consult an adviser immediately upon arrival.
Minor Program Requirements:

Mathematics (30 units)
- Upper-division mathematics courses (exclusive of Mathematics 192, 197TC, 198, 199) (20 units)

Teaching Credential Subject Representative: G. T. Salie. See also under Teacher Education Program.

Graduate Study. The Department offers programs of study and research leading to the M.A., M.A.T., and Ph.D. degrees in mathematics. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Mathematics.


Courses in Mathematics

Lower Division Courses

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. Not open to Concurrent student enrollment. (P/NP grading only) (There is a fee of $45.)

C. Trigonometry (no credit) I. The Staff Lecture—3 hours. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only) (There is a fee of $30.)

D. Intermediate Algebra (no credit) I. The Staff Lecture—3 hours. Basic concepts of algebra, designed to prepare the student for college work in mathematics, such as course 18A, or 21A. Functions, equations, graphs, logarithms, and systems of equations. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only) (There is a fee of $15.)

10. Mathematics and Civilization (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra and geometry. Study of development, applications and theory of mathematics in early civilizations. Mathematics from both an ancient and modern point of view. Problem solving and independent readings.

11. Analytic Geometry (3) I, II, III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: two years high school algebra, plane geometry, plane trigonometry; and obtaining required score on Mathematics Diagnostic Examination. Analytic geometry in two dimensions; elementary functions. (Not open to students who have completed courses 16A, 16B, 16C, 18A or 18B-18C.)

16A. Short Calculus (3) I, II, III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: one and one-half years of high school algebra, plane geometry, plane trigonometry, and obtaining required score on Mathematics Diagnostic Examination. Limits; differentiation of algebraic functions; elementary transcendental functions; applications. Open to students who have received credit for course 21A.

16B. Short Calculus (3) I, II, III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: course 16A or 21A. Integration; functions of exponential and logarithmic functions; applications. Open to students who have received credit for course 21B.

16C. Short Calculus (3) I, II, III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: course 16B or 21B. Differential equations; sequences, series; applications. Not open to students who have received credit for course 21C.

21A. Calculus (4) I, II, III. The Staff Lecture-discussion—4 hours. Prerequisite: two years high school algebra, plane geometry, plane trigonometry, and analytic geometry or course 11, and obtaining required score on Mathematics Diagnostic Examination. Functions, limits, continuity, slope and concavity. Maximum and minimum problems. Applications to motion, natural growth, graphing, extreme of a function. Differentiates. The Hospital’s rule. One credit will be allowed students who have credit for course 16A. (Not open to students who have completed course 168.) (CAN Math 18)

21AH. Honors Calculus (4) I. The Staff Lecture—4 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry or course 11, and obtaining required score on Mathematics Diagnostic Examination. Functions, limits, continuity, slope and concavity. Maximum and minimum problems. Applications to motion, natural growth, graphing, extreme of a function. Differentiates. The Hospital’s rule. One credit will be allowed students who have credit for course 16A. (Not open to students who have completed course 168.) (CAN Math 18)

21BH. Honors Calculus (4) I. The Staff Lecture-discussion—4 hours. Prerequisite: course 21A or 21AH. Continuation of course 21A. Definition of definite integral, fundamental theorem of calculus, techniques of integration. Application to area, volume, arc length, average of a function, improper integrals, surface of revolution. Only two units of credit will be allowed students who have received credit for course 16B or 16C. (CAN Math 20)

21BH. Honors Calculus (4) I. The Staff Lecture-discussion—4 hours. More intensive treatment of material covered in course 21B. Students completing 21BH can continue with course 21CH or the regular 21C.

21CH. Honors Calculus (4) I. The Staff Lecture-discussion—4 hours. More intensive treatment of material covered in course 21C.

22A. Linear Algebra (3) I, II, III. The Staff Lecture—3 hours. Prerequisite: nine units of college mathematics. Matrices and linear transformations, determinants, complex numbers, quadratic forms. (Courses 22A, 22B, 22C may be taken in any order. However, if enrolled in Physics 8, 8B, 8BC-D, courses should be taken in reverse order, 22C, 22B, 22A.)

22AH. Honors Linear Algebra (3) I. 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 22C or consent of instructor. More intensive treatment of material covered in course 22B.

22BH. Honors Differential Equations (3) I. The Staff Lecture—3 hours. Prerequisite: course 22CH 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 22C. Vector algebra, vector calculus in three dimensional fields. Line and surface integrals. Green’s theorem, Stokes’ theorem, divergence theorem.

22CH. Honors Vector Analysis (3) I. The Staff Lecture—3 hours. Prerequisite: course 22C or consent of instructor. More intensive treatment of material covered in course 22C.

36. Fundamentals of Mathematics (3) I. 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. Not open to those who have received credit for course 108.

98. Directed Group Study (1-9) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

108. Introduction to Abstract Mathematics (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Rigorous treatment of abstract mathematics with the emphasis on developing ability to understand and present mathematics arguments.

114. The Theory of Convex Sets (3) III. The Staff Lecture—3 hours. Prerequisite: courses 21C, 22A, 22B, 108; or consent of instructor. Topics selected from the theory of convex bodies, convex functions, inequalities, extremal problems, combinatorial geometry, and integral geometry. Offered in even-numbered years.

115A. The Theory of Numbers (3) I. Adler Lecture—3 hours. Prerequisites: courses 21C, Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers.

115B. The Theory of Numbers (3) II. Adler Lecture—3 hours. Prerequisite: course 108. Euler function, Möbius function, congruences, primitive roots, quadratic reciprocity law. Offered in even-numbered years.

113C. The Theory of Numbers (3) III. Adler Lecture—3 hours. Prerequisite: course 108. Continued fractions, partitions. Offered in even-numbered years.

116. Metric Differential Geometry (3) III. The Staff Lecture—3 hours. Prerequisite: courses 22A, 22C; or consent of instructor. Vector analysis, curves and surfaces in three dimensions. Offered in odd-numbered years.

119A. Partial Differential Equations; Elementary Methods (3) I, II. The Staff Lecture—3 hours. Prerequisites: courses 22A, 22B, 22C. Derivation of partial differential equations; separation of variables; equilibrium solutions and Laplace’s equation; Fourier series; method of characteristics for the one-dimensional wave equation; solution of nonhomogeneous equations.

119B. Partial Differential Equations: Eigenfunction Expansions (3) I, II. The Staff Lecture—3 hours. Prerequisite: course 119A. Sturm-Liouville Theory; self-adjoint operators; mixed boundary conditions; partial differential equations in two and three dimensions; Eigenvalue problems in circular domains; nonhomogeneous problems and the method of eigenfunction expansions; Poisson’s Equations.

118C. Partial Differential Equations: Green’s Functions and Transforms (3) III. The Staff Lecture—3 hours. Prerequisite: course 119B. Green’s function, Green’s functions in two-dimensional problems; Laplace’s equation; Fourier Transforms; Green’s Functions for time dependent problems; Laplace transform and solution of partial differential equations.


121A-121B. Advanced Calculus for the Sciences (3-5) I, III. The Staff Lecture—3 hours. Prerequisite: courses 22A, 22B, 22C. Multidimensional calculus, Fourier series, calculus of variations, special functions, distributions, integral transforms, estimation and inequalities. Intended primarily for students majoring in science, engineering, and applied mathematics.

125. Introduction to Mathematical Logic (4) I. Kron Lecture—3 hours. Prerequisite: course 108. Propositional calculus, predicate calculus, normal forms, completeness. Offered in odd-numbered years.

*125. Introduction to the Theory of Sets (3) III. The Staff Lecture—3 hours. Prerequisite: course 108 or consent of instructor. Fundamental concepts including cardinal numbers, ordinals, transfinite recursion, real numbers, and measurable sets.

127A-127B. Advanced Numerical Analysis (4-4) I-II, III. The Staff Lecture—3 hours; extensive reading and problem solving. Prerequisite: courses 22A, 22C; course 106 may be taken concurrently with consent of instructor. Advanced topics in numerical analysis: root finding, polynomial interpolation, continued fractions, vector functions and several variables; theory of convergence.

128A. Numerical Analysis (4) I. The Staff Lecture—3 hours; term project. Prerequisite: course 21C; knowledge of a programming language such as Pascal, FORTRAN IV or BASIC. Error analysis, approximation, interpolation, numerical differentiation and integration.

NOTE: For key to footnote symbols, see page 131.
null


Deep learning, a subset of machine learning, has revolutionized various scientific fields. It enables computers to learn from data and improve their performance without being explicitly programmed. This technology relies on algorithms that can detect patterns in large, complex datasets. In medicine, deep learning has been particularly transformative, offering solutions to challenges that traditional methods struggle with.

Medical Microbiology

See Medicine, School of

See Medicine (School of); and Medicine (Veterinary Medicine)

Medicine, School of

Hibbard E. Williams, M.D., Dean of the School
James J. Castles, M.D., Executive Associate Dean
Edward C. Goméz, M.D., Ph.D., Associate Dean
Edward J. Hurley, M.D., Associate Dean
Emmet L. Lewis, M.D., Associate Dean
Frank J. Loge, M.D., Associate Dean
Donal A. Walsh, Ph.D., Associate Dean
Jason R. Barr, M.D., Assistant Dean

Dean's Office, Medical Sciences 1C (752-0331)

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Deborah S. Ablin, M.D., Assistant Professor of Clinical Radiology (Radiology)
Raymond D. Adelman, M.D., Professor (Pediatrics)
Judith Agger, Ph.D., Assistant Professor (Human Anatomy)
Charles E. Ahlfor, M.D., Associate Professor in Radiation Oncology
Timothy Albertson, M.D., Ph.D., Associate Professor (Internal Medicine)
Ezra A. Amsterdam, M.D., Professor (Internal Medicine)
Leslie J. Andrews, M.D., Assistant Professor (Obstetrics and Gynecology)
Neil C. Andrews, M.D., Professor (Surgery)
Russell Andrews, M.D., Assistant Professor in Radiation Oncology (Neurosurgical)
Thomas Acki, M.D., Professor (Internal Medicine)
Jose A. Arevalo, M.D., Assistant Professor (Pediatrics)
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Alexander Barry, Ph.D., Professor Emeritus (Human Anatomical)
Herbert Bauer, M.D., Adjunct Lecturer (Community Health)

NOTE: For key to footnote symbols, see page 131.
Gerald J. Keot, M.D., Associate Professor in (Residency in Internal Medicine)
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Jerry P. Lewis, M.D., Professor (Internal Medicine, Pathology)
James S. Lieberman, M.D., Professor (Physical Medicine and Rehabilitation, Neurology)
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Note: For key to footnote symbols, see page 131.
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Joe P. Tupin, M.D., Professor (Psychiatry)
C. John Tupper, M.D., Professor (Community Health, Internal Medicine, Family Practice)
Judith L. Turgeon, Ph.D., Professor (Human Physiology)
Patric L. Twomey, M.D., Associate Professor in Residence (Surgery)
David Vera, Ph.D., Assistant Adjunct Professor (Radiology)
Zakadunn Vera, M.D., Associate Professor (Internal Medicine)
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Wolfgang Waring, Ph.D., Professor Emeritus (Physiological Medicine and Rehabilitation, Human Physiology)
Edward J. Watson-Williams, M.D., Professor Emeritus of Clinical Internal Medicine (Clinical Internal Medicine)
Phillip G. Weiler, M.D., Professor of Clinical Community Health (Clinical Community Health)
Jeana Welborn, M.D., Instructor in Residence (Internal Medicine)
Selton F. Welles, M.D., Ph.D., Professor Emeritus of Internal Medicine
Richard P. Wernberg, M.D., Professor (Pediatrics)
Robert T. Wertz, Ph.D., Adjunct Professor (Neurology)
Theodore C. West, Ph.D., Professor Emeritus (Pharmacology)
Ronald G. Wheeler, M.D., Associate Professor in Residence (Dermatology)
David A. White, M.D., Assistant Professor in Residence (Anesthesiology)
Lynda L. White, M.H.S., Lecturer (Family Practice)
Ralph W. deVere White, M.D., Professor (Urology)
Richard H. White, M.D., Associate Clinical Professor (Internal Medicine)
Connie Whitehead, M.D., Assistant Professor of Clinical Internal Medicine
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Garen Wintternute, M.D., Assistant Professor (Family Practice)
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David H. Winer, M.D., Assistant Professor in Residence (Surgery)
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Admission Requirements and Professional Curriculum. Detailed information can be obtained from the School of Medicine. See also the School of Medicine section in the front portion of this catalog.

NOTE: For key to footnote symbols, see page 131.

Courses in the School of Medicine

The curriculum for the M.D. degree at the University of California, Davis School of Medicine is a four-year program to provide comprehensive training for the practice of medicine. Students are exposed to the basic science training and clinical experience with opportunities for research. While most of the first year emphasizes the basic sciences of medicine, the student is exposed even from the outset to questions of patient management, thus providing a natural transition from the entry pregraduate training into the clinical training of the final two years.

The first-year program is for three quarters, beginning in the Fall. The basic sciences (anatomy, biochemistry, immunology, general pathology) are blended with social sciences (the behavioral aspects of medicine), and students are introduced to the art of communicating with patients, and emergency medicine. The second-year program is for four quarters, but with the Summer Quarter abbreviated to six weeks. The Summer Quarter provides a transition between basic and clinical sciences with the presentation of systematic pathology, an integrated course in nutrition, and a course on human sexuality. In the remaining three quarters, the students complete their training in basic sciences (pharmacology, microbiology) and are then, from an organ system approach, presented the pathophysiological basis of disease (endocrinologic, hematologic, lymphoproliferative, gastrointestinal, integumentary, musculoskeletal, neuromuscular, reproductive, respiratory, urinary). During the second year, students continue training in physical diagnosis, are introduced to laboratory diagnostic techniques (laboratory medicine, nuclear medicine), and are presented with issues in community health. The third-year program is comprised of required clerkship rotations in the clinical specialties: eight weeks of surgery, twelve weeks of medicine, and eight weeks each of obstetrics/gynecology, pediatrics and psychiatry. In addition, four weeks of flexible time are available in the third year for electives or to meet one of the fourth-year program requirements. In the fourth year of the M.D. degree program, students begin to individualize their medical career by the selection of one of three specialty tracks: (1) surgery, (2) medicine, and (3) family practice and behavioral specialties. Within each of the tracks the student has ten weeks of required clerkships (four weeks of clinical specialties; two weeks ophthalmology; two weeks otolaryngology; two weeks physical medicine and rehabilitation), two weeks required experience in the responsibilities of medical practice (office, inpatient, medical economics), twenty weeks of selected clerkships and an opportunity of up to twelve weeks of electives.

To satisfy the M.D. degree program, the student must successfully complete 225 credits of course work and clerkships. Students who enter the program with advanced training in one of the areas required for the program are permitted to substitute clerkship courses with electives of equal credit. In addition to the fourth-year elective program available, there is some opportunity for students to elect from the two years, in particular during the interim period between the first and second years.

First-Year Required Courses

Quarter I: Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>BIOL 410A</td>
<td>Biological Chemistry</td>
<td>5</td>
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<tr>
<td>FAMC 400A</td>
<td>Family Practice</td>
<td>1.5</td>
</tr>
<tr>
<td>HUMANT 400</td>
<td>Human Anatomy</td>
<td>5</td>
</tr>
<tr>
<td>HUMANT 401</td>
<td>Human Embryology</td>
<td>5</td>
</tr>
<tr>
<td>MEDC 400</td>
<td>Internal Medicine</td>
<td>5</td>
</tr>
<tr>
<td>RADS 400</td>
<td>Radiology</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Quarter II: Winter

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 410B</td>
<td>Biological Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>ZOOLOGY 460</td>
<td>Cell Biology</td>
<td>4</td>
</tr>
</tbody>
</table>
Clinical experience—full time (8 weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Obstetric/neonatal/gynecologic experience in delivery room, nursery wards, operating room, clinics. One-third of the second-year clerkship is devoted to obstetric experience. Obstetrics, neonatology and continuing care of fetus-neonate emphasized in perinatal period. Seminars and conferences held throughout.

432B. Pediatric Clerkship (12), I, II, III, IV. Course Committee Chairperson
Clinical experience—full time (8 weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Study and conferences held throughout. (UCM Medical Center or Travis AF) and one in ambulatory medicine (UCD Medical Center). Assumption of appropriate patient care responsibilities; participation in conference/rounds; and seminars during ambulatory rotation.

433. Clinical Clerkship in Psychiatry (12) I, II, III, IV. Course Committee Chairperson
Clinical experience—full time (8 weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Students assigned to various mental health clinical settings following intensive orientation program. Focus on treatment of psychiatric problems encountered by physician in practice. Diagnostic, therapeutic, and interpersonal skills emphasized.

440. Responsibilities of Medical Practice (3) II. Upper Tupper Lecture-discussion—60 hours total. Prerequisite: approval by Committee on Clinical Education. Students will address nomenclature and psychology of the patient-physician relationship (medical ethics, medical jurisprudence, medical errors, psychiatry, etc.), where they critically explore social, ethical and cultural issues arising in medical practice. (SU grading only)

Fourth-Year Requirements
Tracks. The fourth year is comprised of clinical experience in one of three specialty tracks: surgical specialties, medical specialties, and family practice and behavioral specialties. Each track includes required clerkships of four weeks each in Ear, Nose, and Throat (ENT/Eye (Otolaryngology 440 and Ophthalmology 440) and two weeks in Physical Medicine and Rehabilitation (Physical Medicine and Rehabilitation 440); four weeks of surgical specialties, twenty weeks of electives; and twelve weeks of electives. The table below outlines the tracks for the fourth-year student.

Track I: Surgical Specialties

ENT/Eye
Physical Medicine and Rehabilitation
Surgical Specialties
Responsibilities of Medical Practice
Selectives

Internal Medicine or Pediatrics or Surgical sciences

Electives

Track II: Medical Specialties

ENT/Eye
Physical Medicine and Rehabilitation
Surgical Specialties
Responsibilities of Medical Practice
Selectives

Internal Medicine or Pediatrics or Surgical sciences or combination thereof

Electives

Track III: Family Practice and Behavioral Specialties

ENT/Eye
Physical Medicine and Rehabilitation
Surgical Specialties
Responsibilities of Medical Practice
Selectives

Internal Medicine or Pediatrics or combination thereof, (may include 4 weeks of Family Practice or Psychiatry)

Electives

Other Medical Sciences Courses

Professional Courses
450. Introduction to UCD Medical Center (1) I. The Staff Seminar—20 hours total. Prerequisite: second-year medical student. Designed to assist medical student in transition from classroom to hospital setting. (SU grading only)

460. Insights in Clinical Research (1) II. Wash Lecture—1 hour. Prerequisite: students in good standing. Clinical research presented by School of Medicine faculty; overview of pertinent issues, including medical ethics, research protocols, case control methods, etc. (SU grading only)

469. Remedial Studies (4) IV. O’Grady Prerequisite: medical student. intended for students who failed the Spring National Board Examinations. intensive studies to review material from first and second years of curriculum in preparation for taking National Boards in the Fall. Students spend 9-12 hours per day in preparation for these examinations. Faculty consultation and tutoring on an individual basis. (SU grading only)

Departmental Courses:

Anesthesiology

Upper Division Course
192. Internship in Anesthesiology (1-6) I, II, III, IV. The Staff (Bennett, Ken)
Work-load experience—3 to 18 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work-load experience in anesthesia and related fields. (PHS grading only)

Professional Courses
423. Case Management Conference (1) I, II, III, IV. The Staff (Hennessy in charge)
Discussion—1 hour. Prerequisite: intern and residents, advanced medical and veterinary students; consent of instructor. Formal discussion of current hospital case material presented by house officers, students and faculty. Clinical and research experience, combined with pertinent literature references, is brought to bear on the problems with emphasis on prevention as well as non-surgical areas.

421. Basic Science Conference (1) I, II, III, IV. The Staff (White in charge)
Discussion—1½ hours. Prerequisite: advanced medical, veterinary and graduate students; consent of instructor. Discussion of basic science material related directly to anesthesiology, particularly in the areas of physiology and pharmacology. Selected review type 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. Anesthesiology Clinical Clerkship (3-18) I, II, III, IV. (Mott in charge)
Full-time clinical activity (5 full days per week, including ward rounds). Prerequisite: third- or fourth-year medical student; completion of Medical Sciences 430. Instruction in: (1) pre- and post-anesthesia care, (2) induction and maintenance of anesthesia, (3) hazards and complications of anesthesia, (4) monitoring (including invasive), (5) record keeping, (6) surgery requirements of anesthesia. All training is under staff direction.

462. Airway and Mechanical Ventilation Management (3) II, III, Mott and Staff
Clinical clerkship—full time (2 weeks). Prerequisite: third- or fourth-year medical student; completion of Medical Sciences 430. Instructs in: (1) pre- and post-anesthesia care, (2) induction and maintenance of anesthesia, (3) hazards and complications of anesthesia, (4) monitoring (including invasive), (5) record keeping, (6) surgery requirements of anesthesia. All training is under staff direction.

460. Resident Seminar (1) I, II, III, IV. The Staff (Elsie in charge)
Lecture—1 hour. Prerequisite: degree in medicine or veterinary medicine or consent of instructor. 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 texts are circulated in advance of seminars.
289. Biomedical Significance of Prostaglandins and Related Lipids (2) I. Zhou, Zhan, College of Pharmacy
   Lecture—2 hours. Prerequisite: Biochemistry 101A/B; or 101A/B or 101A/B equivalent.
   Lecture and laboratory (20 hours total). Prerequisite: consent of instructor. Clinical
   Integration: 80% of course content is relevant to patient care. (S/U grading only.)

216. Protein Structure (2) I. Benacek
   Lecture—3 hours. Prerequisite: Biochemistry and Biophysics 2014 or consent of instructor. Course designed to allow students at graduate level with currently applied techniques employed in determination of protein structure and significant results derived from them. Techniques which will be presented include amino acid sequence analysis, three-dimensional structure determination by X-ray diffraction, and nuclear magnetic resonance spectroscopy. Offered in odd-numbered years. (S/U grading only.)

217. Molecular Genetics of Fungi (3) R. Holland
   Lecture—3 hours. Prerequisite: standing in a biologi-
   cal sciences major, B. Genetics 100, 102;
   Botany 119, Plant Pathology 130, 215; Microbiology 215 recommended. Advanced treat-
   ment of molecular biology and genetics of fungi including genomics and transcrip-
   tion, and the role of fungi as model systems for understanding eukaryotic cells.

222. Mechanisms of Translational Control (2) I. Hershey
   Lecture—1 hour; discussion—1 hour. Prerequisite: Bio-
   chemistry 201C or consent of instructor. Molecular mech-
   anisms of translation, including regulation of eukar-
   yotic cells, with emphasis on mammalian cells and their
   viruses. An advanced graduate-level treatment of topics related to RNA and protein synthe-
   sis, and translation. Offered in even-numbered years. (S/U grading only.)

291. Topics in Cellular Biochemistry and Physiology (2) I. Traut, Silman (Animal Physiology)
   Seminar—2 hours. Prerequisite: one course in biochemistry; Physiol-
   ogy 100A or Zoology 121A or 121B. General phys-

Biological Chemistry

Lower Division Courses

289. Group Study (1-5) I, II, III, IV. The Staff (Bradburd in charge)
   Lecture—5 hours total. Prerequisite: consent of instructor. Individual or group research on selected topics. (S/U grading only.)

290. Research (1-12) I, II, III, IV. The Staff (Bradburd in charge)
   Prerequisite: consent of instructor. Individual or group research on selected topics. (S/U grading only.)

291. Topics in Cellular Biochemistry and Physiology (2) I. Traut, Silman (Animal Physiology)
   Seminar—2 hours. Prerequisite: one course in biochemistry; Physiology 100A or Zoology 121A or 121B. General physi-

Clinical Psychology

Graduate Course

299. Research (1-12) I, II, III, IV. The Staff
   Prerequisite: graduate student in Clinical Psychology or consent of instructor. Individual or group research on selected topics. (S/U grading only.)

Community Health

Upper Division Courses

289. Group Study (1-5) I, II, III, IV. The Staff (Bradburd in charge)
   Lecture—5 hours total. Prerequisite: consent of instructor. Individual or group research on selected topics. (S/U grading only.)

290. Research (1-12) I, II, III, IV. The Staff (Bradburd in charge)
   Prerequisite: consent of instructor. Individual or group research on selected topics. (S/U grading only.)

291. Topics in Cellular Biochemistry and Physiology (2) I. Traut, Silman (Animal Physiology)
   Seminar—2 hours. Prerequisite: one course in biochemistry; Physiology 100A or Zoology 121A or 121B. General physi-

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289. Biomedical Significance of Prostaglandins and Related Lipids (2) I. Zhou, Zhan, College of Pharmacy
   Lecture—2 hours. Prerequisite: Biochemistry 101A/B or Physiological Sciences 101A/B or Physiology 100A/B or 101A/B or equivalent. Study of the quantitative estimations and the biochemistry of prostaglandins, thromboxanes, prostacyclin and leukotrienes. Biogenesis from precursor fatty acyls, metabolites and pathways between them; nutritional effects on for-

216. Protein Structure (2) I. Benacek
   Lecture—3 hours. Prerequisite: Biochemistry and Biophysics 2014 or consent of instructor. Course designed to allow students at graduate level with currently applied techniques employed in determination of protein structure and significant results derived from them. Techniques which will be presented include amino acid sequence analysis, three-dimensional structure determination by X-ray diffraction, and nuclear magnetic resonance spectroscopy. Offered in odd-numbered years. (S/U grading only.)

217. Molecular Genetics of Fungi (3) R. Holland
   Lecture—3 hours. Prerequisite: standing in a biologi-
   cal sciences major, B. Genetics 100, 102;
   Botany 119, Plant Pathology 130, 215; Microbiology 215 recommended. Advanced treat-
   ment of molecular biology and genetics of fungi including genomics and transcrip-
   tion, and the role of fungi as model systems for understanding eukaryotic cells.

222. Mechanisms of Translational Control (2) I. Hershey
   Lecture—1 hour; discussion—1 hour. Prerequisite: Bio-
   chemistry 201C or consent of instructor. Molecular mech-
   anisms of translation, including regulation of eukar-
   yotic cells, with emphasis on mammalian cells and their
   viruses. An advanced graduate-level treatment of topics related to RNA and protein synthe-
   sis, and translation. Offered in even-numbered years. (S/U grading only.)

291. Topics in Cellular Biochemistry and Physiology (2) I. Traut, Silman (Animal Physiology)
   Seminar—2 hours. Prerequisite: one course in biochemistry; Physiol-
   ogy 100A or Zoology 121A or 121B. General physi-

Clinical Psychology

Graduate Course

299. Research (1-12) I, II, III, IV. The Staff
   Prerequisite: graduate student in Clinical Psychology or consent of instructor. Individual or group research on selected topics. (S/U grading only.)

Community Health

Upper Division Courses

289. Group Study (1-5) I, II, III, IV. The Staff (Bradburd in charge)
   Lecture—5 hours total. Prerequisite: consent of instructor. Individual or group research on selected topics. (S/U grading only.)

290. Research (1-12) I, II, III, IV. The Staff (Bradburd in charge)
   Prerequisite: consent of instructor. Individual or group research on selected topics. (S/U grading only.)

291. Topics in Cellular Biochemistry and Physiology (2) I. Traut, Silman (Animal Physiology)
   Seminar—2 hours. Prerequisite: one course in biochemistry; Physiology 100A or Zoology 121A or 121B. General physi-
care services, and how these affect disease prevention and quality of health care.
455. Multidisciplinary Clinical Preceptorship (454) IV. Orgen Clinical experience-full time 3 weeks. Prerequisite: second-year student in good academic standing. Students will be introduced to several components of geriatric health care and provided with opportunities for clinical observation and experience in a variety of facilities that serve older adults. Multidisciplinary nature of geriatrics will be emphasized. (SU Grading only)

460. Geriatrics in Community Health (6-12) I, II, III, IV. Weiler Discussion—4 hours; activity—full time (4-6 weeks) clinical setting and community needs assessment. Prerequ- isite: fourth-year medical student. Opportunity to participate in state-of-the-art geriatric programs ranging from well elderly to severely impaired. Sites include Yolo, Sacramento and Martinez.

461. Group Practice in Community Health (6-12) I, II, III, IV, Borhani Prerequisite: third- or fourth-year medical students. Clinical preceptorships in ten-man private rural group practice. Southern Monterey County Medical Group, King City, Cal- ifornia. Group demonstrates "one door" medical care for private and indigent farm labor families. (HEW Grant.)

465. Community Analysis and Public Health Practice Preceptor- ship (9) I, II, III, IV, Weiler Discussion—4 hours; preceptorship—full time (4 weeks) community work data analysis and public health. Prerequisite: four-year student. Survey procedures, inventory of alternatives, resources and evaluation of EMS delivery systems. Courses offered jointly with Department of Family Practice.

468. Health Care Delivery in the Emergency Services (5-18) I, II, III, IV. Weiler Prerequisite: third- or fourth-year medical student. Students participate under faculty supervision in assessment of EMS needs and resource evaluation. Students will work in a variety of emergency care delivery roles. Students will participate in multi-disciplinary team conferences and teaching conferences, nursing home rounds, home health visits and hospice care, as well as other geriatric services. (SU Grading only).

Dermatology

Upper Division Courses

192. Internship in Cutaneous Biology (1-4) I, II, III, IV, Isaeoff Work-experience—3-4 hours. Prerequisite: second-year medical student in good academic standing; consent of instructor. Introduction to concepts involved in clinical practice. Participation in multi-disciplinary team conferences and teaching conferences, nursing home rounds, home health visits and hospice care, as well as other geriatric services. (SU Grading only).

Lower Division Courses

92B. Health Science Hospital Practicum (3-5) I, II, III, IV, Smith Field work—hospital setting. Prerequisite: Interest in health-care delivery; consent of instructor. Field experience limited to observation of delivery of dermatologic care and attendance at some conferences. (SU Grading only)

96. Special Topics in Clinical Dermatology (1-6) I, II, III, IV. The Staff (In charge)
For arrangement—3-18 hours. Prerequisite: medical students with consent of instructor. Individually arranged study of selected dermatologic topics. Prerequisites and dermatologic topics determined by student and instructor. Assigned readings and/or clinical examination of selected patients.

493. Research in Cutaneous Biology (1-12) I, II, III, IV, Smith The Staff (In charge)
Laboratory—3-6 hours. Prerequisite: consent of instructor. Research, either laboratory or clinical, on ongoing projects within the department under supervision of faculty. (SU Grading only).

Family Practice

Lower Division Courses

92B. Health Science Hospital Practicum (3-5) I, II, III, IV, Smith Field work—hospital setting. Prerequisite: Interest in health-care delivery; consent of instructor. Field experience limited to observation of delivery of dermatologic care and attendance at some conferences. (SU Grading only)

Upper Division Courses

102A. Internship in Family Practice (1-12) I, II, III, IV, Smith Work-experience—4 hours. Prerequisite: upper division and consent of instructor. Field experience to include upper division students to health-care delivery of patients seen by family physicians and other medical professionals; health promotion and disease prevention; diagnosis and treatment of acute and chronic illnesses; basic laboratory testing and appropriate referral and follow-up. (P/NP grading only)

192B. Health Science Hospital Practicum (3 or 5) I, II, III, IV, Smith (Student Health Center)
Field work—hospital setting. Prerequisite: Interest in health-care delivery; upper division and consent of instructor. Field experience for upper division students. Emphasizes observation of and providing assistance to health professionals including family physicians, nurses, nurse practitioners, technicians, and administrative staff. Introduction to many common hospital procedures and current health issues. Students complete CPR certificate. (P/NP grading only)

102C. Health Science Clinic Practicum (2) I, II, III, IV, Isaeoff Field work—clinic setting. Prerequisite: consent of instructor. Field experience to expose lower division students to health-care delivery of patients seen by family physicians and other medical professionals; health promotion and disease prevention; diagnosis and treatment of acute and chronic illnesses; basic laboratory testing and appropriate referral and follow-up. (P/NP grading only)

Professional Courses

The following courses are for students enrolled in the Family Nurse Practitioner/Physician Assistant Program.

345A-345B-345C. Inpatient Clinical Experience for FNP/PA Students (3-3-3) I, II, III, IV. The Staff Clinical—50 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program. Inpatient clinical experience limited to observation of delivery of dermatologic care and attendance at some conferences. (SU Grading only)

348A. Special Topics in Clinical Dermatology (1-6) I, II, III, IV. The Staff (In charge)
For arrangement—3-18 hours. Prerequisite: medical students with consent of instructor. Individually arranged study of selected dermatologic topics. Prerequisites and dermatologic topics determined by student and instructor. Assigned readings and/or clinical examination of selected patients.

354A-354B-354C. Ethics and Trends in Health Care for Phy- sician Assistants (1-1-1) I, II, III. Treguboff and staff Lecture-discussion—1 hour. Prerequisite: registered student in the Physician Assistant Program. Trends and ethical issues in health care, and review of the process and policies for ethical decision-making in patient care issues. These issues, trends and process will be related to the role of the physician assistant.

352A-352B-352C. Professional Development of the Physician Assistant (1-1-1) I, II, III. Treguboff and staff Lecture-discussion—1 hour. Prerequisite: registered student in Physician Assistant Program. Study of role of the physician assistant and its historical evolution, of the organizational responsibilities and legal considerations of the physician assistant.

344A-344B-344C. Fundamentals of Primary Health Care for FNP/PA Students (3-3-3) I, II, III. Treguboff and staff Lecture-discussion—3 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program or consent of instructor. Study of anatomy, physiology, pathophysiology, diagnostic criteria, approaches to assess and manage common medical problems seen in primary health care.

355A-355B-355C. Advanced Principles of Health Care for FNP/ PA Students (4-4-4) I-III. Treguboff and staff Lecture-discussion—4 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program; successful completion of course 345A-345B-345C, or consent of instructor. Study of anatomy and physiology, pathophysiology, diagnostic criteria and approaches to assess and manage patients with complex and/or multiple health care problems in primary care settings, and to learn the management of patients in inpatient settings.

356A-356B-356C. Pharmacology for FNP/PA Students (1-1-1) I-III. Treguboff and staff Lecture-discussion—1 hour. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program or consent of instructor. Principles of pharmacokinetics and pharmacodynamics, the classifications of drugs and representative drugs within each class, and application of these principles to pediatric and geriatric patients, and to pregnant or lactating women.

360A-360B-360C. Ethnics and Trends in Health Care for FNP Students (1-1-1) I-III. Treguboff and staff Lecture-discussion—1 hour. Prerequisite: registered student in the Family Nurse Practitioner Program or consent of instructor. Study of the role of the nurse practitioner and its historical evolution, of the legal considerations, of the implications of care management and advocacy for the consumer, and of professional responsibilities of the Family Nurse Practitioner.

346A-346B-346C. Behavioral Science for FNP/PA Students (2-1-1) I-III. Treguboff and staff Lecture-discussion—1 or 2 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program or consent of instructor. Study of communication skills and interviewing techniques, of self-awareness and awareness of others, of assessment of patients' concerns and resolving the patient's stress to help patients reach their own solutions, of behavior modification concepts and techniques.

346D-346E-346F. Behavioral Science for FNP Students (1-1-1) I-III. Treguboff and staff Lecture-discussion—1 hour. Prerequisite: registered student in the Family Nurse Practitioner Program or consent of instructor. Study of communication skills and interviewing techniques, of self-awareness and awareness of others, of assessment of patients' concerns and resolving the patient's stress to help patients reach their own solutions, of behavior modification concepts and techniques.

346G-346H-346I. Behavioral Science for FNP/PA Students (1-1-1) I-III. Treguboff and staff Lecture-discussion—1 hour. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program or consent of instructor. Study of communication skills and interviewing techniques, of self-awareness and awareness of others, of assessment of patients' concerns and resolving the patient's stress to help patients reach their own solutions, of behavior modification concepts and techniques.

NOTE: For key to footnote symbols, see page 131.
Human Physiology
Upper Division Courses
192. Internship in Human Physiology (1-12) I, II, III, IV. The Staff
Preceptor: consent of instructor. Directed reading and group discussion or laboratory experience on selected topics. (SU grading only.)

199. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prequisite: consent of instructor. (SU grading only.)

Professional Courses
400. Human Physiology (8) II. Curl, R. Pinkston, and staff
Lecture—6 hours; laboratory—7 hours. Prerequisite: consent of instructor. Introduction to the study of the human body systems, with emphasis on the nervous, cardiovascular, and respiratory systems. (SU grading only.)

401A. Physical Diagnosis Practicum (2) II. G.E. Fouke, J. Robbins
Lecture—1 hour; discussion—1 hour; and clinical activity—4 hours (30 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Students spend 6 days at one of the University or affiliated hospitals or in offices of a medical faculty member. Includes physical diagnosis and clinical skills. Additional time will be in a preceptorship, course 401B. (Quarter VI of Medical School curriculum.) (Deferred grading only, pending completion of course sequence.)

401B. Physical Diagnosis Practicum (1) III. G.E. Fouke, J. Robbins
Individual study—1 hour; clinical practicum—six three-hour sessions. Prerequisite: consent by Committee on Student Evaluation and Promotion. Students will work with a suitable patient for students to develop individual clinical skills. (Quarter VII of Medical School curriculum.) (Deferred grading only, pending completion of course sequence.)

402. Occupational Medicine (1) II. Schenker
Lecture—1 hour. Prerequisite: consent by Committee on Student Evaluation and Promotion. Introduction to principles of occupational medicine. Topical exposure, occupational diseases of the lungs, skin, nervous and reproductive systems, cancer of occupational origin. Occupational epidemiology and legal aspects of occupational medicine discussed. (Quarter VI of Medical School curriculum.)

419. Introduction to Clinical Nutrition (3) IV. Halsted, Rucker, and staff
Lecture—30 hours total. Prerequisite: completion of first year of School of Medicine; consent by Committee on Student Evaluation and Promotion. Course considers the role of nutrition in human health and disease, human nutrition—dietary allowances; energy, protein, vitamin and mineral requirements, and metabolism—with current knowledge of the role of nutrition in such conditions as neoplasia, alcoholism, obesity, diabetes, gastrointestinal disorders, (Quarter IV of Medical School curriculum.) (Same course as Biological Chemistry 418.)

420A. Hematopoietic and Lymphoreticular System (4.5) I. Lewis, DeNardo and Staff
Lecture—21 hours; laboratory—22 hours; discussion—20 hours (64 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Provides a solid foundation in basic and diagnostic areas and an emphasis on the operation of the human hematopoietic system. (Quarter VI of Medical School curriculum.)

420B. Pathophysiology of Digestive Diseases: Gastrointestinal System (3.5) I. Pinstone and staff
Lecture—21 hours; discussion—9 hours (40 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Course considers the role of nutrition in human health and disease, human nutrition—dietary allowances; energy, protein, vitamin and mineral requirements, and metabolism—with current knowledge of the role of nutrition in such conditions as neoplasia, alcoholism, obesity, diabetes, gastrointestinal disorders, (Quarter IV of Medical School curriculum.) (Same course as Biological Chemistry 418.)

422C. Respiratory System: Pathophysiology of Respiratory Disease (4) II. Lillington and staff
Lecture—38 hours; discussion—14 hours (52 total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Foundation of the physiological function of the human respiratory system. (Quarter VI of Medical School curriculum.)

425. Principles of Cardiovascular Medicine (4) I. Laslett and staff
Lecture—3 hours; discussion—2 hours. Prerequisite: consent by Committee on Student Evaluation and Promotion. Introduction to principles of diagnosis and management of cardiovascular disorders. (Quarter VI of Medical School curriculum.)

426. Urinary System (3.5) I. Gulyasay, Stone and staff
Lecture—24 hours; discussion—18 hours; laboratory—10 hours (52 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Basic understanding and pathophysiology of diseases of the urinary system. Includes studies of the urinary tract, physiology of renal function, renal blood flow, renal blood pressure, renal autoregulation, renal diseases,hydronephrosis, urinary tract infections, renal medullary anatomy, and renal disease. (Quarter IV of Medical School curriculum.)

426F. Endocrine Metabolic-Regulatory (4.5) III. Soeber and staff
Lecture—38 hours; discussion—14 hours (52 total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Basic understanding and pathophysiology of diseases of the urinary system. Includes studies of the urinary tract, physiology of renal function, renal blood flow, renal blood pressure, renal autoregulation, renal diseases,hydronephrosis, urinary tract infections, renal medullary anatomy, and renal disease. (Quarter IV of Medical School curriculum.)

426G. Ambulatory Medicine Clerkship (6 or 12) II, III, IV. Fitzgerald et al.
Clinical experience—full time (4 or 6 weeks). Prerequisite: third- or fourth-year medical students with advance approval by Division of Cardiology. Emphasis placed on history taking, physical examination of pediatric and adult patients with congenital and acquired cardiovascular disease. Hospital rounds in CCU and elsewhere. The roles of ECG, PCG, and angiocardiography in clinical medicine will be evaluated. May be repeated for credit. Limited enrollment.

460. Cardiology Clinical Clerkship: Consult Service (3-18) I, II, III, IV. Geriatric patients (4 weeks); 4-8 hours (hospital); 1-5 hours (clinics). Prerequisite: third- and fourth-year medical students with advance approval by Division of Cardiology. Consultation available in geriatric units. May be repeated for credit. Limited enrollment.

461. Management of Coronary Artery Disease: Coronary Care Unit (3-18) I, II, III, IV. Inpatient service—full time (4 weeks). Prerequisite: completion of second year of medical school and advance approval by Division of Cardiology. Research in laboratory and exercise testing to be determined by instructor. Current methods of clinical research involving certain aspects of diagnosis and treatment. Includes acute coronary care, hemodynamic monitoring, stress testing, cardiac catheterization, pathologic correlations and the modern approach to therapy, both medical and surgical, based on pathophysiologic mechanisms. May be repeated for credit. Limited enrollment.

462. Cardiology Clinical Clerkship: Martinez VA Hospital (3-18) I, II, III, IV. Lecture—12 hours; discussion—6 hours; seminar—2 hours; clinical consultation—20-25 hours. Prerequisite: third- and fourth-year medical students with advance approval by Division of Cardiology. Martinez VA Hospital; and consent of instructor. Clinical evaluations in cardiology under supervision of a medical resident and attending physician. Active participation in seminars and conference. Limited enrollment.

463. Internal Medicine in Internal Medicine Intensive Care Unit (MICU) (9) I, II, III, IV. Albertson. Clinical activity—full time. Prerequisite: completion of third year in medical school; consent of Director of MICU. At UCSF Medical Center as acting intern in MICU. Service under direction of medical resident and staff. Responsibility for patients admitted to MICU. On call in hospital every third night. Limited enrollment.

464. Internal Medicine and Subspecialties in Outpatient Clinic: VA Outpatient Clinic (6-18) I, II, III, IV. Gruen and staff. Clinical activity—full time (4 or 12 weeks); includes conference and clinic. Prerequisite: completion of third year of Medical School. Participation with members of specialty (internal medicine) and subspecialty (cardiology, gastroenterology, endocrinology, pulmonary and immunology-allergy) in the initial clinical evaluation, work-up, management and follow-up of patients in outpatient clinical setting. Limited enrollment.

465. Group Study in Internal Medicine (1-18) I, II, III, IV. The Staff (Slive in charge). Prerequisite: consent of instructor. Special study for medical students which may involve library or laboratory research, ambulatory or inpatient care responsibility on campus, at UCSF Medical Center or on campus by specific arrangement. (SU grading only.)

Internal Medicine—Cardiology

Upper Division Course

192. Internship in Cardiology (1-12) I, II, III, IV. Longhurst and staff. Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in cardiology may be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course

220. Basic Science in Cardiology (1) I. Kaufman. Lecture—1 hour. Prerequisite: graduate or medical student status. Fundamentals underlying cardiovascular medicine, including hemodynamics, neural control of the circulation, biochemistry and some experimental design and statistics. Experts in each of these fields will give current information in their areas. Offered in even-numbered years. (SU grading only.)

Professional Courses

401. Clinical Cardiology Clerkship: Kaiser (3-18) I, II, III, IV. The Staff. Clerkship (4 weeks); 8-12 hours (hospital); 1-5 hours (clinics). Prerequisite: third- and fourth-year medical students with advance approval by Division of Cardiology. Emphasis placed on history taking and physical examination of pediatric and adult patients with congenital and acquired cardiovascular disease. Hospital rounds in CCU and elsewhere. The roles of ECG, PCG, and angiocardiography in clinical medicine will be evaluated. May be repeated for credit. Limited enrollment.

460. Cardiology Clinical Clerkship: Consult Service (3-18) I, II, III, IV. Geriatric patients (4 weeks); full-time (40 hours). Prerequisite: third- and fourth-year medical students with advance approval by Division of Cardiology. Participation with members of subspecialty consultation in service in initial clinical evaluation, work-up, management, and follow-up of patients with cardiac disorders. May be repeated for credit. Limited enrollment.

Graduate Course

299. Research (1-12) I, II, III, IV. The Staff (Walker in charge). Prerequisite: consent of instructor. Endocrinology research. (P/NP grading only.)

Professional Courses

460. Endocrinology Clinical Clerkship (5-18) I, II, III, IV. Walker and staff. Prerequisite: outpatient clinical activity—full time (3 days per week for 4 weeks). Students must be on an outpatient clerkship with the staff at the time of admission. Participation with members of subspecialty service in the initial evaluation, work-up, management and follow-up of patients with endocrinologic disorders. Both inpatient and outpatient experience. Limited enrollment.


466. Insights in Endocrinology (1-3) I, II, III, IV. Walker. Clinical experience—3-9 hours; oral presentation. Prerequisite: student in good academic standing and consent of instructor. First- or second-year students observing in endocrine. Diagnosis and treatment of diabetes mellitus and other endocrine disorders discussed. Students also give brief in-service teaching in the ward. (SU grading only.)

469. Research (1-12) I, II, III, IV. The Staff (Walker in charge). Prerequisite: consent of instructor.

Internal Medicine—Gastroenterology

Upper Division Course

192. Internship in Gastroenterology (1-12) I, II, III, IV. Trudeau and staff. Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in gastroenterology may be repeated for credit up to 12 units. (P/NP grading only.)

Professional Courses


462. Gastroenterology Clinical Clerkship (1-18) I, II, III, IV. Pinnstone. Inpatient/outpatient clinical experience in gastroenterology. Prerequisite: successful completion of third-year and consent of instructor. Participation with members of subspecialty service in the initial clinical evaluation, work-up, management and follow-up of patients with gastrointestinal disorders. Offered at VA Hospital, Martinez.

468. Insights in Gastroenterology (1-3) I, II, III, IV. Trudeau. Clinical experience—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. To gain insight in clinical activities of Gastroenterology-Digestive Disease Division through attendance at any of the following: endoscopic procedures, ward rounds, outpatient clinic, and G.I. grand rounds. (SU grading only.)

469. Research (1-12) I, II, III, IV. Pinnstone, Trudeau, Danilowitz, Lawson, Prindiville. Prerequisite: medical student status; consent of instructor. Part-time participation in active clinical and basic research projects. Some will involve both patient care and relevant laboratory procedures. Basic research includes liver metabolism, liver function tests, bacterial markers, porphyria diet and cofactor metabolism. Clinical: varied. (SU grading only.)

Internal Medicine—General Medicine

Upper Division Course

192. Internship in General Medicine (1-12) I, II, III, IV. Roby and staff. Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in general medicine. May be repeated for credit up to 12 units. (P/NP grading only.)

Professional Courses

440A-440B-440C-440D-440E-440F. Introduction to AIDS and Related Disorders (2) I, II, III, IV. Flyn. Discussion—1 hour; directed experience—3 hours. Prereq-
ualitie: first and second year medical students in good academic standing and permission of instructor. This course familiarizes students with the diagnosis and treatment of individual patients and their interaction with the human immunodeficiency virus, epidemiological, and demographic consequences of consequences of nuclear weapons and nuclear war. (SU/GR grading only.) Offered in spring term, second year.

450. General Medicine Consults (I-I-18) I, IL, III, IV. The Staff (Division Chief in charge)
Inpatient-outpatient clinical activity—40 hours. Prerequisite: fourth-year medical students and consent of general medicine clerkship. Supervised opportunity to see entire spectrum of medical problems encountered by a general medicine service. Student spends time in General Medicine Clinic and on the General Medicine Consult Service. Consultation Service is particularly concerned with medical evaluation of surgical patients. Limited enrollment.

Discussion—1 hour; clinical experience—3 hours. Prerequisite: third and fourth year medical students in good academic standing and permission of instructor. Students will participate in patient care, including patient examination and the diagnosis and management of patients with acquired immunodeficiency syndrome and AIDS related complex. Students will participate in intensive ambulatory medicine clinic as well as clinic assistantship in the AIDS clinic. Laboratory experience includes evaluation of the condition of patients with AIDS and AIDS-related complex. Laboratory experience is provided by members of Division of General Internal Medicine. Laboratory experience will be directed toward investigation of a clinical problem of general medical interest.

Internal Medicine—Hematology-Oncology

Upper Division Courses

199. Research in Hematology-Oncology (I-I-9) I, II, III, IV. Mackenzie and staff
Laboratory—hours variable. Prerequisite: upper division standing and consent of instructor. Experience in laboratory research. (P/NP grading only.)

Graduate Courses

250. Topics in Hematology (1-4) I, II, III, IV. The Staff (Levy in charge)
Prerequisite: one year of graduate course work and/or consent of instructor. Basic concepts of the physiology of the hematopoietic system, the pathophysiology of hematologic disease, and the concepts of therapy will be offered for study. The course will be offered as it is of interest and background of the students.

299. Research (1-12) I, II, III, IV. The Staff (Levy in charge)
Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (SU/GR grading only.)

Professional Courses

480. Hematology-Oncology Clinical Clerkship (5-18) I, II, III, IV. J.P. Lewis and staff
Inpatient-outpatient clinical activity—40 hours. Prerequisite: Medical Sciences 431 and/or consent of instructor. Participation with members of the subspecialty in the initial clinical evaluation, work-up, management and follow-up of patients with hematologic and oncologic disorders. May be repeated for credit. Limited enrollment.

481. Ambulatory and Consult Clerkship (5 or 12) I, II, III, IV. Lewis and staff
Clinical experience—full time (4 to 8 weeks). Prerequisite: fourth-year medical student in good academic standing. Outpatient rotations include general hematology-oncology clinics, hemophilia clinic, sickle cell clinic, and two surgical clinics. In addition, students will work on inpatient hematology and oncology consult service, the bone marrow transplant unit, and will attend all conferences sponsored by the Division.

482. Hematology-Oncology Clinical Clerkship (5-18) I, II, III, IV. Gandra and staff
Inpatient-outpatient clinical activity—40 hours. Prerequisite: Medical Sciences 431 and/or consent of instructor. Intensive clinical experience in hematology-oncology at Martinez VA Hospital, with emphasis on evaluating new patients, reading bone marrow reports, and administering chemotherapy. Weekly tutorial sessions with faculty and presentation of a comprehensive review of one topic. May be repeated for credit. Limited enrollment.

490. Practicum in Care for the Terminally Ill (3) I, II, III, IV. Meyers
Discussion—3 hours; seminar—2 hours: hospice clinical activity—full time (4-6 week duration); written report. Prerequisite: fourth-year medical student and an interview with program Medical Director. UCD Medical Center Sacramento Hospice Care Program provides supportive services to patients with terminal illness. Emphasis on outpatient care and home care. This elective provides experience in symptom relief, psycho-social care and bereavement counseling. Written report will be major component used in grading. (SU/GR grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Lewis in charge)
Prerequisite: consent of instructor. (SU/GR grading only.)

Internal Medicine—Infectious Diseases

Upper Division Courses

192. Research in Internal Medicine (1-12) I, II, III, IV. Goldstein and staff
Work-learning experience—3-6 hours; final report. Supervised work-learning experience in the Division of Infectious Diseases. Laboratory experience will be provided to acquire experience in clinical settings. May be repeated for credit up to 12 units. (P/NP grading only.)

199. Infectious Diseases Research (1-5) I, II, III, IV. The Staff (Goldstein in charge)
Prerequisite: chemistry through organic chemistry (In addition, physical and biochemistry preferred), biology through basic bacteriology (in addition, microbiology and immunology preferred). Consent of instructor required. Classroom experience requiring reading and actual manual effort in solution will be assigned to each student. Progress and results will be reviewed at intervals with instructor and via seminar presentation. (P/NP grading only.)

Graduate Course

250. Small Computers in Medical Research (3) I. Donovan
Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Theoretical principles and practical aspects of mini- and microcomputer applications in medical research.

Professional Courses

400. Infectious Diseases Clinic (4.5-6) I, II, III, IV. Goldstein and staff
Clinical experience—full time (3 to 4 weeks). Ambulatory patient care training. Prerequisite: Medical Sciences 431. Selected outpatients at UC Davis Medical Center with chronic respiratory or urinary tract infections will be worked up and followed.

480. Infectious Diseases Clinical Clerkship (3-18) I, II, III, IV. Goldstein
Discussion—seminar—laboratory. Prerequisite: completion of two years of study in accredited medical school in good standing. In addition to seeing patients, skill in investigation of patients and diseases regarding whom consultation has been requested, students will have laboratory experience in clinical microbiology. Students will also attend and participate in infectious diseases conferences and rounds. Limited enrollment with priority to third-year medical students.

485. Clinical Clerkship (3-18) I, II, III, IV. McCabe
Lecture—1 hour; discussion—10 hours; laboratory—variable; clinical clerkship—full time (2 to 12 weeks). Prerequisite: core medicine clerkship. Students will do clinical consultation in Infectious Diseases and conduct supervision of a fellow in Infectious Diseases and attending physician. Students will participate actively in conferences and attending rounds and weekly afternoon sessions with optional participation in research laboratory.

488. Insights in Infectious Diseases (3-12) I, II, III, IV. Goldstein
Clinical experience—3-6 hours. Prerequisite: student in good academic standing and consent of instructor. Student will attend infectious diseases consult rounds and also have opportunity to participate in Infectious Diseases service and clinically related research. Introduction to diagnosis and treatment of patients in Infectious Diseases. (SU/GR grading only.)

490. Seminar in Infectious and Immunologic Diseases (2) I, II, III, IV. Goldstein and staff
Seminar—2 hours; library research. Prerequisite: Medical Sciences 431. Epidemiology, diagnosis and management of the more important infectious and immunologic diseases will be considered. Wherever possible, actual inpatients (UC Davis Medical Center) will be used to demonstrate evaluation of individual cases. (SU/GR grading only.) Limited enrollment. (May enroll for two consecutive quarters.)

499. Research Topics in Infectious Disease (2-12) I, II, III, IV. The Staff (Goldstein in charge)
Prerequisite: successful completion of the first year of study in the Division of Infectious Diseases, graduate students, and/or consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results to be reviewed at intervals with instructor and via seminar presentation. (SU/GR grading only.)

Internal Medicine—Nephrology

Upper Division Course

192. Internship in Nephrology (1-12) I, II, III, IV. Gulyassy and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in nephrology. May be repeated for credit up to 12 units. (P/NP grading only.)

Professional Courses

460. Nephrology and Fluid Balance (5-12) I, II, III, IV. Gulyassy and staff
Clinical activity—full time. Prerequisite: completion of third year of medical school; consent of instructor. Active participation in all inpatient/outpatient clinical activities, attendance at specific lectures and conferences at UCD Medical Center covering the field of nephrology and fluid-electrolyte disorders. Limited enrollment.

481. Nephrology, Fluid and Electrolytes (4.5-6) I, II, III, IV. Gulyassy
Lecture—6 hours; discussion—10 hours; clinical activity—full time (3 to 12 weeks). Prerequisite: fourth-year medical student; consent of instructor. Supervised work-learning in all inpatient/outpatient clinical activities and conferences at the Martinez VA Hospital and attendance at specific lectures covering the field of nephrology and fluid balance. Limited enrollment.

489. Research in Nephrology (3-18) I, II, III, IV. Gulyassy
Prerequisite: individual arrangement and consent of instructor. Independent laboratory research on a specific problem related to nephrological or immunological causes of renal disease and/or uriemic disorders in humans or animals. (SU/GR grading only.)

Internal Medicine—Nutrition

Upper Division Course

192. Internship in Clinical Nutrition (1-12) I, II, III, IV. Halsted and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in nutrition. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course

290C. Clinical Nutrition Research Conference (1) I, II, III, IV. Halsted, Phinney, McCamish, Davis
Seminar—1 hour. Weekly seminar meeting, presented by a graduate student, taking the form of research completed or in progress, to be attended by all students and journal review from current journal. (SU/GR grading only.)

Professional Courses

461. Nutrition Clinical Clerkship (3-18) I, II, III, IV. Halsted and staff
Lecture—2 hours; clinical experience—full time (2 to 12 weeks). In-depth experience in assessment and monitoring of nutritional support of adult patients at UCD Medical Center whose illnesses are complicated by malnutrition, and of covering the Nutrition Clinic with problems in undernutrition due to various illnesses.

480. Insights in Clinical Nutrition (1-3) I, II, III, IV. Halsted
Clinical experience—3-4 hours. Prerequisite: student in good standing; consent of instructor. Student will attend weekly clinical nutrition consult rounds (four evenings) and/or Nutrition Consult (one day). Introduction to diagnosis and treatment of common nutritional problems. (SU/GR grading only.)

499. Research in Nutrition (5-18) I, II, III, IV. Halsted, McCamish, Phinney, Davis
Prerequisite: medical student in good standing; consent of instructor. Participation in on-going clinical or basic nutrition research. Student may devise own project depending upon time commitments.

Internal Medicine—Occupational and Environmental Health

Upper Division Courses

190C. Research Conference in Occupational and Environmental Health (1) I. Beaumont; II. Samuels; III. McCurdy; IV. Gold
Prerequisite: successful completion of the first year of study in the Division of Internal Medicine, graduate students, and/or consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results to be reviewed at intervals with instructor and via seminar presentation. (SU/GR grading only.)

NOTE: For key to footnote symbols, see page 131.
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress and techniques in occupational and environmental health. Critical discussions of recent articles. May be repeated for credit. (P/NP grading only.)

192. Internship in Occupational and Environmental Health (1-2) I, II, III, IV. Schenker and staff
Internship—96 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in occupational and environmental health. May be repeated for credit up to 12 units. (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

250. Pesticide Epidemiology (3) I, II, III, Goldsmith Discussion—1 hour; seminar—2 hours. Prerequisite: medical students; graduate students in biological or environmental health sciences who have completed or are enrolled in Epidemiology and Preventive Medicine 402; upper division undergraduate who has completed Environmental Studies 126; consent of instructor. Examination of the human health effects and the risk of disease from occupational and community exposure to pesticides. Some of the clinical endpoints include cancer, neurotoxic effects, reproductive impairment, and immunotoxicologic effects. (P/NP grading only.)

251. Toxic Substances and Environmental Medicine (3) II, Goldsmith Discussion—1 hour; seminar—2 hours. Prerequisite: medical students; graduate students in biological or environmental health sciences who have completed or are enrolled in Epidemiology and Preventive Medicine 402; upper division undergraduate who has completed Environmental Studies 126; consent of instructor. Examination of the human health effects and the risk of disease from community (and occupational) exposure to toxic waste. (P/NP grading only.)

Professional Courses

466. Occupational and Environmental Medicine Elective (0-12) I, II, III, IV. Schenker Clinical and laboratory experience—full time (4 to 8 weeks). Prerequisite: consent of instructor. Participate in activities of Occupational and Environmental Health Unit. Major activity is involvement in an epidemiologic research project of the University. Also participates in Ambulatory Occupational and Environmental Medicine Clinic at UCD Medical Center. (SU grading only.)

480. Insights in Occupational and Environmental Medicine (1-3) I, II, III, IV. Behaner Clinical experience—3 to 9 hours; small research projects. Prerequisite: first- or second-year medical student in good standing; consent of instructor. Students will observe and participate in research and clinical activities in occupational and environmental medicine which include conferences, occupational health centers, environmental health clinics, clinical activities and field visits. Students develop and present small individual research projects. (SU grading only.)

499. Research (1-12) I, II, II, IV. Schenker and staff Lecture—40 hours; clinical—4 to 8 hours. Prerequisite: third- or fourth-year medical student or consent of instructor. Student participates in activities of Division of Occupational and Environmental Health. Major activity is involvement in an epidemiologic research project of the Division. Also participates in ambulatory Occupational and Environmental Medicine Clinic at UCD Medical Center.

Internal Medicine—Pulmonary Medicine

Upper Division Course

192. Internship in Pulmonary Medicine (1-12) I, II, III, IV. Lillington and staff
Internship—36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in pulmonary medicine. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course

210. Grant and Scientific Paper Writing (1) I, II, III, IV. Gershwin and staff
Lecture—12 hours. Prerequisite: consent of instructor. Basics of scientific writing for grants and papers. Each student will prepare a grant or paper for critique and feedback tutorial.

Professional Courses

460. Pulmonary Clinical Clerkship (3-18) I, II, III, IV. Lillington and staff
Clinical experience—full time (2 to 12 weeks). Prerequisite: Medical Sciences 431. At UCD Medical Center participating and rounding with Pulmonary fellows and consultation.

Also includes pulmonary function test interpretation, outpatient assignments in outpatient clinic and preparation and presentation of material at weekly conferences.

482. Pulmonary Clinical Clerkship (3-18) I, II, III, IV. Krumpe and staff
Clinical activity—full time. Prerequisite: completion of second year of medical school; consent of instructor. Participates at the Martinez VA Hospital with members of the subspecialty service in initial clinical evaluation work-up, management, and consultation of patients with pulmonary disorders. Includes exposure in Pulmonary Function Laboratory, Respiratory Care Unit, and pulmonary diagnostic processes. Limited enrollment.

464. Outpatient Route in Pulmonary Medicine (3 or 6) I, II, III, IV. Lillington and staff
Clinical activity—two 3-hour morning sessions. Prerequisite: completion of all or most of medical school; consent of instructor. Attendance one morning at TB Clinic and one morning at Pulmonary Medicine Clinic at UCD Medical Center. Students will be responsible for initial contact of individual patients and their presentation to attending staff.

480. Pulmonary-Critical Care Medicine Insights (1-3) I, II, III, IV. Lillington Clinical experience—3 to 9 hours. Prerequisite: student in good academic standing and consent of instructor. Student will attend respiratory outpatient clinics and in-patient pulmonary consult rounds and medical intensive care rounds. Introduction to diagnostic and treatment of common pulmonary problems. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Cross in charge)
Prerequisite: consent of instructor. (SU grading only.)

Internal Medicine—Rheumatology—Allergy

Lower Division Course

99. Directed Research in Immunology (1-5) I, II, III, IV. Gershwin Laboratory—14 hours. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/NP grading only.)

Upper Division Courses

192. Internship in Rheumatology—Allergy (1-12) I, II, III, IV. Gershwin and staff
Internship—36 to 39 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in rheumatology—allergy. May be repeated for credit up to 12 units. (P/NP grading only.)

193. Directed Research in Immunology (1-5) I, II, III, IV. Gershwin Laboratory—14 hours. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/NP grading only.)

Graduate Courses

210. Clinical Immunology and Immunopathology (4) I, II, III, IV. Gersthen Laboratory—22 hours. Prerequisite: Medical Microbiology 107 or Veterinary Microbiology 270, or consent of instructor. Descriptive analysis of animal and human pathologic processes that interact with the immune system. Emphasis on infections, genetics, transplantation, allergy and autoimmunity. Offered in even-numbered years.

298. Topics in Rheumatology and Clinical Immunology (1-5) I, II, III, IV. Gersthen Laboratory—1-12 hours. Prerequisite: consent of instructor. Independent research will be encouraged in both animal models of human disease (including congenitally athymic [nude], asplenic, and New Zealand mice) and the cellular immune system of patients with systemic lupus erythematosus, Sjogren’s syndrome, polyarteritis and drug hypersensitivity. (SU grading only.)

Professional Courses

460. Rheumatology Clinical Clerkship (1-18) I, II, III, IV. Leek and staff
Inpatient-outpatient clinical activity—full time. Prerequisite: Medical Sciences 431 and consent of instructor. Participation will include preceptor and resident on service in the medical and therapeutic management of patients with rheumatic diseases.

NOTE: For key to footnote symbols, see page 131.

461. Allergy Clinical Clerkship (3-18) I, II, III, IV. Gershwin and staff
Inpatient-outpatient clinical activity—full time (2 to 12 weeks). Prerequisite: completion of second year of medical school and consent of instructor. Student will work with preceptor in allergy clinic and attending in allergy clinic and teaching conferences. Study of the literature. Will see patients with problems in clinical immunology, immunologic and allergic diseases.

480. Insights in Rheumatology (1-3) I, II, III, IV. Leek Clinical activity—3 to 9 hours. Prerequisite: student in good academic standing and consent of instructor. Participation in the medical consultations rounds, rheumatic disease clinics and conferences with supervised readings in rheumatology. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Gershwin in charge)
Prerequisite: medical student with consent of instructor. Part-time participation in clinical and basic research projects which involve both preclinical and relevant laboratory procedures. Students can gain experience in clinical medicine and clinical investigation. (SU grading only.)

Medical Microbiology

Upper Division Courses

107. Chemical and Cellular Immunology (4) II. Benjamini, Sobelwitz Lecture—4 hours. Prerequisite: Biochemistry 101A, 101B or consent of instructor. Chemical and cellular basis of immunity; structure-function relationship of antigens, antibodies and their interactions; molecular and genetic basis of antibody diversity; cellular basis of immunity; immunochemical and cellular aspects of hypersensitivity; immunogenetics and neoplasms of the immune system. (Same course as 427.)

115. Ecological Parasitology (2) II. Theis 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.

116. Parasitology for Wildlife Biologists (2) III. Theis Lecture—2 hours. Prerequisite: upper division standing in wildlife biology or biological sciences or ecology. Emphasis on the relationships and parasites play in wildlife dynamics. Lectures on techniques of collection, preservation and methods of surveying wildlife for parasites and the parasitology ecology and zoonotic potential of parasites encountered by wildlife biologists.

130. Medical Mycology (2) II. Pappajohn Lecture—2 hours. Prerequisite: a course in pathogenic microbiology; consent of instructor. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in even-numbered years. (Same course as 430.)

192. Internship in Medical Microbiology (1-12) I, II, III, IV. The Staff (Beaum in charge)
Work experience—36 hours; final report. Prerequisite: upper division standing; approval of project prior to internship. Supervised work-study experience in medical microbiology and related subjects. (SU grading only.)

198. Group Study in Medical Microbiology (1-5) I, II, III, IV. The Staff (Beaum 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/NP grading only.)

199. Research in Medical Microbiology (1-5) I, II, III, IV. The Staff (Beaum in charge)
Hours to be arranged. Prerequisite: upper division standing and consent of instructor. Individual research. (P/NP grading only.)

Graduate Courses

209. Frontiers in Immunology (2) II, III, IV. Benjamini, Sobelwitz Lecture—8 hours. Prerequisite: consent of instructor. Current developments in various aspects of immunology and their interrelationships. (SU grading only.) (Same course as 409.)

215. Medical Parasitology (5) I. Theis Lecture—3 hours; laboratory—6 hours. Prerequisite: graduate students with consent of instructor. Epidemiological, pathogenesis, diagnostic methods, basic parasitology, helminths and arthropods of medical importance. Offered in even-numbered years. (Same course as 415.)

220. Current Concepts in Bacterial Ultrastructure (2) III. Beaum Lecture—12 hours. Prerequisite: consent of instructor. Directed reading and research with open discussion and assignment of assigned topics.
282 Medicine, School of

299. Group Study in Medical Microbiology and Immunology (1-5) 3rd, 4th, 5th, 6th, 7th. The Staff (Beanman in charge) Prerequisites: 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, The Staff (Beanman in charge) Prerequisites: consent of instructor; open to graduate students. Laboratory investigation contributing to the dissertation for a graduate degree. (SU grading only.)

Professional Courses

405. Immunologic Prophylaxis (2-1) II, Pappagiannis Lecture—2-1 hours. Prerequisite: consent of instructor. Bases of immunization practices and immunosuppressant diagnostic procedures particularly related to diseases of man. (SU grading only.)

407. Chemical and Cellular Immunology (4) II, Benjamini, Sciennati Lecture—4 hours. Prerequisite: medical student with consent of instructor. Chemical and cellular basis of immunity: structure-function relationships of antigens, antibodies and their interactions; molecular and cellular aspects of antibody diversity; cellular basis of immunity; immunogenic and cellular aspects of hypersensitivity; immunogenetics and regulation of the immune response. (SU grading only.) (Same course as 107.)

411. Tissue Typing (1-4) I, II, III, IV. Cheng Individualized instructor—discussion—1-3 hours and laboratory—1 hour. Prerequisite: receipt of a grade of C or better in immunology. Consent of instructor. Principle and techniques of tissue typing through assigned reading and laboratory instruction. Content will vary according to the needs of the students. (SU grading only.)

415. Medical Parasitology (5) I. Thesis Lecture—5 hours, laboratory—6 hours. Prerequisite: medical student with consent of instructor. Epidemiologic, pathologic, diagnostic methods and laboratory studies of parasites and arthropods of medical import. Offered in even-numbered years. (SU grading only.) (Same course as 215.)

420. Current Concepts in Bacterial Ultrastructure (2) III. Beeman Discussion—2 hours; formal presentation or term paper. Prerequisite: medical students with consent of instructor. Evaluation of current status of bacterial ultrastructure with an emphasis on host-parasite interactions through discussions and assigned readings. (SU grading only.)

430. Medical Myology (2) II, Pappagiannis Lecture—2 hours. Prerequisite: a course in pathogenic micro-ecology; consent of instructor. Various aspersions of pathogenic micro-organisms affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in even-numbered years. (Same course as 215.)

486A. Basic and Medical Immunology (3) III. Sobieszewski and staff Lecture—27 hours and laboratory—4 hours (31 hours total). Prerequisite: medical student with consent by Committee on Student Evaluation and Promotion. Biology of the immune response to microbial infections in humans. (Quarter III of Medical School curriculum.)

486B. Pathogenic Microbiology (1) I. Beanman and staff Lecture—64 hours total; laboratory—28 hours total. Prerequisite: second-year medical students with consent by Committee on Student Evaluation and Promotion. Biology of pathogenic microorganisms with emphasis on their role in human disease.

491. Tutoring in Medical Microbiology (1-5) I, II, III, IV. Beanman and staff Tutoring—3-15 hours. Prerequisite: appropriate preparation in subject matter and consent of instructor. Assistant instructor by tutoring medical students in one of the departmental courses. Specific tutoring and required curriculum of the School of Medicine. (SU grading only.)

493. Group Study in Medical Microbiology and Immunology (1-5) I, II, III, IV. The Staff (Beanman in charge) Prerequisites: medical students with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (SU grading only.)

Neurology

Lower Division Course

199. Individual Special Study and Research (1-4) I, II, III, IV. The Staff (Chairperson in charge) Prerequisites: consent of instructor. Required and recommended reading is offered to qualified students. Studies on psychophysiology, single unit electromyography and instrumentation are offered in Davis. (P/NP grading only.)

Graduate Courses

290. Seminar in Selected Topics (1-12) I, II, III, IV. Sobey, Gori, Rembar—1 hour. Prerequisite: consent of instructor. Selected topics in Neuroscience will be offered. (SU grading only.)

299. Group Study (1-12) I, II, III, IV. The Staff (Gabor in charge) Prerequisites: consent of instructor for graduate students desiring to explore topics in depth. Lectures and conferences may be involved. (SU grading only.)

299. Individual Special Study and Research (1-12) I, II, III, IV. Sobey Laboratory—3-36 hours. Prerequisite: consent of instructor. Individual special study and research in Neurophysiology and Biomedical Engineering is offered both Davis and Sacramento Medical Center. (SU grading only.)

Professional Courses

420. Neuromuscular Pathophysiology (4) II. Gabor and staff Lecture—34 hours and discussion—16 hours (50 hours total). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Lectures and clinical discussions of pathophysiology underlying neurological disorders including disorders of development, muscle, nerve, cerebellum, circulation, metabolism, myelin, cortical function, movement, cerebrospinal fluid, autonomic function and special sensory systems (vision, hearing, cerebral system infection, neoplasia and trauma. (Quarter VII of Medical School Curriculum.)


454. Electrophysiology and Evoked Potentials (10) I, II, III, IV. Gabor, Saywell Clinical activity—full time (12 weeks) technique and interpretation. Prerequisite: four-week Neurology clerkship and consent of instructor. Principles of electrophysiological diagnosis including technical basis of electromyography and evoked potentials. Emphasis placed on how these studies are applied to neurological diagnosis.

455. Child Neurology (6) I, II, III, IV. Gasp Lectures—36 hours. Clinical activity—full time (12 weeks). Prerequisite: satisfactory completion of Medical Sciences 431, 432A, and 432B and consent of instructor. Students exposed to children with disorders of the nervous system, both in out-patient and in-patient services. Cases presented to a member of full time faculty who will discuss clinical findings, differential diagnosis, management and therapy. This course satisfies the fourth year neuromuscle-science requirement.

456. Cortical Neurology (18) I, II, III, IV. Remler, Knigo Clinical neurology at Marinette VA Hospital. Prerequisite: course 451 or the equivalent, consent of instructor. Student will pursue small project in clinical neurological research or higher cortical functions—focus on scientific analysis of behavior in disease states.

457. Special Topics in Neurology (18) I, II, III, IV. The Staff Clinical activity—full time (12 weeks). Prerequisite: fourth-year medical student; consent of instructor. Special topics in neurological sciences. (SU grading only.)
be arranged at another institution with accredited residency programs in neurosurgery under proper supervision.

4.65 Clinical Neurosurgery Martinez VA Medical Center (6 or 18) I, II, III, IV. Andrews and staff
Clinical activity—full time (4 to 12 weeks). Prerequisite: third- or fourth-year medical students or consent of instructor. Patient work-up, peri-operative care, and frequent first or second assisting in the operating room. Close integration with the appropriate requisites of routine clinical training to the neurological history examination and diagnostic procedures for patients with nervous system disorders.

4.70 Advanced Clinical Neurosurgery (6-18) I, II, III, IV. The Staff (Chairperson in charge)
Clinical activity—full time (4-12 weeks). Prerequisite: fourth-year medical student in good academic standing. Consent of instructor. Observation of neurological surgery in emergency room, operating room and hospital floors, including manner of treatment of a variety of chronic and acute neurological disorders. (SU grading only.)

4.90 Neurosurgical Research (6-18) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: medical student with consent of instructor. Student will participate in surgical or neurological projects of may pursue and design independent projects. (SU grading only.)

Obstetrics and Gynecology

Lower Division Courses

190. Seminar in Early Mammalian Development (1-5) I, II, III, IV. Wilejko Seminar—1 hour; short paper. Prerequisite: Zoology 100 or the equivalent. Each student will present paper from the recent scientific literature on various research topics in early mammalian development. Short paper at the end of course. (SU grading only.)

196. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P.N.P. grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P.N.P. grading only.)

Upper Division Courses

200. Current Topics in Research (1) I, II, III, IV. The Staff Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Selected topics in reproductive biology. (SU grading only.)

201. Seminar in Early Mammalian Development (1) I, II, III, IV. Wilejko Seminar—1 hour. Each student will present a paper from the recent scientific literature on various research topics in early mammalian development. Short paper at the end of course.

209. Group Study (1-5) I, II, III, IV. Overstreet Prerequisite: graduate standing; consent of instructor. (SU grading only.)

Professional Courses

"401. Discussions in Obstetrics and Gynecology (2) I, II, III, IV. The Staff Discussion—2 hours. Prerequisite: second-year medical students; consent of instructor. Obstetrics and gynecology history taking and examination, an overview of the physiology and pathology of the female reproductive tract, and a consideration of the reaction of the female to pelvic disease and pelvic sexual identity.

402. Reproductive System and Perinatology (2) I, II, III, IV. The Staff (Obstetrics and Gynecology, Pediatrics) Lecture—20 hours total; discussion—2 hours total. Prerequisite: consent by Gynecology. This course is a part of either Obstetrics and Gynecology or General Obstetrics as outlined in the course description. (SU grading only.)

460. Elective Clerkship (4-18) I, II, III, IV. Schneider and staff Clinical activity—full time (3 days per unit). Prerequisite: third- or fourth-year medical students; Medical Sciences 432A; consent of instructor. Active participation in inpatient and outpatient care of patients admitted to General Hospital. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

461. Elective Clerkship (4-18) I, II, III, IV. Schneider Clinical activity—full time (3 days per unit). Prerequisite: fourth-year medical student; Medical Sciences 432A; consent of instructor. Active participation in inpatient and outpatient care at Woodland Memorial Hospital. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

464. Obstetrics and Gynecology Clerkship (4-18) I, II, III, IV. Schneider Clinical activity—full time (3 days per unit). Prerequisite: third- or fourth-year medical students; Medical Sciences 432A; consent of instructor. Active participation in inpatient and outpatient care at Woodland Memorial Hospital. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

465. Obstetrics and Gynecology Clerkship (4-18) I, II, III, IV. Schneider Clinical activity—full time (3 days per unit). Prerequisite: third- or fourth-year medical students; Medical Sciences 432A; consent of instructor. Active participation in inpatient and outpatient care at Woodland Memorial Hospital. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

468. Obstetrics: Adolescent Pregnancy (4-18) I, II, III, IV. Meyers Seminar; clinical activity—individually arranged. Prerequisite: two years of medical school; consent of instructor. Direct clinical contact with at least two adolescent pregnancies provided over a 9-month period. Emphasis on the biomedical and psychological clinical issues of pregnancy, delivery, the peripuerperium and neonatal interaction. Read assignment will be reviewed.

469. Perinatal Medicine Clerkship (4-18) I, II, III, IV, H. Hanson and staff (of Maternal-Fetal Medicine Division) Prerequisite: fourth-year medical students; consent of instructor; Management of complications for such as toxemia, diabetes, hypertension, cardiac disease, premature labor, etc., and the complications of pre-eclampsia, as well as exposure to X-ray and other ionizing radiation. Consent of instructor.

470. Acting Internship in Obstetrics and Gynecology (4-18) I, II, III, IV. O. Clinical activity—full time (4-6 weeks). Prerequisite: thirteenth- or fourteenth-year medical students who have completed Medical Sciences 432A; consent of instructor. Student will perform as intern and expect the following experience: Obstetrics and Gynecology, 2 weeks each; perform inpatient care; be on call every third night; attend scheduled conferences one half-day per week. Round daily with attending.

471. Ambulatory Gynecology and Obstetrics (4-18) I, II, III, IV. MacKay Clinical activity—full time (4-6 weeks). Prerequisite: third- or fourth-year medical students who have completed Medical Sciences 432A; consent of instructor. Student will perform as intern and expect the following experience: Obstetrics and Gynecology, 2 weeks each; perform inpatient care; be on call every third night; attend scheduled conferences one half-day per week. Round daily with attending.

472. Research in Obstetrics and Gynecology (4-18) I, II, III, IV. Chang and staff Prerequisite: medical student with consent of instructor. Student will pursue research problem of his own choosing, selected with help of the faculty. Integration with ongoing faculty research projects recommended. (SU grading only.)

Ophthalmology

Upper Division Course

192. Research Internship (1-2) I, II, III, IV. The Staff Work-team experience—35-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. This course is only available to students enrolled in the Ophthalmology research. Research staff in Ophthalmology have programs in ophthalmic biology, electron microscopy, biochemistry, immunology, pharmacology, genetica. (SU grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff Prerequisite: consent of instructor. (P.N.P. grading only.)

Graduate Course

299. Basic Research in Visual Science (1-2) I, II, III, IV. The Staff Prerequisite: consent of instructor. (SU grading only.)

Professional Courses

440. Ophthalmology Required Clerkship (3) I, II, III, IV. Manns Clinical activity—full time (2 weeks) Prerequisite: consent by Committee on Student Evaluation and Promotion. Fundamental knowledge of ophthalmic anatomy and physiology is required. Students will perform ophthalmic examinations on patients present to clinic and staff, and lead discussion of treatment regimens. Emphasis will be on providing an opportunity to observe and assist in emergency and operating room settings.

441. Basic Clinical Ophthalmology (4-5) I, II, III, IV. Rod Clinical activity—be arranged (3 weeks). Prerequisite: medical students who have completed either Medical Sciences 430 or Ophthalmology 440 (in third or fourth year), consent of instructor. Provides an acquaintance with the fundamentals of routine clinical ophthalmology.

445. Advanced Subspeciality Ophthalmology (6 or 9) I, II, III, IV. Mannis, Katner Clinical activity to be arranged (4 weeks off campus or 6 weeks at UCD Medical Center). Prerequisite: medical students who have completed either Medical Sciences 430 or Ophthalmology 440 (in third or fourth year), consent of instructor. Participation in disciplines of neuro-ophthalmology, pediatric ophthalmology, diseases of the cornea and external eye, glaucoma and retina. Rotations at UCD Medical Center may be arranged in 6-week units of one service alone, or in combination, as arranged with instructors.

490. Insights in Ophthalmology (1-3) I, II, III, IV. Manns and staff Clinical experience—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Observation of ophthalmic surgery in emergency room, operating room and hospital floors, including manner of treatment of a variety of chronic and acute ophthalmic disorders. (SU grading only.)

Orthopaedic Surgery

Lower Division Course

199. Special Studies for Undergraduates (1-4) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: lower division standing. (P.N.P. grading only.)

Upper Division Course

199. Special Studies for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: upper division standing; consent of instructor. (P.N.P. grading only.)

Professional Courses

401A. Sports Medicine: Medical Aspects of Sports Injuries (3) I. Manier Lecture—20 hours; laboratory—1 hour. Prerequisite: completion of the first year of medical school. This course is designed to introduce students to the pathophysiology of sports injuries, physical examination of the injured athlete, and management of sports injuries. Specific injury and sports medicine modalities will be discussed. (SU grading only.) Game course as Physical Medicine and Rehabilitation 401A.

421. Skeletal System (2.3) Lecture—20 hours; discussion—12 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Provides a basic source understanding of normal and abnormal skeletal and joint development, physiology, and pathology. Clinical correlates are provided only as a supplement to emphasize cause and effect phenomena as they relate to bone and joint disease. (Quarter VII of Medical School curriculum.)

426. Initial Management of Musculoskeletal Trauma (3-6) I, II, III, IV. Szabo Clinic—full time (2 to 4 weeks). Prerequisite: third- or fourth-year student in good academic standing; completion of skeletal anatomy and consent of instructor. Elective providing opportunity to observe and assist in emergency and operating room settings in management of orthopaedic problems of trauma, urgent supervision of resident clinical exposure, not meet surgical specialty requirement. Limited enrollment.

428. Ambulatory Orthopedics (3-6) I, II, III, IV. Szabo Clinic—full time (2 to 4 weeks). Prerequisite: third- or fourth-year student in good academic standing; consent of instructor. Introduction to general orthopaedic problems and their management in an outpatient environment. Students will perform ambulatory orthopedic examinations, present patients to staff, and lead discussion of treatment regimens. Emphasis placed on ambulatory physical exam and interpretation of X-rays. Does not meet surgical specialty requirement. Limited enrollment.
Otolaryngology

Lower Division Courses

192. Internship in Otolaryngology (1-12) L, II, III,IV. Chair person in charge.
Project report due to 36 hours. Pre requisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work-learning experience in otolaryngology and related fields. Final project report. (P.N.P. grading only.)

198. Directed Group Study (1-5) L, II, III,IV. The Staff Pre requisite: consent of instructor. (P.N.P. grading only.)

199. Special Study in Otolaryngology for Advanced Undergraduates (1-0) L, II, III,IV. Chair person in charge.
Pre requisite: advanced undergraduate with consent of instructor. (S.U. grading only.)

Graduate Courses

290C. Research Conference in Otolaryngology (1) L, II,III. The Staff
Lecture-discussion—1 hour. Pre requisite: graduate students; medical students; advanced undergraduates with consent of instructor. Presentation and discussion of faculty and student research in otolaryngology. (S.U. grading only.)

291. Principles of Speech, Hearing and Equilibrium (3) L, II,III. The Staff
Lecture-discussion—3 hours. Pre requisite: graduate students; medical students; advanced undergraduates with consent of instructor. Presentations by faculty and guest lectures on anatomy, physiology, and behavior involved in speech production, hearing, and equilibrium. Each student will be expected to make one class presentation.

298. Group Study (1-5) L, II, III,IV. The Staff
(S.U. grading.)

299. Individual Study in Otolaryngology for Advanced Graduate Students (1-12) L, II, III, IV. Chair and staff
Pre requisite: advanced graduate student with consent of instructor. (S.U. grading only.)

Professional Courses

400. Suturing Techniques (1) L, II, III,IV. The Staff
Lecture—5 hours; laboratory—10 hours total. Pre requisite: 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.

401. Clinical Examinations in Otolaryngology (1) L, II, III,IV.
Lecture—1 hour; laboratory—1 hour; practical—1 hour total.
Pre requisite: second-year medical students with consent of instructor; open to graduate students. (S.U. grading only.)

402. Otolaryngology in Family Practice (1) L, II, III,IV.
Lecture—10 hours total. Pre requisite: fourth-year medical students and family practitioners with consent of instructor; open to graduate students. Planned as a refresher course for those already possessing a background in the specialty.

403. Basic Principles of Reconstructive Surgery (1) L, II, III,IV.
Lecture—2 hours; laboratory—2 hours total. Pre requisite: third- or fourth-year medical students with consent of instructor; open to graduate students. (S.U. grading only.)

404. Otolaryngology Required Clerkship (3) L, II, III,IV.
Clinical clerkship. Pre requisite: consent by Committee on Student Evaluation and Promotion. Provides fundamental knowledge of otolaryngologic diagnosis and principles, develops facility with direct Ear, Nose and Throat instruments; provides an understanding of treatment for ear, nose and throat problems manageable by a primary care provider. (S.U. grading only.)

405. Otolaryngology Elective (3-18) L, II, III,IV.
Full-time clinical activity. Pre requisite: third- and fourth-year medical students with consent of instructor; open to graduate students. (S.U. grading only.)

406. Surgical Team Participation (3-18) L, II, III,IV.
Clinical clerkship—full time (4 to 6 weeks). Pre requisite: third-or fourth-year medical student; Medical Science 430. Students will work with Ear, Nose and Throat resident involved with inpatient care and clinic in treatment of head and neck tumors. Surgical oncology including radiotherapy and surgical reconstruction. (S.U. grading only.)

407. Insights in Otolaryngology (1-3) L, II, III,IV.
Pre requisite: first and second-year medical students in good academic standing; consent of instructor. Individualized activities (dependent upon time available) prepration of report to be given to Ears, Nose and Throat including observing patient exams, ward and outpatient clinics. Audits classes and lecture courses. (S.U. grading only.)

409. Journal Seminar (1) L, II, III,IV, Donald, Chole Lecture-discussion—10 hours total (course given three times per quarter). Pre requisite: fourth-year medical students with consent of instructor; open to graduate students. Monthly review of current otolaryngologic and related literature and recent advances.

408. Individual or Group Study (1-3) L, II, III,IV. The Staff
Lecture-discussion—3 hours total. Pre requisite: consent of instructor. Advanced otolaryngology students in good academic standing; consent of instructor. Individualized activities (dependent upon time available) preparation of report to be given to Ears, Nose and Throat including observing patient exams, ward and laboratory. (S.U. grading only.)

409. Research (1-12) L, II, III,IV. The Staff
Pre requisite: medical students with consent of instructor; open to graduate students. Participation in ongoing projects.

Pathology

Upper Division Courses

192. Internship in Human Pathology (1-12) L, II, III,IV. Chair and staff
Work-learning experience—3 to 5 hours total. Pre requisite: consent of instructor. Directed activity. (S.U. grading only.)

195. Special Pathology for Advanced Undergraduates (1-0) L, II, III,IV. Chairperson in charge.
Pre requisite: advanced undergraduate and consent of instructor. (P.N.P. grading only.)

Graduate Courses

Lecture—1 hour; laboratory—2 hours; seminar—1 hour total. Pre requisite: first- or fourth-year medical student and consent of instructor. (S.U. grading only.)

203. Introduction to Neurosurgical Pathology (1-4) L, II, III,IV.
Lecture—1 hour; laboratory—1 hour total. Pre requisite: consent of instructor; open to students from first-year to fourth-year medical students. Study of neurosurgical tissue resection and the problems of injury, infection, neoplasia, and malformation in both the human and experimental animal. Seminars include correlation of clinical, gross and microscopic findings. Discussions provide student laboratory experience.

210. Introduction to Human Pathology (9) L, II, III,IV.
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Pre requisite: graduate or upper division students with background in gross and microscopic anatomy, histology, and biochemistry. Study of the processes, causes and effects of disease, including infection, neoplasm, and metabolic disease; emphasis on correlation of clinical and microscopic findings. (S.U. grading only.)

211. Advanced Group Study (1-5) L, II, III,IV. The Staff
Pre requisite: consent of instructor. (S.U. grading only.)

212. Research (1-12) L, II, III,IV. The Staff
Pre requisite: consent of instructor. (S.U. grading only.)

Professional Courses

406. Brain-Cutting Conference (1-4) L, II, III,IV.
Pre requisite: third- or fourth-year medical students or consent of instructor. Current specimens are sectioned, discussed, and clinical correlations proposed.

407. Diseases of the Nervous System (1-3) L, II, III,IV.
Lecture—1 hour; discussion—1 hour; seminar—1 hour. Pre requisite: third- or fourth-year medical students or special training in pathology or neurology preferred. Consent of instructor. Study of human nervous system reactions to disease including infection, neoplasia and maldevelopment; application of experimental models to human pathology and clinical correlations. Seminars emphasize microscopic findings in current cases; discussions include individualized examination of nervous system disease. (S.U. grading only.)

408. Autopsy Case Studies (1-12) L, II, III,IV. Rieber Lecture—2 hours; discussion—2 hours; laboratory—2 hours total. Pre requisite: consent of instructor. Participation and performance, under supervision, of complete autopsies with correlation of clinical material, gross, microscopic and laboratory findings.

411. General Pathology (3) L, II, III,IV.
Lecture—27 hours; discussion—2 hours; laboratory—11 hours (40 hours total). Pre requisite: consent by Committee on Student Evaluation and Promotion. Introduction to principles governing processes of disease which cross over normal tissue boundaries. Correlation of gross and microscopic examination of disease. Required for first-year medical students. (Quarter III of Medical School curriculum.)

423. Systemic Pathology (8.5) L, IV.
Cardiff Lecture—67 hours total; laboratory—60 hours total. Pre requisite: consent by Committee on Student Evaluation and Promotion. Important and common diseases of human organ systems. Pathophysiologic basis of disease in the clinical setting. (Quarter IV of Medical School curriculum.)

424. Laboratory Medicine (2) L, II.
Lecture—13 hours; discussion—1 hour; laboratory—11 hours (25 hours total). Pre requisite: consent by Committee on Student Evaluation and Promotion. Course provides a fundamental knowledge of the role and application of modern clinical laboratory procedures, with an emphasis upon optimization of selection of laboratory measurements, decision analysis, interpretation of laboratory results, solving of clinical problems using laboratory data. (Quarter III of Medical School curriculum.)

434. Clinical Laboratory Immunology (9) L, II, III,IV.
Lecture—full time (6 weeks). Pre requisite: third- or fourth-year medical student and consent of instructor. Emphasis upon laboratory techniques, procedures and interpretation of laboratory results. Students will be expected to participate fully and in all laboratory operations including bench techniques, laboratory management and quality control. (S.U. grading only.)

466. Medical Jurisprudence (2) L, Reed Lecture—1 hour; discussion—1 hour; laboratory—1 hour total. Pre requisite: upper division medical or medical student standing. Examination of the American legal and judicial systems related to the practice of medicine and physician-patient relationship. (S.U. grading only.)

477. Teaching in Pathology (1-5) L, II, III,IV. The Staff
Lecture—3 to 15 hours. Pre requisite: consent or instructor. Assistant instructor by teaching medical
Pediatrics

Upper Division Course

199. Special Study in Pediatric Research (1-6) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: undergraduate student with consent of instructor based upon adequate preparation as determined by instructor.
(P/NP grading only)

Graduate Course

299. Pediatric Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: graduate students who are candidates for a degree in a some area of biology or behavioral sciences; consent of instructor. (S/U grading only)

Professional Courses

401. Preceptorship in Pediatrics (2, 6-12) I, II, III, IV. Chairperson in charge
Preceptorship—half time. Prerequisite: second-year medical student or first-year medical student with consent of instructor.
Opportunity for preceptor in primary medical care in a practicing pediatrician's office. Participation in history taking and physical examination will be at the discretion of preceptor and dependent on student's experience. Evaluation by student.

Clinical experience—full time (14 to 12 weeks). Prerequisite: third- or fourth-year medical student; Medical Sciences 432B; consent of preceptor and Chairperson. Opportunity to participate in practice of preceptor performing such tasks as history taking, physical examination, and patient management.

420. Reproductive System and Perinatology (2) I. Weinberg and staff (Pediatrics; Neonatology)
Lecture—20 hours total; discussion—2 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Normal structure and function of reproductive system are presented. Abnormalities in perinatology are approached by study of appropriate clinical problems. (Same course offered by Obstetrics and Gynecology 453B. Quarter VI of Medical School curriculum.)

4030. Acting Internship: General Inpatient Pediatric Clerkship (6-18) I, II, III, IV. Beauchamp
Clinical experience—full time (14 to 12 weeks). Prerequisite: completion of Medical Sciences 432B with grade of B or better; letter of recommendation from Pediatric faculty member. The Ward Acting Intern functions in a manner similar to that of a pediatric intern. The Acting Intern takes admissions in the regular sequence and is expected to take night call, The acting Intern can expect to manage between six and ten patients at a time. Limited enrolment.

Clinical experience—full time (14 to 12 weeks). Prerequisite: completion of Medical Sciences 432B with grade of B or better; letter of recommendation from Pediatric faculty member. Supervised experience in pediatric care on outpatient setting of the office of the pediatrician. Student functions as "Acting Intern" with appropriate supervision by resident and attending faculty. Limited enrolment.

4681. Elective in Pediatric Hematology/Oncology (3-18) I, II, III, IV. Athens
Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor and outpatient experience in diagnosis of hematologic and oncologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrolment.

482. Elective in Pediatric Endocrinology (3-18) I, II, III, IV. Corr
Clinical experience—full time (2 to 12 weeks). Prerequisite: completion of second-year study or the equivalent; consent of instructor. Inpatient and outpatient experience in diagnosis and management of endocrine disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrolment.

464. Acting Internship in Neonatology (6-18) I, II, III, IV. Greiner
Clinical experience—full time (4 to 12 weeks). Prerequisite: completion of Medical Sciences 432B with grade of B or better; letter of recommendation from Pediatrics faculty member. Diagnostic and therapeutic aspect of the medical and surgical care of the premature. Student expected to take night call. Limited enrolment.

465. Pediatric Specialty Clinic Elective (3-18) I, II, III, IV. Beauchamp
Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Supervised experience in a variety of pediatric subspecialties. Limited enrolment.

466. Elective in Pediatric Cardiology (3-18) I, II, III, IV. Choy
Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in the diagnosis and management of cardiovascular disorders in children. Laboratory experience and participation in clinical investigation may be arranged.

467. Elective in Pulmonary Medicine (3-18) I, II, III, IV. McDonald
Clinical experience—full time (2 to 12 weeks); daily rounds, two weekly half-day clinics. Prerequisite: pediatric clerkship, inpatient and outpatient management of pediatric patients with pulmonary diseases. These will include but will not be limited to cystic fibrosis, asthma, and other forms of chronic pulmonary disease as well as congenital abnormalities.

468. Elective in Pediatric Nephrology (3-18) I, II, III, IV. Adelman
Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in the diagnosis and management of renal diseases in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrolment.

469. Elective in Pediatric Infectious Disease (3-18) I, II, III, IV. Haistad
Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and treatment of infectious diseases of infants and children. Laboratory and clinical investigation may be arranged. Limited enrolment.

470. Elective in Pediatric Neurology (3-18) I, II, III, IV. Goppe
Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 431, 432A, and 432B and consent of instructor. Inpatient and outpatient experience in diagnosis and management of neurological disorders in children. Students will also participate in other pediatric subspecialty clinics which serve children with neurological disorders. This course does not satisfy the fourth-year neurology requirement. Limited enrolment.

471. Elective in Pediatric Gastroenterology (3-18) I, II, III, IV. Cannon
Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and management of patients with conditions of gastrointestinal tract. Laboratory experience and participation in clinical investigation may be arranged. Limited enrolment.

472. Elective in Pediatric Intensive Care (6-18) I, II, III, IV. Shank
Clinical experience—full time (4 to 12 weeks). Prerequisite: completion of Medical Sciences 432B with grade of A or consent of instructor on record; letter of recommendation from Pediatrics faculty member. Evaluation and support of critically ill infants and children. In general, student expected to take night call every third night during rotation. Limited enrolment.

*499. Research Topics in Pediatrics (1-18) I, II, III, IV. The Staff (Abilities in charge)
Prerequisite: student in Medical School with consent of instructor. Individual research project in pediatric subspecialty areas. (cardiology, neurology, endocrinology, hematology, metabolism, nephrology, and others) may be arranged with faculty member. Independent research by student will be emphasized and long-term projects are possible. (S/U grading only)

Note: For key to footnote symbols, see page 131.
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macokinetic values in experimental animals. Exercises designed to bolster apt test question matter of course. Offered in even-numbered years.

208. Application of Computers to Pharmacology (1) I, II, III, The Staff
Lecture—1 hour. Prerequisite: consent of instructor. Presentation of basic concepts and problems.

210. Fundamentals of Pulmonary Toxicology and Pharmacology (3) II, Hoffinger
Lecture—2 hours. Prerequisite: consent of instructor. Major toxicologic and pharmacologic aspects of the lung. Areas considered include: (1) basic lung structure and function, (2) pulmonary vascular disease, (3) lung toxins and injury and, (4) principal drugs used in respiratory disorders.

220. Statistical Approach to Pharmacological Research (2) III, IV, The Staff
Lecture—2 hours. Prerequisite: course 200A or consent of instructor. Introduction to application of statistics in pharmacological research; emphasis on distributions, measurements of location, dispersion and correlation, significance, probability, uncertainty, designing of experiments.

297. Tutoring in Pharmacology (1-3) I, II, III, The Staff (Chairperson in charge)
Tutorial—3-9 hours. Prerequisite: courses 200A-200B and 200A-200B, unless exempted by consent of instructor. Under supervision of students assist in preparation and teaching of courses in Pharmacology. (SU grading only.)

298. Group Study (1-5) I, II, III, IV, The Staff (Chairperson in charge)
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU grading only.)

Professional Courses

400A. Principles of Pharmacology (4) 1. Hance and staff
Lecture—29 hours; discussion—16 hours; laboratory—16 hours (61 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Principles in pharmacology, including pharmacokinetics and drug metabolism and the actions, use and toxicity of major classes of drugs. (Quarter V of the Medical School curriculum.)

400B. Principles of Pharmacology (5) II. Winters and staff
Lecture—26 hours; discussion—16 hours; laboratory—16 hours (58 hours total).Prerequisite: consent by Committee on Student Evaluation and Promotion. Principles in pharmacology, including pharmacokinetics and drug metabolism and the actions, use and toxicity of the major classes of drugs. (Quarter VI of the Medical School curriculum.)

401. Seminar in Pharmacology for Medical Students (1) I, II, III, IV, The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: consent of instructor. Seminar in pharmacology for medical students.

407. Tutoring in Pharmacology (1-5) I, II, III, IV, Stark Tutoring—4 hours; discussion of project prior to period of internships by preceptor. Supervised work experience; clinical and "basic" research projects in Physical Medicine and Rehabilitation on neuromuscular disorders; final written report. (P/NP grading only.)

408. Directed Research for Medical Students (1-12) I, II, III, IV, The Staff (Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: consent of instructor. Directed research in pharmacology for medical students. (P/NP grading only.)

Physical Medicine and Rehabilitation

Upper Division Courses

102. Internship in Physical Medicine and Rehabilitation (1-12) I, II, III, IV, The Staff (Enrollment coordinator) Work-team experience—3-36 hours. Prerequisite: upper division met, approval of project prior to period of internship by preceptor. Supervised work team experience; clinical and "basic" research projects in Physical Medicine and Rehabilitation on neuromuscular disorders; final written report. (P/NP grading only.)

104. Directed Group Study (1-5) I, II, III, IV, The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV, The Staff (Chairperson in charge)
Lecture—2 hours; laboratory—1 hour. Prerequisite: students with upper division course in systemic physiology or anatomy, and medical students. Multidisciplinary course introducing students to physiologic principles of physical medicine and rehabilitation, the 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.) (Same course as Physical Education 201A.)

202. Selected Topics in Rehabilitation and Physical Medicine (1) I, II, III, IV. The Staff
Prerequisite: consent of instructor.

209. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

Professional Courses

401A. Sports Medicine: Medical Aspects of Sports Injuries (3) I, Bernauer
Lecture—2 hours; laboratory—1 hour. Prerequisite: medical students or graduate students with upper division course in systemic physiology or anatomy. Multidisciplinary course introducing students to physiologic principles of physical medicine and rehabilitation, the physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. (Same course as Orthopedic Surgery 401A.)

440. Rehabilitation Medicine Clerkship (3) I, II, III, IV, Lieberman
Clinical clerkship fulltime (2 weeks). Prerequisite: Third- or fourth-year medical student; consent by Committee on Student Evaluation and Promotion. Rehabilitation medicine and genetics relating to comprehensive care of the physically disabled and the physical medicine and rehabilitation of neurologic and musculoskeletal disorders. Physical effects, indications and contraindications of the therapeutic modalities and their application to common musculoskeletal disorders.

441. Rehabilitation Medicine Clinical Elective (3-18) I, II, III, IV, The Staff
Clinical activity—full time. Prerequisite: completion of third year in Medical School; Medical Sciences 430, 431. Intended for non-U/C medical students. Emphasis on evaluation of patients with neurological or orthopaedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Fourth-year student may function as acting intern on Physical Medicine and Rehabilitation service.

442. Rehabilitation Medicine Clinical Elective (5-18) I, II, III, IV, The Staff
Clinical activity—full time. Prerequisite: Medical Sciences 430, 431; completion of third year in Medical School. Emphasis on evaluation of patients with neurological or orthopaedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Physical Medicine and Rehabilitation at off-campus facility must be approved by Chairperson.

448. Insights in Physical Medicine and Rehabilitation (1) I, II, III, IV. The Staff
Clinical experience—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Exposure to inpatient rehabilitation medicine including ancillary therapies and related services. Development of knowledge and experience of musculoskeletal examination of patients. Observation of ward rounds and outpatient clinics. (SU grading only.)

449. Advanced Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Study and experience for medical students in any of a number of areas in physical medicine and rehabilitation. (SU grading only.)

499. Research for Medical Students (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Research on any of a variety of topics in physical medicine and rehabilitation. (SU grading only.)

460. Plastic Surgery

Professional Courses

460. Clinical Plastic Surgery Elective (1-18) I, II, III, IV. Clinical activity—full time (approximately 40 hours per week). Prerequisite: third- or fourth-year medical students; Medical Sciences 430; consent of instructor. Total involvement in patient care involving surgical preparation, treatment, operative care, and follow-up. Developing and understanding reconstructive plastic surgery. Microvascular surgery included. Student rotation.

NOTE: For key to footnote symbols, see page 131.

461. Dentistry for Future Physicians and Surgeons (6-12) I, II, III, IV, Thaller
Discussion—3 hours; laboratory—2 hours; clinic activity—full time (4-6 weeks). Prerequisite: third- or fourth-year medical students. General practitioners must recognize dental-related problems, have the ability to alleviate potential pain, and be able to refer these problems for further definitive evaluation and treatment. Students will have basic knowledge of dentistry; recognize potential dental problems; provide emergency care; have knowledge of where to refer these problems. (SU grading only.)

470. Microvascular Surgical Techniques in Plastic Surgery (9) I, II, III, IV
Discussion—4 hours; laboratory—8 hours. Prerequisite: Medical Sciences 430. Instruction in microvascular surgery with operating microscope and microsurgical instruments. It is expected that students will learn surgical techniques enabling him/her to repair vessels as small as 1-2 mm by end of course.

Psychiatry

Upper Division Courses

198. Directed Group Study (1-5) I, II, III, IV, The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

Graduate Courses

226. Psychiatric Implications of Legal Intervention (2) I, II, Bauer
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. Must court demonstrations. (Same course as Community Health 226.)

288. Directed Group Study For Graduate Students (1-5) I, II, III, IV, The Staff (Blacker in charge)
Prerequisite: graduate standing and consent of instructor. (P/NP grading only.)

299. Special Study for Graduate Students (1-12) I, II, III, IV, The Staff (Blacker in charge)
Prerequisite: graduate standing and consent of instructor. (SU grading only.)

Professional Courses

461. Behavioral Aspects of Medicine (5) III. Steward
Lecture—28 hours total; discussion—2 hours total; seminar—10 hours total; independent study—20 hours total. Prerequisite: core course for first-year medical students. Overview of healthy growth/development through the life cycle; interviewing skills including the use of nonverbal communication, interviewing techniques for use in practice and use of tools for evaluation of the patient's biologic, psychological, and social factors in the patient-physician interaction.

462. Human Sexuality (1.5) I, II, Blacker
Lecture—18 hours total; discussion—2 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Introduction to basic aspects in mental/emotional dysfunction. Focus on understanding the development and symptomatology of major forms of psychiatric dysfunction. (Quarter VI of Medical School curriculum.)

481. Psychiatry Grand Rounds (1) I, II, III, IV, Doran and staff
Lecture—1 hour. Prerequisite: medical students or other qualified mental health professionals with consent of instructor. Weekly conference of U/C students. Presentation of selected cases, presentation of lecture and research reports.

413. Outpatient Psychiatry Clerkship (6-12) I, II, III, IV, Doran and staff
Clinical experiences—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 and/or consent of instructor. Clinical management of adult outpatients. Includes initial evaluation, differential diagnosis, and treatment planning, in addition to brief psychotherapy and interviewing skills. Conferences, medication clinics, and videotaping under supervision.

414. Consultation-Liaison Clerkship (6-12) I, II, III, IV, Doran and staff
Clinical experiences—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 and/or consent of instructor. Student functions as member of the team in evaluation, management, and
Chemistry, and biology into a comprehensive and vigorous laboratory experience in biomedical nuclear chemistry. Subjects include evaporation and purification of appropriate gamma and beta radiotopes, compound biological pharmacodynamics and radiomonitoring. (Same course as 101.)

411. Radiological Physics (I) [Physics of Nuclear Medicine] (3) I. Busenberg, Leichsdit, Macsey, Vera
Lecture—4 hours total; laboratory—3–4 hours total. Prerequisite: consent of instructor. Subjects of diagnostic and therapeutic nuclear medicine, nuclear physics, radiographic imaging, interaction of ionizing beams; dosimeters, attenuation; internal and external dosimetry; health physics; radiation detection and imaging, scintillation cameras, computer planning and treatment. Offered at VA Hospital, Martinez. Offered in even-numbered years. (SU grading only.)

412. Clinical Clerkship in Nuclear Medicine (9 or 16) II, III, IV. Doran
Clinical activity—full time (3 days per unit). Prerequisite: satisfactory completion of second year of Medical School or the equivalent; consent of instructor. Clerkship is devoted to radiolabeled methods with clinical, pathophysiologic, and other diagnostic aspects of the patient’s care. Each patient cared for by student with faculty member. Reading assignments, informal projects, and research techniques available. Limited enrollment with preference to students enrolling for 18 units.

413. Group Study in Nuclear Medicine (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor.

414. Research in Nuclear Medicine (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

Radiology—Therapeutic
Graduate Course
29. Independent Study and Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisites: enrollment in Biophysics Group for Ph.D. candidate, and consent of group adviser and sponsor. (SU grading only.)

Professional Courses
464. Clinical Clerkship Elective (9 or 18) I, II, III.
Clinical activity—full time (3 days per unit). Prerequisite: completion of third year of Medical School. Consent of instructor. Clinical oculoogy course. Each student participates in daily teaching conferences where all new cases are discussed. Elective restricted to students enrolled in therapeutic radiology. Interviews and examination of patients for presentation to staff, and reports on selected reading relevant to cases seen. Limited enrollment.

459. Group Study in Therapeutic Radiology (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor.

460. Research in Therapeutic Radiology (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only for medical students.)

Surgery
Upper Division Courses
192. Internship in General Surgery (1-12) I, II, III, IV. The Staff
Work-learning experience—3–6 months. Prerequisite: upper 6th quarter standing; approval of project prior to period of internship, by preceptor. Supervised work-study experience in general surgery and related fields. (P/NP grading only.)

196. Special Study in General Surgery for Advanced Undergraduates (1-12) I, II, III, IV. The Staff
Prerequisite: advanced undergraduate student with consent of instructor. (P/NP grading only.)

Graduate Course
209. Research (1-12) I, II, III, IV. Wolfe in charge
Prerequisite: graduate standing and consent of instructor. (SU grading only.)

Professional Courses
419. Introduction to Clinical Surgery (1-4) I, II, III. Ward
Clinical activity—full time. Prerequisite: second-year medical student with consent of instructor. Designed to introduce medical students to basic principles of surgical practice and the most common surgical diseases. Course will afford opportunity to review surgical patients and discuss them with members of staff.

460. Clinical Surgical Elective (3-4) I, II, III, IV. The Staff
Clinical activity—full time (2 to 6 weeks). Prerequisite:
fourth-year medical student or third-year medical student with completion of Medical Sciences 430. Preparation of patients, treatment, operative care, and postoperative follow-up. Services include Surgery Clinic, Surgical Nutrition, Pediatric Surgery, Cardiac Surgery, Gastrointestinal Surgery, and Burn Clinic.

461. Surgery Burn Unit Clerkship (6 or 9) I, II, III, IV. The Staff Clinical instruction—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Student functions as an intern in the eight-bed Burn Unit; learns principles of critical care, fluid and electrolyte resuscitation and management of surgical wounds.

462. Surgery Trauma Service Clerkship (6 or 9) I, II, III, IV. Blaisdell and staff Clinical instruction—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Student works as an intern on one of the two general surgery Trauma teams, participating in resuscitation and management of critically injured patients. Team hours consist of 24 hours on, and 24 hours off.

463. Surgery Intensive Care Unit (6 or 9) I, II, III, IV. Holcomb and staff Clinical instruction—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Student participates in direct supervision of critically ill surgical patients in a twelve-bed surgical ICU. Each student is closely supervised. Provides depth experience with management of critically ill patients.

464. General Surgery Clerkship: Kaiser Hospital (6 or 9) I, II, III, IV. The Staff Clinical instruction—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Student participates with residents in the management of a large number of general surgical procedures and participates in their care.

465. General Surgery Clerkship: Martinez VA Hospital (6, 9, 12, II, III, IV. Guarnaccia, Ward Clinical instruction—full time (4 or 8 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Part of the General Surgery Clerkship Program with the University of California, Davis. The Martinez rotation has a large number of gastrointestinal and vascular surgical problems as well as broad surgical experience.

466. General Surgery Clerkship: Travis AF Base Hospital (6 or 9) I, II, III, IV. Gilmore, Ward Clinical instruction—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Opportunity to participate on the surgical service of our affiliated Air Force Hospital. Provides a broad number of general surgery problems and provides a broad clinical experience in surgery.

467. Surgical Oncology (3-9) I, II, III, IV. Goodnight and staff. Clinical instruction—full time (2 to 6 weeks). Prerequisite: fourth-year medical student or third-year medical student with completion of Medical Sciences 430. Student teams medical and surgical principles applicable to cancer. Participates in day-to-day care of surgical oncology patients; and opportunity to learn the medical, radiologic, and surgical approaches to cancer therapy.

478. Clinical Surgery Preceptorship: Off Campus (6-18) I, II, III, IV. Ward Clinical instruction—full time. Prerequisite: fourth-year medical student and consent of instructor. Student participates in the preceptor, operative and postoperative care of surgical patients under the supervision of attending staff.

480. Insights in Surgery (1-3) I, II, III. I, IV. The Staff Clinical instruction—full time (3-36 hours). Prerequisite: good academic standing and consent of instructor. Individualized activities, including ward rounds, subspecialty clinics and conferences, grand rounds, and observation of a variety of surgical procedures. (SU grading only.)

494H. Fourth-Year Surgical Honors Program (18) I, II, III, IV. Wolffman Prerequisite: completion of third year of Medical School with superior performance on Medical Sciences 430; consent of instructor; to provide intensive and comprehensive training in surgery to students interested in postgraduate surgical career, that would enable them to succeed during the internship and residency training. (SU grading only.)

498. Group Study (1-5) I, II, III, IV. Prerequisite: medical student; consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics.

499. Laboratory Research (1-12) I, II, III, IV. Ward and staff—Laboratory—3-36 hours. Prerequisite: completion of second year of medical school; consent of instructor. Laboratory research in surgical related problems. Participation in projects to include the following: burn, nutrition, oncology, transplant and others. (SU grading only.)

Urology

Lower Division Course

49. Special Study for Undergraduates (1-5) I, II, III, IV. The Staff Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Course

299. Research in Urology (1-12) I, II, III, IV. Detch, deVere White in charge Prerequisite: graduate standing and consent of instructor. (SU grading only.)

Professional Courses

400. Office Surgery (1) I, II, III, IV. deVere White Clinical activity—4 hours in afternoon (6 weeks). Prerequisite: fourth-year medical students with consent of instructor. Introduction to ambulatory surgery. Topics to include: basic therapeutic and diagnostic procedures from case material relevant to private clinic. Management of urinary tract infection will be emphasized.

420. Urinary System (3.5) III. Stone, Bogusky Lecture—24 hours, discussion—18 hours, and laboratory—10 hours (52 hours total). Prerequisite: approval by Committee on Student Evaluation and Promotion. Fundamentals and aspects of (a) disorders of water, electrolytes and acid-base balance; (b) development and mechanisms of parenchymal renal diseases; (c) major congenital and acquired urolologic diseases; (d) urinary tract infections. (Quarter VII of Medical School curriculum.) (Same course as Internal Medicine 420E.)

460. Urology Clinical Clerkship (5-18) IV, I, II, III, IV. deVere, White Clinical instruction—full time. Prerequisite: second-year medical student; physical diagnosis or the equivalent; consent of instructor. Clinical experience in diagnosis and treatment of urologic disease. Student will work closely with house staff, participate in conferences and surgery, and perform initial patient evaluation on new patients. May be repeated for credit. Limited enrollment.

461. Internship in Urology (5-18) I, II, III, IV. deVere, White Clinical instruction—full time. Prerequisite: fourth-year medical student; consent of instructor. Under supervision, student acting as intern, assume full inpatient responsibility including admission history, physical examination, management of hospitalization, and participate in surgical procedures, outpatient clinic and learning diagnostic and therapeutic procedures. May be repeated for credit.

465. Surgical Team Participation: Martinez VA Medical Center (6 or 12) I, II, III, IV. Mendenhall. Clinical clerkship—full time (4 or 8 weeks); lecture—varied. Prerequisite: third- or fourth-year medical student; Medical Sciences 430. Students will participate in care of assigned patients in a busy urology inpatient service and outpatient clinic. Clerkship provides exposure to urologic procedures performed in operating room and cystoscopic suite under supervision of Urology staff physicians.

499. Research in Urology (1-12) I, II, III, IV. Detch, deVere White, E.L. Lewis, Palmer, Stone Research—3-36 hours. Prerequisite: medical or veterinary medical students with consent of instructor. Research in urology, male infertility, urodynamics, neurogenic bladder. Unique opportunity to apply recent technologies (nuclear medicine resonance, flow cytometry, recombinant DNA in investigation, diagnosis and treatment of GU cancer, infectious disease, male infertility and development of gonitourinary bioprosthescs.

NOTE: For key to footnote symbols, see page 131.

Medicine

(School of Veterinary Medicine)

Anthony A. Stannard, D.V.M., Ph.D., Chairperson of the Department

Department Office, 2102 Medical Science 1A

7552-1363

Faculty

Alexander A. Ardanis, D.V.M., M.S., Professor
Dale L. Brooks, D.V.M., Ph.D., Lecturer
Gary P. Carlton, D.V.M., Ph.D., Professor
Larry D. Cowgill, D.V.M., Ph.D., Associate Professor
Nancy E. East, M.S., D.V.M., M.P.V.M., Assistant Professor
Pamela H. Gilley, D.V.M., Assistant Clinical Professor
Laurence R. Enos, Pharm.D., Lecturer
Murray E. Fowler, D.V.M., Professor
John M. Gay, D.V.M., Ph.D., Assistant Professor
Lisa W. George, D.V.M., Ph.D., Associate Professor
Ronald P. Hedrick, Ph.D., Associate Professor
Roy V. Harrickson, D.V.M., V.M., Lecturer
David E. Hinton, Ph.D., Professor
Charles A. Hjerpe, D.V.M., Professor
Peter J. Irke, V.M.D., Professor
Mark D. Kittleton, D.V.M., M.S., Ph.D., Associate Professor
D.J. Lauren, M.S., Ph.D., Assistant Adjunct Professor
Gerald V. Ling, D.V.M., Professor
Donald G. Low, D.V.M., Ph.D., Professor
John P. Maas, D.V.M., M.S., Assistant Professor
John P. Maas, D.V.M., M.S., Assistant Professor of Clinical Diagnostic Medicine (California Institute for Medical Laboratory)
John Madigan, M.S., D.V.M., Assistant Professor
Richard W. Nelson, D.V.M., Assistant Professor
Niels C. Pedersen, D.V.M., Ph.D., Professor
William R. Pritchard, D.V.M., Ph.D., J.D., Professor
Livio G. Raggi, D.V.M., Ph.D., Professor Emeritus
Edward C. Ramsay, D.V.M., Lecturer
Edward A. Rhode, D.V.M., Professor
Jeffrey A. Roberts, D.V.M., Assistant Clinical Professor
Bradford P. Smith, D.V.M., Professor
Arthur A. Stannard, D.V.M., Ph.D., Professor (Medicine, Pathology)
Donald R. Strombeck, D.V.M., Ph.D., Professor
William P. Thomas, D.V.M., Associate Professor
Mark C. Thurmond, M.P.V.M., Ph.D., Associate Professor
Michael Torten, D.V.M., Ph.D., Visiting Professor
Laura D. Weaver, V.M.D., Senior Lecturer
James F. Wilson, D.V.M., J.D., Lecturer
W. David Wilson, B.V.M.S., M.R.C.V.S., Associate Professor
William W. Wingfield, M.S., Ph.D., Assistant Adjunct Professor
Janet Yamamoto, Ph.D., Assistant Research Immunologist

Part-Time Clinical Faculty

Fredric L. Frye, D.V.M., M.S., Clinical Professor

Courses in Medicine

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5) I, II, III, The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

290. Seminar in Veterinary Medicine (1) I, II, III. The Staff (Chairperson in charge)

298. Group Study (1-5) I, II, III. The Staff Prerequisite: student in School of Veterinary Medicine or
Medieval Studies
(College of Letters and Science)
Dennis J. Dutschke, Ph.D., Program Director
Program Office, 922 Sprout Hall (752-1219)

Committee in Charge
Samuel G. Armstead, Ph.D. (Spanish)
Dennis J. Dutschke, Ph.D. (Italian)
Ingeborg Hendson, Ph.D. (German)
Winder McConnell, Ph.D. (German)
David A. Nutter, Ph.D. (Music)
Marjane Osborn, Ph.D. (English)

The Major Program
The major in Medieval Studies is designed to introduce students 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 includes studies in history, art, philosophy, literature, drama, music, national languages, religion, rhetoric, and political theory.

Medieval Studies
A.B. Major Requirements:

Preparatory Subject Matter

Language proficiency is a necessity; courses in Latin and other European languages are strongly recommended, particularly for students desiring to pursue graduate studies in the medieval field.

Depth Subject Matter
History, at least 12 units from History 102B, 121A, 121B, 121C, 201C.

Literature: at least 16 units, including two courses from each of two of the following: 16
- French 115, 141.
- German 120, 122.
- Italian 113A, 113B, 115A, 115B, 138A, 139B.
- Philosophy and religion, at least 8 units from Philosophy 105, 132, 145, 145A, 190; Dramatic Studies 210, 210.
- Arts and language, at least 8 units from Art 176A, 176B, 179C, 177A, 177A, 178B, 178B.

- Dramatic Art 156, 156 German 100, Music 121 (note prerequisite), 199; Rhetoric and Communication 110, 111.
- Political thought, at least one course from Political Science 115, 116, 118A.
- Senior thesis, Medieval Studies 190.

Total Units for the Major 52

Major Advisers. D. J. Dutschke (Italian), W. McConnell (German), J. J. Murphy (Rhetoric), M. Osborn (English).

Minor Program Requirements:

Medieval Studies

The minor in Medieval Studies is designed to be a coherent program of interdisciplinary study. Medieval Studies units may be taken in one or more of the traditional fields of concentration, including art, drama, history, literature, music, national languages, philosophy, political theory, religious studies and rhetoric. Courses must be upper division and chosen from at least two of these subject areas, and they must be within the three periods of Early Medieval Culture, culture of the High Middle Ages, and Medieval transformations. Students may also select a minor with a thematic emphasis.

There is no foreign language requirement for the minor, although knowledge of Latin or a romance language is recommended.

The minor must be designed in consultation with a Department Advisor.

Minor Advisers. D. J. Dutschke (Italian), W. McConnell (German), J. J. Murphy (Rhetoric), M. Osborn (English).

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 Saint Augustine, The Consolation of Philosophy of Boethius, Beowulf, the Nibelungenlied, and the Song of Roland. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 1B, History 4A, or Comparative Literature 1 or 2.

20B. The Culture of the High Middle Ages (4) II. The Staff Lecture—3 hours; discussion—1 hour. Readings in translation in the culture of the High Middle Ages, such as the Summa Theologica of Thomas Aquinas, the Chronicles of Froissart, The Canterbury Tales of Chaucer, and the Divine Comedy of Dante. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 1B, History 4A, or Comparative Literature 1 or 2.

20C. Medieval Transformations (4) III. The Staff Lecture—2 hours; discussion—1 hour; paper or term presentation. Course deals with the great medieval transformations that took place before the Renaissance. Topics will be selected from various disciplines, such as literature, philosophy, religion, history, art, music, political thought, rhetoric, and other pertinent fields. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 1B, History 4A, or Comparative Literature 1 or 2.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Upper Division Courses

120A-D, 120E, 120F. The Medieval World (4) I, II, III. The Staff (Chairperson in charge) Lecture—2 hours; discussion—1 hour; term paper. Course deals with selected thematic lenses from the Middle Ages, such as the Fall of Rome to the beginning of the Renaissance. Subjects will vary each year 10 years to cover such topics as

- The Monastic Orders; 
- Origins of Universities; 
- The Seven Liberal Arts, and Their Significance in the Middle Ages; 
- Family and Society; 
- The Church and State. 


190. Senior Seminar (4) I, II, III. The Staff Seminar—4 hours. Prerequisite: senior standing in Medieval Studies. Preparation of research paper dealing with a selected aspect of medieval culture, under supervision of three members of the Committee in Charge.

197. Tutoring In Medieval Studies (1-4) I, II, III. The Staff (Chairperson in charge) Seminar—2 hours; minimum: courses 20A and 20B; upper division standing; consent of instructor and chairperson of curriculum committee. Tutoring in Medieval Studies 20A and 20B, including leadership in small discussion groups affiliated with the course. May be repeated for credit for a total of 6 units. (P/NP grading only)

196. Directed Group Study (1-5) I, II, III. The 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)
### Microbiology

**Microbiology A.B. Major Requirements:**

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
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</thead>
<tbody>
<tr>
<td>Microbiology 2 or 102, 3 or 102L</td>
<td>4-6</td>
</tr>
<tr>
<td>Biological Sciences 1</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 2A, 2B</td>
<td>2</td>
</tr>
<tr>
<td>Statistics 13</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics 16A-16B or 21A-21B</td>
<td>6-8</td>
</tr>
<tr>
<td>Physics</td>
<td>6</td>
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<tr>
<td>Recommended: Physics 6A, 6B, 6C.</td>
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**Microbiology B.S. Major Requirements:**

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<th>Preparatory Subject Matter</th>
<th>UNITS</th>
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</thead>
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<td>Microbiology 2 or 102, 3 or 102L</td>
<td>5-55</td>
</tr>
<tr>
<td>Biological Sciences 1</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 2A, 2B</td>
<td>12</td>
</tr>
<tr>
<td>Statistics 13</td>
<td>12</td>
</tr>
<tr>
<td>Mathematics 16A-16B or 21A-21B</td>
<td>12</td>
</tr>
<tr>
<td>Physics 6A-6B-6C</td>
<td>12</td>
</tr>
</tbody>
</table>

**Microbiology Depth Subject Matter:**

| Microbiology 105, 130A; 110-110L or 120-120L | 13-14 |
| 130B-130L or 177-177L. | 12 |
| Biochemistry 101A, 101B, 101L | 3     |
| Genetics 100            | 4     |
| Additional units from Microbiology 110-110L, 120, 120L, 130B, 130L, 177, 177L. | 8 |
| Microbiology 162, Botany 114, 118, 119; Veterinary Microbiology 127, 128. | 8 |

Total Units for the Major: 86-91

**Microbiology Breadth Subject Matter:**

- College of Agricultural and Environmental Sciences students: 24
- English and rhetoric: 8
- Social sciences and/or humanities: 16

See also the College section for additional requirements.

**College of Letters and Science students:** Refer to the College section for a description of requirements to be completed by the major.

**Major Advisers:** W.J.C. Pfeiffer, M.L. Wheelis.

**Honors and Honors Program:** Contact a major adviser from those listed above.

**Teaching Credential Subject Representative:** W.J.C. Pfeiffer, M.L. Wheelis.

**Graduate Study:** The Graduate Group in Microbiology offers programs of study and research leading to the M.S. and Ph.D. degrees in microbiology. The offerings of the Department of Microbiology are augmented by courses and faculty of the Departments of Biochemistry and Biophysics, Botany, Food Science and Technology, Genetics, Virology, and Entomology, and the Schools of Medicine and Veterinary Medicine. For detailed information regarding graduate study in microbiology, address the Chairperson, Graduate Group in Microbiology, Department of Microbiology.

**Related Courses:** For other courses related to Microbiology see course offerings in the Departments of Biological Sciences, Botany, Epidemiology and Preventive Medicine, Food Science and Technology, Medical Microbiology, Plant Pathology, Veterinary Microbiology.

**Faculty of the Department of Microbiology** also teaches in the following courses: Biological Sciences 1, 10 and 19.

**Courses in Microbiology Lower Division Courses**

1. **General Microbiology** (3) I, II, III. Prerequisite: Biological Sciences 1. The biology of bacteria with some of its applications. Not open for credit to students who have completed course 102.

2. **Bacteriology** (3) I, II, III. Prerequisite: Biological Sciences 1. Designed to acquaint student with basic techniques of bacteriology, with major responsibility for organizing and accompanying work resting with student. (P/NP grading only.)


4. **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.)

**Upper Division Courses**

102. **General Bacteriology** (4) I. Baumann. Lecture—4 hours. Prerequisite: Biological Sciences 1 and Chemistry 2B. Meets 101A, 101B, 101L. Designed for microbiology and bacteriological sciences. Survey course dealing with the physiology, genetics, and taxonomy of bacteria. Continues study of microbiology, or use microorganisms as tools for study of genetics and biochemistry. Only one unit of credit allowed if Microbiology 3 has been taken.

105. **Bacterial Diversity** (5) I. Nelson, Pfeiffer. Lecture—5 hours; laboratory—6 hours. Prerequisites: courses 102, 102L, and 102B. Biochemistry 101A. Biochemistry 101B recommended. Survey of the major groups of environment emphasizing diversity of energy metabolism, morphology and natural history. Includes methods for determination of evolutionary relationships among groups, isolation and characterization of bacterial strains from various habitats.

110. **Bacteriology of Insects** (3) I. Baumann. Lecture—3 hours; laboratory—6 hours. Prerequisites: courses 2 or 102, and 105 (or may be taken concurrently). Experiences in the isolation, cultivation, physiology, genetics and taxonomy of selected insect pathogens. Bioassay of toxins and observations on the mechanisms of pathogenesis. Offered in odd-numbered years.

110L. **Bacteriology of Insects Laboratory** (2) I. Baumann. Laboratory—6 hours. Prerequisites: course 3 or 102L. Biochemistry 101A or Psychological Sciences 101A. Physiological basis of pathogenic and symbiotic associations between prokaryotes and insects. Taxonomy, physiology, pathogenesis and molecular biology of insect pathogens. Insect immunity. Nutritional associations between microorganisms and insects. Pertinent embryological background information will be included in the lectures.

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.

120L. **Microbial Ecology Laboratory** (2) III. Meeks. Laboratory—6 hours; one optional overnight weekend field trip. Prerequisite: course 120 (may be taken concurrently); consent of instructor. Study of prokaryotic microorganisms from certain habitats. One-half of laboratory effort will consist of organized experiments and the remaining 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. The Staff Lecture—3 hours. Prerequisite: courses 2 or 102; Biochemistry 101B (may be taken concurrently); Genetics 100; Mathematics 16A. Physiology and regulation of bacterial growth include adaptation to the environment. Mapping techniques and use of mutants in problem solving.

130B. Bacterial Physiology and Genetics (3) II. J. Artz, Wheeles Lecture—3 hours. Prerequisite: course 130A. Gene regulation and mutation. Structure and function of the bacterial cell envelope; synthesis of peptidoglycan and lipopolysaccharide; active transport of nutrients; chemotaxis.

130L. Bacterial Physiology Laboratory (3) III. Artz, Wheeles Laboratory—6 hours. Prerequisites: courses 3, 130A. Physiology and genetics of bacterial and viral viruses; isolation and characterization of mutant strains. Map molecular mutation by conjugation and transduction. Studies on control of enzyme synthesis by induction, repression, and catabolic repression.

152. General Virology (4) I, II. Manning Lecture—4 hours. Prerequisite: Biological Sciences 1; Genetics 100 and Biochemistry 101B recommended. Integrated presentation of the nature of animal, bacterial, and viral viruses, including their structure, replication and genetics.

177L. Metabolism of Anoecobacillus 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, a consideration of their unusual environment and their metabolic characteristics, with emphasis on energy yielding catabolic pathways.

177Y. Laboratory in Metabolism of Anaerobic Bacteria (2) II. Macy (Animal Science) Laboratory—6 hours. Prerequisite: course 3 or 102L; course 177 (may be taken concurrently). Isolation of anaerobic bacteria from a number of different natural environments; experimentation dealing with certain characteristic physiological and metabolic aspects of anaerobic bacteria. Offered in even-numbered years.

190C. Undergraduate Research Conference (1) I, II, III. The Staff (Chairperson in charge) Discussion/conference—1 hour. Prerequisite: upper division standing; consent of instructor. Presentation and critical discussion of student research papers; designed for advanced undergraduate students. May be repeated for a maximum of 3 units of credit when subject matter differs. (P/NP grading only.)

192. Internship (1-12) II, III. The Staff (Chairperson in charge) Laboratory—3-36 hours. Technical and/or professional experience in a field campus. Supervised by a member of the Microbiology Department faculty. (P/NP grading only.)

197T. Tutoring in Bacteriology (1-5) I, II, III. The Staff (Chairperson in charge) Tutoring—1-5 hours. Prerequisite: course 3, and 18 upper division units in Microbiology; consent of chairperson. Assist in undergraduate laboratory courses supervised by teaching assistants; in discussion sections supervised by faculty; and staffing "drop-in" offices for individual help. (P/NP grading only.)

198. Directed Group Study (1-6) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-15) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200A-200B-200C. Microbiology for First-Year Graduate Students (3-3-3) I-III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: first-year graduate standing with interest in Microbiology. A survey of general microbiology at this level.

210. Molecular Mechanisms In Microbial Pathogenesis (3) I. Manning, Hin (Veterinary Microbiology and Immunology) Lecture—3 hours. Prerequisite: course 105 or Veterinary Microbiology 127 and 128 or the equivalent. Study of the mechanisms involved in the pathogenesis of higher eukaryotic organisms. Emphasis on the alteration or inhibition of cellular metabolism and function by bacteria and animal viruses. Offered in odd-numbered years.

215C. Recombinant DNA Laboratory (4) I. The Staff Laboratory—12 hours. Prerequisite: course 215A or Biochemistry 101A/101B; Genetics 100. Application of the recombinant DNA technology to modern problems in biology, biochemistry and genetics. Emphasis on molecular cloning strategies, choice of vectors, preparation of insert DNA and selection procedures.

225L. Recombinant DNA Laboratory (4) I, II. The Staff Laboratory—Discussion—6 hours. Prerequisite: course 130L or Biochemistry 101L; Genetics 100; and consent of instructor. Application of recombinant DNA technology to modern problems in biology, biochemistry and genetics. Emphasis on molecular cloning strategies, choice of vectors, preparation of insert DNA and selection procedures. (Submit application to Microbiology Department Office, two weeks prior to first day of class.)

240. Biology of Autotrophic Prokaryotes (3) III. Meeks, Wheeles Lecture—3 hours. Prerequisite: Biochemistry 101B. Biochemistry and ecology of photosynthetic and chemosynthetic bacteria, and of methylocorobic bacteria, with special emphasis on the mechanisms of ATP and reducing power generation. Offered in odd-numbered years.

250. Biology of Yeasts (3) B. Blais (Viticulture and Enology), C. Price (Food Science and Technology) Lecture—3 hours; laboratory—6 hours. Prerequisite: consent of instructor. Survey of the genetics, physiology, regulatory mechanisms, structure, ecology and diversity of yeasts and related organisms. Offered in odd-numbered years.

250. Bacterial Genetic Regulatory Mechanisms (3) II. Artz 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; rRNA modification effects; autoregulation; control of bacterial viruses, superconorsts. Offered in even-numbered years.

270. Advanced Animal Virology (3) II. Manning, Privat-Stalo Lecture—3 hours. Prerequisite: consent of instructor. Selected advanced topics on biological and biochemical properties of animal viruses may be repeated for credit. Offered in odd-numbered years.

290. Advanced Research Conference (1) I, II, III. The Staff (Chairperson in charge) Discussion/conference—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and critical discussion of student research papers. Designed for advanced graduate students. May be repeated for credit. (SU grading only.)

291. Selected Topics In Bacteriology (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Current progress in bacteriology and cellular and molecular biology. (SU grading only.)

292. Seminar In Bacteriology, Genetics and Virology (1) I, II, III. The Staff (Chairperson in charge) 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. Manning Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current topics in animal virology. (SU grading only.) (Same course as Veterinary Microbiology 282.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Microbiology

(A Graduate Group)

John C. Meeks, Ph.D., Chairperson of the Group Group Office, 158 Hutchison Hall (Microbiology Department), 752-2925

Graduate Study. The Graduate Group in Microbiology offers study and research leading to the M.S. and Ph.D. degrees. For information on the graduate study and undergraduate preparation for the program contact a graduate adviser or the Chairperson of the Group. See also the Graduate Division section in this catalog.

Graduate Advisers. B. L. Beanam (Medical Microbiology); R.C. LeFevre (Veterinary Microbiology and Immunology); D.C. Nelson (Microbiology); D.M. Ogydzinski (Food Science and Technology).

Courses in Microbiology

Graduate Courses

290C. Advanced Research Conference (1) I, II, III. The Staff (Meeks in charge)

NOTE: For key to footnote symbols, see page 131.

Military Science

(College of Letters and Science)

Reserve Officers' Training Corps (ROTC), Army

Douglas M. Crawford, Lt.Col., Chairperson of the Department

Department Office, 125 Hickey Gymnasium (752-0541)

Faculty

Lieutenant Colonel Douglas M. Crawford, Professor
Major John F. Campbell, Assistant Professor
Captain Joseph A. Schaier, Assistant Professor
Captain Robin B. Friedman, Assistant Professor

Program of Study

The Military Science Department extends the educational opportunities and provides extracurricular activities which qualify a student for a commission in the Army Reserve, National Guard, or Regular Army. The program assists qualified students in all academic fields to prepare for positions of leadership in military or civilian careers. A continuing effort is made to assign graduates to military career fields assigned with their major field of study, individual capabilities and preferences in one of seventeen career fields (i.e., Infantry, Engineer, Aviation, Medical Service Corps, Armor, Military Intelligence, etc.). Active duty obligation for ROTC graduates will not exceed four years for those who choose Active Duty or six months for those who choose Reserve Component Duty. The combined total service obligation is eight years.

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 from 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, upon approval by the Department Chairperson.

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 text books, uniforms and equipment are provided without cost. Students are given leadership development experience at summer camp (advanced camp) between their third and fourth years of the course. Emphasis is on individual 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.
Courses in Military Science

Lower Division Courses

11. Roles and Organization of the U.S. Army (1) L
   Lecture—1 hour. Prerequisite: lower division status. Constitutional and legal basis of the Army, organization and structure, roles in times of war. American military concept. Impact of civil-military relations and Soviet military power on role of Army studied in context of current problems.

12. Introduction to Military Leadership and Map Reading (1) L
   Lecture—1 hour. Prerequisite: lower division status. Introduction to leadership theories used in military organizations. Contributes the duties and responsibilities of junior Army officers, the general environment that officers lead, and the leadership roles performed. Introduces military map reading.

13. Introduction to Basic Military Operations (1) L
   Lecture—1 hour. Prerequisite: lower division status. Basic military tactical theories and their application at the individual and squad level. Course introduces military tactical operations and first aid. Prerequisite: as introduced in course 11 are applied to offensive and defensive tactics.

14A. Introduction to Military Leadership Skills (3) L
   Lecture—2 hours. Prerequisite: lower division status and consent of instructor. Personal and organizational leadership skills introduced in leadership laboratory. Extensive supervisory leadership experience conducted in a military environment. Basic military skills necessary to function in a leadership role are also covered. (PNP grading only).

14B. Introduction to Military Leadership Skills (3) L
   Lecture—2 hours. Prerequisite: lower division status and consent of instructor; completion of all previous laboratories. Development of leadership and military skills introduced in course 14A is continued with emphasis on the individual's role in the squad, the basic organization and role of the Army. As students gain capabilities, supervisory controls are reduced. (PNP grading only).

14C. Introduction to Military Leadership Skills (3) L
   Lecture—2 hours. Prerequisite: lower division standing and consent of instructor; completion of all previous laboratories. Students demonstrate skill levels required for promotion to non-commissioned officer level. Use of chain of command from company to division is emphasized. Interrelationship of squad and platoon organizations is explored. (PNP grading only).

21. Military History (2) L
   Lecture—2 hours. Prerequisite: lower division status. Survey of military history from 1900 to present, focusing on World War I, World War II, the Korean War, and the Vietnam War.

22A. Intermediate Military Leadership and Operations: I (2) L
   Lecture—2 hours. Prerequisite: lower division status and consent of instructor. Survey of military leadership, the U.S. Army, and the military classroom. Students gain hands-on experience in military classes offered at the three-year colleges.

22B. Intermediate Military Leadership and Operations: II (2) L
   Lecture—2 hours. Prerequisite: lower division status; consent of instructor. Continuation of course 22A. Individual leadership roles identified in course 22A are studied in more depth enabling each student to improve on targeted weaknesses. Instruction is presented in intermediate defensive tactics at the squad level.

24A. Individual Military Leadership Skills (1) L
   Laboratory—2 hours. Prerequisite: lower division status; courses 14A, 14B, 14C and 21, or consent of instructor. Develops and exercises personal military leadership skills in extensive supervised leadership laboratories. Intermediate level military skills necessary for leadership roles are developed. Students perform in role of junior non-commissioned officers.

24B. Individual Military Leadership Skills (1) L
   Laboratory—2 hours. Prerequisite: lower division status; courses 14A, 14B, 14C and 21, or consent of instructor. Develops and exercises personal military leadership skills in extensive supervised leadership laboratories. Intermediate level military skills necessary for leadership roles are developed. Students perform in role of junior non-commissioned officers.

24C. Individual Military Leadership Skills (1) L
   Laboratory—2 hours. Prerequisite: lower division status; courses 14A, 14B, 14C, and 21, or consent of instructor. Develops and exercises personal military leadership skills in extensive supervised leadership laboratories. Students are rotated through squad and team-level supervisory positions, given responsibility to operate in a military environment. (PNP grading only).

NOTE: For key to footnote symbols, see page 131.
Aerospace Studies (Air Force)

Air Force ROTC is available to UC Davis students through a program offered at California State University, Sacramento (CSUS). Then Department of Aerospace Studies (AFROTC) offers a two- or four-year program leading to a commission in the United States Air Force. All course work (12 or 16 semester units) is completed on the CSUS campus with the exception of Field Training conducted during part of the summer at an active Air Force base. Upon completion of the Program (integrated with UC Davis’ quarter system) and all requirements for the Bachelor of Science degree, cadets are commissioned second lieutenants in the Air Force and serve a minimum of four years on active duty. Graduates who are qualified and selected may enter pilot or navigator training immediately upon graduation, or serve in a specialty consistent with their academic major, individual goals, and existing Air Force needs. Graduates may request a delay of entry on active duty to continue their education or may apply for Air Force sponsored graduate school to begin immediately upon entry on active duty. Due to firm scheduling requirements for the AFROTC program, students are encouraged to work closely with their academic advisors in planning this academic program.

Application to the AFROTC Program must be later than the middle of a student’s sophomore year. Contact representatives in the Aerospace Studies Department at CSUS, telephone (916) 278-7315, for information on the program or processing of entry. (An AFROTC Program is also available within the UC system at Berkeley campus, Department of Aerospace Studies, (415) 642-3572.)

AFROTC offers 3rd-, 3-, 2nd-, and 2-year scholarships to qualified students. Applications are accepted in a variety of academic disciplines; however, particular emphases will be given to applicants in the fields of engineering and navigation.

Music

(College of Letters and Science)

David A. Nutter, Ph.D., Chairperson of the Department
Department Office, 112 Music Building (752-0666)

Faculty

Lawrence E. Anderson, Ph.D., Lecturer
Ross Bauer, Ph.D., Assistant Professor
Roberti S. Bloch, M.A., Professor
Anna Maria Busse Berger, Ph.D., Assistant Professor
Sydney R. Charles, Ph.D., Professor Emeritus
Andrew D. Frank, M.A., Professor
D. R. Holman, Ph.D., Professor
Mary E. Hovst, B.A., Lecturer
Albert J. McNeil, M.S., Professor
Maria A. Niederberger, Ph.D. candidate, Lecturer
David A. Nutter, Ph.D., Associate Professor
Christopher A. Reynolds, Ph.D., Associate Professor
Jerome W. Rose, M.A., Professor Emeritus
Wayne Slayton, Ph.D., Professor
Richard G. Swift, M.A., Professor
William E. Valente, M.A., Professor

Faculty Affiliates in Applied Music

Dona Lee Brandon, M.S.M., Lecturer (organ)
Lois Brandwyna, M.A., Lecturer (piano)
Diana Catlin, M.A., Lecturer (viola da gamba)

David Granger, M.M., Lecturer (bassoon)
Edward Higgins, M.M., Lecturer (trumpet)
Kurt Kaufman, B.M., Lecturer (cello Examination)
Stanley Lunetta, M.A., Lecturer (percussion)
Peter Nowlen, B.M., Lecturer (French horn)
Deborah Pittman, M.A., Lecturer (clarinet)
Robin Richman, B.M., Lecturer (flute)

The U.C. Davis Contemporary Music Players

Rosa Bauer, Director
Robert Samson Bloch, violin and viola
Thomas Derthick, bass
Peter Nowlen, French horn
Sarn Oliver, violin
Beth Pearson, cello
Deborah Pittman, clarinet
Karen Roseman, viola
Laurel Zucker, flute and guest artists

The UCD Faculty Woodwind Quintet

Emily Ferguson, oboe
David Granger, bassoon
Deborah Pittman, clarinet
Robin Richman, flute
Peter Nowlen, French horn

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. Options are provided for those students with special interests in composition, history, teaching and performance, and for those who plan to continue graduate work in music. The Department of Music offers a Master of Arts degree with emphasis on composition, music history or conducting, and a Master of Arts in Teaching with emphasis on the teaching of music.

A.B. Major Requirements:

Preparatory Subject Matter


Music 30, 31 (or the equivalent as determined by consultation with major advisor), one year

Piano skills, Music P (required of all majors)

Depth Subject Matter

Music 26A, 26B, 26C, 104A, 104C

At least 12 units selected from Music 121


At least 8 units in performance courses

Select from Music 130 or 131, 141, 142, 143, 144, 145, 146.

Total Units for the Major

92

Beginning and transfer students must take an examination in piano playing. Sufficient pianistic ability to perform four-part chorales and compositions comparable in difficulty with The Little Preludes of Bach is prerequisite to upper division coursework in the major. Students with deficiencies will be required to pass Music P. All majors in music will be expected to perform the compositions cited above before a jury of faculty members prior to advancement into the upper division. Students transferring from other colleges should take the examination and consult with departmental major advisors before enrolling in any music course.

Foreign Language Requirement. Attention is called to the requirements in foreign languages for higher degrees in music: a reading knowledge of French or German for the M.A. degree. Undergraduates
contemplating advanced study in music should prepare to satisfy these requirements as they proceed to the bachelor's degree.


Minor Program Requirements:

MUSIC 294 Music is a minimum of eighteen units of upper division
Music courses for the minor.

Performance requirements include:

- Coursework in music history, theory, and practice
- Composition
- Orchestration
- Conducting
- Performance in recitals, concerts, and productions

NOTE: For key to footnote symbols, see page 131.

Upper Division Courses

104A-104B: Advanced Theory (4-4-4) I-II, I-II

107A. Computer and Electronic Music (3) I. Slawson

107B. Computer and Electronic Music (3) II. Slawson

107C. Computer and Electronic Music (3) III. Slawson

107D. Computer and Electronic Music (3) IV. Slawson

108A-108B. Orchestra (2-2) I, II. Frank

109A. Masterworks in Performance (2) I. Holoman

109B. The Music of a Major Composer: Beethoven (4) I. Buuser

109C. The Music of a Major Composer: Brahms (4) I. Buuser

109D. The Music of a Major Composer: Mozart (4) I. Buuser

110. Choral Conducting (2) I. McNeil

113A. Music of Non-Western Civilizations (2) I. Buuser

113B. Music of Non-Western Civilizations (2) II. Buuser
Graduate Courses

200. Music Research (4) I. Busse Berger
Seminar—3 hours; term paper. Introduction to problems and techniques of research; practical application of music bibliog-raphy to questions about issues in musicology, music theory, and performance practice.

201. Advanced Music Research and Criticism (4) I. Holoman
Seminar—3 hours; term paper. Study and practice of ex-post facto writing about music. Application of advanced research techniques in writing for different purposes, ranging from essays for the general public to thesis proposals and articles for scholarly journals.

202. Notation (4) I. Busse Berger
Seminar—3 hours; term paper. Study of musical notation; investigation of techniques for editing Medieval and Ren-naissance music.

203A-203B. 203C. Composition (4-4-4) A. Valente; I. Swift; I. Frank
Seminar—3 hours. Technical projects and free composition.

204. Advanced Conducting (3) I, II, III. The Staff (Holoman in charge)
Tutorial—2 hours; practical—2 hours. Prerequisite: courses 111, 112 or the equivalent; keyboard skills appropriate to graduate standing. Technical aspects of conducting and the broader issues in music history and art. Ensembles that conductors must face before leading a rehearsal or performance.

207. Electronic and Computer Music (4) I. Busse Berger Seminar—2 hours; term paper: Computer and electronic music with the Sun 3-based computer-music system and associated facilities.

210A. Prospector in Music (Theory and Analysis) (4) I. Swift
Seminar—3 hours: term paper. Voice-leading analysis of tonal music derived from Schenker and pitch-class set theory. Recent work on compositional design, generalizations of the concept of interval, psychologically-modulated music theory, and theories of durational structure and timbre.

210B. Prospector in Music (Musicology and Criticism) (4) I. Reynolds and staff
Seminar—3 hours; term paper. Issues and concepts of modern music history, including practice performance questions for specific repertories and periods; principles, aims, and methods of archival study, and determination of musical sources; philosophical debates about goals and aims of the discipline in general.

210C. Prospector in Music (Ethnomusicology) (4) I. III. Staff Seminar—3 hours; term paper. Intensive examination of major trends in ethnomusicology as exemplified by scholars working in specific geographical areas. Ethnomusicological theory, ranging from ethnographic description to ethnomusicholgy study (Seeger) to analysis of individual genres to sociological analysis of musical practice, performance, and cultural settings.

211. Topics in Music History (4) I. Reynolds; II. Busse Berger; III. Bloch Seminar—3 hours. Studies in selected areas of music history and theory. May be repeated for credit.

222. Techniques of Analysis (4) I. I. Swift; II. Bloch; III. Frank Seminar—3 hours. Analysis and analytical techniques as applied to music of all historical styles. May be repeated for credit.

213. Ethnomusicology (Pacific Cultures) (4) I. III. The Staff Seminar—3 hours; term paper. Court music, religious music, and popular forms of China, Japan, Korea, Melanesia, and Indochina. Issues concerning history, theoretical constructions, performance practice, and cultural settings of the music will be stressed. May be repeated for credit.

219. Individual Study (1-12) I, II, III. The Staff (Holoman in charge)
(S/U grading only.)

Teaching Methods Courses

230. The Teaching of Music (3) I. Anderson
Lecture—3 hours; term paper. Prerequisite: course 1 or the equivalent. Methods of teaching music in grades K-6.

231. The Teaching of Music (3) I. McNeill
Lecture—3 hours; term paper. Prerequisite: course 230 or the equivalent. Methods of teaching music in grades 7-12.

Instrumental Methods. The courses in this series consider methods of teaching orchestras and band instruments, and include repertory and program planning for winter secondary schools.

231A-321B. Stringed Instruments (1-1)-I. III. The Staff Discussion—2 hours. Prerequisite: course 4C.

NOTE: For key to footnote symbols, see page 131.
296 Native American Studies

Two courses from Native American Studies 118, 119, 124, 163 .......................... 8
One course from Native American Studies 101, 181A, 181B, 181C .................. 4
Anthropology 141A or 141C .................................................. 4
One course from Anthropology 141B, 144, History 182A, 186A, 186B, 189A, 189B .......... 4

Areas of Specialization .................................................. 20
(a) Art area: Native American Studies 101, Art 151, 185C, 185E
(b) Education area: Native American Studies 171, Applied Behavioral Sciences 173 or 175, Education 100, 110, 163
(c) Community Development area: Applied Behavioral Sciences 151, 152, Anthropology 226, 126, Political Science 178 or Applied Behavioral Sciences 154
(d) Ethnicity area: Applied Behavioral Sciences 172, 176, Anthropology 134, Political Science 129, Sociology 130
[Other areas may be developed by the student in consultation with the major adviser]

Unrestricted Electives .................................................. 42-43
Total Units for the Major 180

Major Adviser. D. Riling.

Minor Program Requirements:
The Native American studies minor is designed to provide an introduction to the Native experience in North America by means of comprehensive exposure to coursework dealing with the major aspects of Indian life, including history, values, politics, literature, and art.

Minor Program:
Select one course from each of the following categories: 24
Introduction, Native American Studies 1, 10, or 33
Ethnohistory, Native American Studies 130A, 130B or 130C
Politics and current affairs, Native American Studies 116, 117, 118, 124 or 161
Literature, Native American Studies 181A, 181B or 181C
Art, Native American Studies 101

Undergraduate Major. Concentration in Native American culture is also available through the Applied Behavioral Sciences major.

American History and Institutions. This University requirement can be satisfied by any one of the following: Native American Studies courses: 10, 55, 116, 130A, 130B, 130C. (See also under University requirements.)

Courses in Native American Studies

Lower Division Courses
1. Introduction to Native American Studies (4) I. The Staff; II, III. Riling
Lecture—3 hours; discussion—1 hour. Introduction to U.S. and Native American culture; relationships of Native American Studies to other academic disciplines.

10. Native American Experience (4) I, II. The Staff
Lecture—4 hours. Introduction to Native-American historical and social development with emphasis on the U.S. area and upon those processes such as relations with non-Indians which have contributed to the current condition of Indian people. General Education credit: Contemporary Society/Introductory.

32. Native American Music and Dance (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Introduction to the music and dance of the native peoples of the U.S. Students will study secular native music and dance from a cross-section of regions and tribes. Offered in even-numbered years.

33. Native American Art in the U.S. (4) I. Longfellow
Lecture—4 hours. Comprehensive survey of Indian art forms with emphasis upon design, media, and function. Intent is to familiarize the student with a wide range of styles and techniques of Indian arts in the United States.

34. Native American Art Workshop (4) I, II. Ill. Longfellow
Lecture—1 hour; laboratory—3 hours; to be arranged—3 hours. Prerequisite: consent of instructor; course 33 recommended. Studio projects in Native-American art, design and crafts. (P/NP grading only)

55. Americanism: Native American Contributions to World Civilization (4) I. The Staff
Lecture—4 hours. Prerequisite: course 1. Analysis and study of Americanism: traits, inventions, and developments originated in the Americas by native peoples. Offered in odd-numbered years.

70. Native American Perception (4) I. The Staff
Lecture—4 hours. Prerequisite: course 1. Study of the culturally determined attitudes, values, and motivations of American Indian peoples and the differences in perception between Native Americans and the dominant society.

90. Special Study for Undergraduates (1-5) I, II. III. The Staff
(Rising in charge); consent of instructor. (P/NP grading only)

Upper Division Courses
101. Contemporary Indian Art (4) II. Longfellow
Lecture—4 hours. Prerequisite: course 33. Historical review of contemporary Indian art from 1900 to the present by looking at the art centers of Oklahoma and Santa Fe. Social pressures that have influenced the imagery that exists today will be examined. Offered in odd-numbered years.

107. Special Topics in Native American Languages (4) I, II. III. Riling
Lecture-discussion—4 hours. Prerequisite: consent of instructor. Investigation of various subjects in contemporary historical Native American language studies. May be repeated for credit when a different topic is studied.

112. History and Culture of the "Five Civilized Tribes" (4) I. The Staff
Lecture—4 hours. Prerequisite: upper division standing; course 1. History and culture of the Native American people, found in southeastern part of the U.S., called the "Five Civilized Tribes." Offered in odd-numbered years.

116. Native American Traditional Governments (4) I. Riling
Lecture—4 hours. Prerequisite: course 1; Anthropology 2; Study of selected Native-American Tribal Governments, confederations, leagues, and alliance systems. Offered in even-numbered years.

117. Native American Governmental Decision Making (4) II. Riling
Lecture—4 hours. Prerequisite: course 116, Political Science 2; Anthropology 123 recommended. Native-American government and community decision making with emphasis on federal and state relations, tribal sovereignty, current political trends and funding for tribal services. Offered in odd-numbered years.

118. Native American Politics (4) III. Riling
Lecture—4 hours. Prerequisite: course 116. Examination of the various interest groups and movements found among native people and how they relate to the determination of Indian affairs. Study of political action available to native groups, and local communities, along with relevant theory relating to underdevelopment. Offered in even-numbered years.

124. Contemporary Affairs of Native Americans in California (4) III. Riling
Lecture—4 hours. Prerequisite: course 1. Study of the contemporary problems, issues, and developments involving Native Americans, both urban and rural, in California. Offered in odd-numbered years.

130A. Native American Ethno-Historical Development (4) I. Forbes

130B. Native American Ethno-Historical Development (4) II. Forbes
Lecture—4 hours. Prerequisite: course 1, 10, 130A, History 17A or 17B recommended. Study of Native American Ethno-History in North America, 1770-1890. Offered in even-numbered years.

130C. Native American Ethno-Historical Development (4) III. Forbes
Lecture—4 hours. Prerequisite: course 1, 10, or 130A; or History 17A or 17B; or Anthropology 2

NOTE: For key to footnote symbols, see page 131.
Native American Studies

(College of Letters and Science)
Jack D. Forbes, Ph.D., Program Director
Program Office, 922 Sproul Hall (752-1219)

Committee in Charge
Jack D. Forbes, Ph.D. (Anthropology, Native American Studies)
George C. Longfish, M.F.A. (Native American Studies)
David R. Ringle, M.A. (Native American Studies)
David A. Robertson, Ph.D. (Anthropology)
Lenora A. Timp, Ph.D. (Linguistics)
Delbert L. Trua, Ph.D. (Anthropology)

Native American Studies

Minor Program Requirements:
The Native American Studies minor provides an introduction to the Native experience in the Americas by means of exposure to coursework dealing with some of the major aspects of Indian life, including history, values, politics, literature, and art.

A new major in Native American Studies in the College of Letters and Science is currently under development and will eventually replace the Native American Studies program in the College of Agricultural and Environmental Sciences. Students enrolled in the existing major program should check the Class Schedule and Room Directory for supplementary information about course offerings and degree requirements.

Nematology

(College of Agricultural and Environmental Sciences)
Howard Ferris, Ph.D., Chairperson of the Department
Department Office, 488 Hutchison Hall (752-1400)

Faculty
Edward P. Caswell, Ph.D., Assistant Professor
Howard Ferris, Ph.D., Professor

Bruce A. Jaffe, Ph.D., Assistant Professor
Harry K. Kaye, Ph.D., Professor
Benjamin F. Lownsbery, Ph.D., Professor Emeritus
Armand R. Maggenti, Ph.D., Professor
DeWayne J. Raski, Ph.D., Professor Emeritus
David L. Vignieri, Ph.D., Lecturer
Beverly C. Westerdahl, Ph.D., Lecturer
Valerie M. Williams, Ph.D., Assistant Professor

Related Major Programs: See the major in Entomology.

Graduate Study: Graduate degrees in Entomology are offered through the Department of Entomology or the Department of Plant Pathology. Refer to the Graduate Division section in the catalog for details.

Courses in Nematology

Upper Division Courses

100. General Plant Nematology (4) I. Ferris
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1 or 10; lower division student with consent of instructor only. An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops.

110. Introduction to Nematology (4) II. Maggenti
Lecture—2 hours; Prerequisite: Zoology 2 or the equivalent or consent of instructor. The relationship of nematodes to man's environment. Classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil as parasites of plants and animals.

199. Special Study for Advanced Undergraduates (1-5) I, II, III, Summer. The Staff (Chairperson in charge). Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

120. Principles and Techniques of Nematode Taxonomy and Morphology (4) I, III. The Staff
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100 or the equivalent. Review and investigation of relationships between parasitic nematodes and plants, the relationship between nematodes and their environment, and relationship between nematodes and other biota. Biology of systems explored at the population, organismal, and cellular levels. Offered in odd-numbered years.

225. Nematode Taxonomy and Comparative Morphology (5) II, Maggenti
Lecture—2 hours; laboratory—6 hours; 3 hours of laboratory to be announced. Prerequisite: course 220. The taxonomy, morphology, and comparative morphology of soil, freshwater, and marine nematodes as well as selected plants and animals. Offered in even-numbered years.

240. Biological Control of Insect and Plant Nematology (2) I. Jaffe, Kaye
Lecture—1 hour; laboratory—3 hours or field trips. Prerequisite: upper-division course in entomology, nematology, or plant pathology. Biological control potential of nematodes against insect pests and of microorganisms against nematode pests. Offered in odd-numbered years.

245. Field Nematology (1) I. The Staff
Fieldwork—6 days. Prerequisite: courses 100, 220. Six-day demonstration and field study in applied nematology including diagnosis and control of nematode biological problems for control of field pest design, and establishment in association with diverse California crops. (SU grading only.)

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. (SU grading only.)

396. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

399. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

Nutrition

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Academic Affairs

See Academic Affairs, below; Academic Affairs (A Graduate Group); and Academic Affairs

Community Nutrition

Preparation: plan in advance to include the required course prerequisites.
Nutrition 101 or 110, plus 111 . . . 9
Nutrition 118, 119 . . . 7
Nutrition 120 . . . 4
Physiology 110 . . . 5
Courses in Nutrition

Lower Division Courses

10. Discoveries and Concepts in Nutrition (3) II, III. The Staff Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. To receive GE credit, course must be taken in a concurrent or subsequent quarter; Nature and Environment/introductory.

11. Current Topics and Controversies in Nutrition (2) II, III. The Staff Discussion—1.5 hours; oral reports, written reports, term papers. Prerequisite: course 20 (may be taken concurrently). Assigned readings and discussion of topics of current concern and broad interest in contemporary nutrition. Coordinated with course 10. Not open for credit to students who have taken an upper division course in nutrition. To receive GE credit, course must be taken in a concurrent or previous quarter; Nature and Environment/introductory.

20. Food and Culture: An Introduction to Culture, Diet, and Calorie (4) II. Grivetti Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 2. Historical and contemporary overview of culture, food habits, and diet; exploration of the major themes in food habit research; minority food habits; origins and development of dietary practices. General Education credit: Nature and Environment/Introductory.

32. Public Issues in Nutrition and Food Science (1) II. Schnee, Schweigt (Food Science and Technology) Seminar—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 Food Science and Technology 83.)

99. Individual Study for Undergraduates (1-5) I, II, III. The Staff Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

101. An Introduction to Nutrition and Metabolism (5) I. Lerner Lecture—5 hours. Prerequisite: Chemistry BB; 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.

110. Principles of Nutrition (5) II. Calvert (Animal Science) and Rucker (Nutrition); III. Hung (Animal Science) and Rucker (Nutrition) Lecture—5 hours. Prerequisite: Physiology 101B (preferred) or Biochemistry 101B (may be taken concurrently); a course in physiology or zoology. Fundamental principles of the nutrition needs of other animals. Physiological basis of nutrient requirements for growth, maintenance and reproduction. Physiological basis of nutritional disorders.

111. Human Nutrition (4) III. Keen, McDonald Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or 110. Nutrition of humans; critical study of nutrient requirements at various phases of life cycle.

112. Nutritional Assessment: Dietary, Anthropometric, and Clinical Methods (4) I. Hung Lecture—1 hour; laboratory—2 hours. Prerequisite: course 110 or 111 (may be taken concurrently). Methods of nutritional assessment in humans to evaluate dietary intake (dietary records and recalls, food frequency lists), body composition (anthropometry, physiological methods), and clinical signs of malnutrition. Principles of validity and reliability and interpretation of results.

113. Nutritional Assessment: Biochemical Measures (2) I, II. The Staff (McDonald in charge) Lecture—1 hour; laboratory—2 hours. Prerequisite: course 111. Variety of biologic markers of human nutritional status including hematologic, urine, and hair analyses of clinical importance will be demonstrated and evaluated. Emphasis on the precision, accuracy, reliability and interpretation of the values.

114. Developmental Nutrition (4) II. Keen Lecture—4 hours. Prerequisite: course 110 or 111. Role of nutritional factors in embryonic and postnatal development.


116A-B. Diet Therapy (3-3) I-II. Zeman, Clifford, Stem Lecture—3 hours; laboratory—3 hours. Prerequisite: course 111; Physiology 110 (required or recommended). Nutritional problems in contemporary medicine. Problems in planning diets for normal and pathological conditions.

116A-L. Practicum in Diet Therapy (2) I. Zeman Lecture—1 hour; laboratory—2 hours; extensive written assignments. Prerequisite: course 116A (may be taken concurrently). Planning and evaluation of therapeutic diets; procedures in patient education. Coordinated with course 116B. (Deferred grading only pending completion of 116A-B; sequence.)

116B-L. Practicum in Diet Therapy (1) II. The Staff (Zeman in charge) Lecture—1 hour; laboratory—1 hour; extensive written assignments. Prerequisite: course 116A (may be taken concurrently); 116AL. Planning and evaluation of therapeutic diets; procedures in patient education. Coordinated with course 116B. (Deferred grading only pending completion of 116A-B; sequence.)

117. Experimental Nutrition (5) II. Clifford Lecture—3 hours; laboratory—6 hours. Prerequisite: course 110; Biochemistry 101B or Physiological Sciences 101B; a laboratory course in nutrition or biochemistry. Methods of assessing nutritional status. Application of chemical, microbiological, chromatographic and enzymatic techniques to current problems in nutrition.

118. Community Nutrition (3) II. Dewey, McDonald Lecture—3 hours. Prerequisite: course 101 or 111; course 116A recommended. Nutrition problems in contemporary communities in the U.S. and in developing countries. Nutrition programs and policy, principles of nutrition education.

119. Field Work in Community Nutrition (4) II. Dewey Lecture—2 hours; work—6 hours. Prerequisite: course 118 and consent of instructor. Introduction to field work in community nutrition involving nutrition education, nutrition counseling, or community nutrition research.

120. Food Habits and their Nutritional Implications (4) I. Grivetti Lecture—3 hours; discussion—1 hour. Prerequisite: upper division or graduate standing; upper division course in nutrition or Biochemistry 101B recommended. Advanced themes exploring food habits and their nutritional implications; pica; toxicants naturally occurring in food; ethnic diet; food systems; dietary culture; sensory responses.

122. Ruminant Nutrition and Digestive Physiology (3) III. Morris and Macy (Animal Science) Lecture—3 hours. Prerequisite: Physiology 101B; Biochemistry 101A-101B or Physiological Sciences 101A-101B. Microbiology 2 recommended. Study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in the ruminant.

122L. Ruminant Nutrition Laboratory (2) II, III. Macy (Animal Science) Laboratory—6 hours. Prerequisite: course 122 (concurrently). Students will conduct experiments in small groups and attend demonstrations on topics peculiar to ruminant digestive physiology and nutrition. The laboratory will deal with topics developed in lectures.

123. Nutrition of Non-Ruminant Animals (3) II. Klaing (Avian Sciences) Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110 or 111. Physiological Sciences 101A-101B or Biochemistry 101A-101B; upper division standing in biological or agricultural sciences recommended. Comparative nutrition of non-ruminant animals including domestic animals, wildlife and man. Relation of nutrition to body composition, feed intake, growth, disease, exercise and stress. Discussion and laboratory exercises on the scientific method for answering questions in nutrition.

124. Nutrition and Feeding of Finfishes and Shellfishes (3) III. Hung (Animal Science) Lecture—3 hours. Prerequisite: course 110 or 115. Application of principles of nutrition to feeding of fish and shellfish, feeding habits, gastrointestinal anatomy, digestive physiology, aquatic environment, nutrient requirements, diet formulation and quality control, and feeding practices of commercially cultured fishes.

125. Journalistic Practicum in Nutrition (2) III. Stern, Swenerton Discussion—2 hours. Prerequisite: course 110; a course in written or oral expression or consent of instructor. Critical analysis and discussion of current, controversial issues in nutrition; the use of journalistic techniques to interpret scientific findings for the lay public. Students will be required to write several articles for campus media. Course may be repeated once for credit. Offered in even-numbered years.

130. Proseminar in Nutrition (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: senior standing; course 111. Discussion of human nutrition problems. Each term will involve a different emphasis on experimental, clinical, and dietary problems of community, national and international scope. May be repeated for credit with instructor. (P/NP grading only.)

190. Nutrition Research Conference (1) I, II, III. The Staff (Schnee in charge) Discussion—1 hour. Prerequisite: upper division standing in Nutrition or related biological science; consent of instructor. Introduction to research findings and methods in nutrition. Presentation and discussion of research by faculty and student. May be repeated for credit. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff Laboratory—3-36 hours. Prerequisite: one upper division course in Nutrition and consent of instructor. Work experience on one campus in practical nutrition, supervised by a faculty member. (P/NP grading only.)

197. Tutoring in Nutrition (1-2) I, II, III. The Staff Discussion—3-6 hours. Prerequisite: Nutrition Science 101B, Community Nutrition 101A. Complete. Completion of course 101 or 110 with B grade or better. Tutoring of students in nutrition courses, assistance with discussion groups or laboratory assignments, conference with instructor in charge of course: written evaluations. May be repeated if tutoring a different course. (P/NP grading only.)

199. Directed Group Study (1-5) I, II, III. The Staff (Schnee in charge) (P/NP grading only.)

Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Schnee in charge) (P/NP grading only.)

Graduate Courses


202. Advanced Animal Energetics and Energy Metabolism (4) I. The Staff (Balchin, Animal Science, in charge) Lecture—4 hours. Prerequisite: Biochemistry/Physiological Sciences 101B, Physiology 110. History of nutritional energetics; evaluation of energy transformations associated with food utilization, and energy expenditures at cellular, tissue and animal levels as affected by diet and physiological state; appetite regulation; obesity, lipid transport and metabolism.
Nutrition (A Graduate Group)

R.L. Baldwin, Ph.D., Chairperson of the Group
Group Office, 1151 Meyer Hall (752-2512)

Graduate Study. The Graduate Group in Nutrition offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding these programs, address the chairperson of the group.

Graduate Advisers. Consult the Nutrition Graduate Group Office.

Nutrition Science
(College of Agricultural and Environmental Sciences)

The Major Program

The Nutrition Science major provides organized study in nutrition and relevant biological and physical sciences as preparation for (1) graduate study in nutrition, including the number of species or groups; (2) professional study of medicine, veterinary medicine, public health, dietetics, and other health sciences; and (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.

Nutrition 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.

Preparatory Subject Matter

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<th>Subject</th>
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<tr>
<td>Mathematics, (Mathematics 16A-16B)</td>
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<td>Biology with laboratory (Biology Sciences 1)</td>
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<td>Chemistry, general organic, and quantitative (Chemistry 1A-1B, 1B; and 8A-8B or 12A-12B)</td>
<td>5-27</td>
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<td>Microbiology with laboratory (Microbiology 2, 3)</td>
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<td>Statistics (Statistics 13 or Agricultural Science and Management 150)</td>
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<td>Written or oral expression (requirements)</td>
<td>7-8</td>
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<td>Computer logic or programming (Computer Science Engineering 10 or Agricultural Science Management 21)</td>
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<td>Biochemistry (Biochemistry 101A-10B) or Physiological Science (Physiological Science 101A-101B)</td>
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<td>Nutrition 110, 111, 117</td>
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<td>Nutrition courses selected from 112, 113, 114, 115, 116A, 116B, 122L, 123, 190, 190C, 198, and 199</td>
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<td>Courses in social sciences and humanities</td>
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Nutrition Science

Obstetrics and Gynecology

See Medicine, School of

Ophthalmology

See Medicine, School of
Orientation
(Stout College of Agricultural and Environmental Sciences)

Courses in Orientation

Questions pertaining to the following course should be directed to the instructor or to the Biochemistry and Biophysics Department, 149 Briggs Hall.

Lower Division Course

1. Orientation (no credit) I, II, III. Chaykin (Biochemistry and Biophysics). Discussion. Exploration of the philosophy, purposes, significance, expectations and mechanisms of university education. (P/N grading only.)

Orthopaedic Surgery
See Medicine, School of

Otolaryngology
See Medicine, School of

Pathology

See Pathology (School of Medicine); and Pathology (Veterinary Medicine), below

Pathology
(Stout College of Veterinary Medicine)

Donald L. Dungworth, B.V.Sc., Ph.D., Chairperson of the Department
Department Office, 1125 Haring Hall (752-1365)

Faculty

Mark L. Anderson, D.V.M., Ph.D., Assistant Adjunct Professor (California Veterinary Diagnostic Laboratory)
Brack C. Barr, D.V.M., Ph.D., Assistant Adjunct Professor (California Veterinary Diagnostic Laboratory)
Arthur A. Blackford, V.M.D., Ph.D., Adjunct Professor (California Veterinary Diagnostic Laboratory)
Arthur A. Blackford, V.M.D., Ph.D., Adjunct Professor (California Veterinary Diagnostic Laboratory)
Dominic C. Blanchard, D.V.M., Ph.D., Assistant Adjunct Professor (California Veterinary Diagnostic Laboratory)
Donald L. Cordy, D.V.M., Ph.D., Professor Emeritus
Donald L. Dungworth, B.V.Sc., Ph.D., Professor
Jeanne W. George, D.V.M., Assistant Clinical Professor (Pathology, California Primate Research Center)
Robert J. Higgins, B.V.Sc., M.Sc., Ph.D., Assistant Professor
Charles A. Holmberg, D.V.M., Ph.D., Associate Professor
Peter C. Kennedy, D.V.M., Ph.D., Professor
Linda J. Lowenstein, D.V.M., Ph.D., Associate Professor
N. James MacLachlan, B.V.Sc., Ph.D., Associate Professor
F. Charles Mohr, D.V.M., Ph.D., Assistant Professor
Peter F. Moore, B.V.Sc., Ph.D., Associate Professor
Jack E. Moulton, D.V.M., Ph.D., Professor Emeritus
Harvey J. Oller, D.V.M., Ph.D., Professor
Bennie J. Osburn, D.V.M., Ph.D., Professor
Roy R. Pool, Jr., D.V.M., Ph.D., Professor
Anthony A. Zhan, D.V.M., Ph.D., Professor
(Department of Veterinary Pathology)

Dennis W. Wilson, D.V.M., M.S., Ph.D., Assistant Professor

Courses in Pathology

Upper Division Course

23. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/N grading only.)

Graduate Courses

281. Foreign Animal Diseases (3) III. Olender Lecture—3 hours. Prerequisite: Veterinary Medicine 452, and 461 or 462. Designed for students interested in research and teaching in veterinary medicine. Diseases studied are the most important ones that currently ravage Third-World countries, particularly in Africa and Latin America. (S/U grading only.) Offered in even-numbered years.

282. Tumor Pathology (3) I, II. The Staff (Dungworth in charge) Lecture—3 hours. Prerequisite: graduate standing or final year veterinary student and consent of instructor. The histogenesis, incidence, geographical distribution, etiology, transmission, immunity, host response, gross and microscopic structure, and metastasis of the neoplasms of domestic animals. Offered in even-numbered years.

280-318C-320C. Selected Topics in Advanced Special Pathology (3-4) I-III. The Staff (Dungworth in charge) Lecture—3-4 hours. Prerequisite: graduate standing or veterinary student and consent of instructor. Discussion of selected topics and important recent developments in current surgical pathology cases based on clinical records and microscopic study. (S/U grading only.)

289. Comparative Pathology of Laboratory Animals (3) III. Lowenstein Lecture—3 hours. Prerequisite: graduate standing, DVM degree or, or final year veterinary medical student. Patterns of reaction to injury of selected organ systems and differentiating morphologic characteristics of their major disease entities. Emphasis on pathogenetic mechanisms and cellular subcellular pathology involved in inflammation, pulmonary disease, renal disease, and avian disease. Offered during the fall quarter of even-numbered years.

287. Comparative Pathology of Laboratory Animals (3) III. Lowenstein Lecture—3 hours. Prerequisite: graduate standing, DVM degree, or final year veterinary student; consent of instructor in charge. The pathogenesis and distribution of disease caused by parasites and other agents. Emphasis will be on the mechanisms of infections and the responses to infections. Offered in even-numbered years.

290. Seminar in Veterinary Pathology (1) I, II, III. The Staff Seminar—1 hour. (S/U grading only.)

291. Histopathology Conference (1) I, II, III. The Staff (Olender in charge) Discussion—1 hour. Prerequisite: graduate standing or final year veterinary student; consent of instructor. Discussion of selected cases based on records and slides. Defense of diagnoses. (S/U grading only.)

292. Surgical Pathology Conference (1) I, II, III. The Staff (Pool in charge) Discussion—1 hour. Prerequisite: graduate standing or final year veterinary student; consent of instructor. Diagnosis and discussion of current surgical pathology cases based on clinical records and microscopic study. (S/U grading only.)

293. Necropsy and Surgical Pathology (1-4) I, II, III. The Staff (Olender in charge) Discussion—1 hour per week. Prerequisite: consent of instructor. Responsible diagnostic casework. Performance of necropsies, slide reading, and case reporting. (S/U grading only.)

294. Primate Pathology Conference (1) I, II, III. Lowenstein Discussion—1 hour per week. Prerequisite: graduate standing or final year veterinary student; consent of instructor. Discussion of selected topics in primate pathology based on currently available material. Given jointly by Departments of Pathology in the Medical and Veterinary Schools, and the California Primate Research Center. (S/U grading only.)

295. Group Study (1-8) I, II, III. The Staff Group Study of advanced topics in pathology. (S/U grading only.)

NOTE: For key to footnote symbols, see page 131.
Ph.D. degrees. Detailed information may be obtained by writing to the Graduate Adviser.

Graduate Adviser: W.H. Bosson.

Courses in Philosophy

Lower Division Courses

1. Introduction to Philosophy (4) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Problems of philosophy through major writings from various periods. Problems are drawn from political, aesthetic, religious, metaphysical, and epistemological concerns of philosophy. General Education credit: Civilization and Culture/Introducory.

5. Critical Reasoning (4) I, III. III. The Staff

Lecture—3 hours; discussion—1 hour. Criteria of good reasoning in everyday life and in science. Basic principles of deduction and induction; fallacies in reasoning; and aids to reasoning; principles of scientific investigation; aids to clarity. Not open to students who have completed course 6.

6. Critical Reasoning and Writing (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Criteria of good reasoning in everyday life and in science. Basic principles of deduction and induction; fallacies in reasoning; and aids to reasoning; principles of scientific investigation; aids to clarity. Not open to students who have completed course 5.

10A. Themes in Philosophy (4) I. G. Greissmer; II, Iublen

Lecture-discussion—3 hours; papers or written reports. Introduction to selected problems involving cultural interest. Students are offered an opportunity to learn philosophy by working with sections of cultural interest. The course is designed to expose students to philosophical questions. General Education credit: Civilization and Culture/Introducory.

14. Ethical and Social Problems in Contemporary Society (4) I. The Staff

Lecture—3 hours; term paper. Philosophical and ethical issues and positions involved in contemporary moral and social problems. Among topical areas: civil disobedience and revolution, social and sex discrimination, environment and population control, genetic engineering, technology and human values, sexual morality, freedom in society. General Education credit: Civilization and Culture/Introductory.


Lecture—3 hours; discussion—1 hour. Prerequisite: one lower division course in philosophy. This course explores the interaction of cultural and religious perspectives and the underlying assumptions and their fundamental role in science and religion. General Education credit: Civilization and Culture/Introductory. Recommended: students must have completed an introductory GE course in philosophy or religious studies. (Same course as Religious Studies 18).

21. History of Philosophy: Ancient (4) I. Malcolm

Lecture—3 hours; discussion—1 hour. Survey of Greek philosophy with special attention to the Pre-Socratics, Plato and Aristotle. General Education credit: Civilization and Culture/Introductory.


Lecture—3 hours; discussion—1 hour. Selections from Descartes, Leibniz, Spinoza, Locke, and Hume. General Education credit: Civilization and Culture/Introductory.

23. History of Philosophy: Eighteenth Century (4) III. Mathey

Lecture—3 hours; discussion—1 hour. Selections from Locke, Berkeley, Hume, and Edgeworth. General Education credit: Civilization and Culture/Introductory.

24. Introduction to Ethics (4) I. Hampton

Lecture—3 hours; discussion—1 hour. Reading of historical and contemporary works. Writing of critical papers on ethical theory. Why should we be moral? What is moral behavior? How do social ideas, class bias, and gender roles contribute to our concepts of ethical issues. General Education credit: Civilization and Culture/Introductory.

31. Approaching Scientific Reasoning (4) III. Healey

Lecture—3 hours; discussion—1 hour. Introduction to scientific and philosophic problems of the scientific method and the scientific enterprise. Emphasis on understanding the nature of scientific reasoning and the scientific method. General Education credit: Civilization and Culture/Introductory.
credit: Civilization and Culture/Introductory or Nature and Environment/Introductory.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (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

(Certain upper division courses may not be offered every year in the major.)

100. Founders of Modern Thought (4) III. The Staff Lecture-discussion—3 hours; term paper. Prerequisite: not open to philosophy majors or students who have received credit for 225 or 255. An inquiry into the philosophy from Descartes to Kant. Major emphasis upon problems still current today.


102. Theory of Knowledge (4) I. Metey Lecture-discussion—3 or 4 hours; term paper. Prerequisite: one course in philosophy recommended. Philosophical problems of perception and thought, memory and preconception, illusion, truth and verification, types of evidence. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Philosophy 1, 22 or 23.

103. Philosophy of Mind (4) II. Wieden Lecture-discussion—3 hours. The relation between mind and body, our knowledge of other minds, and the explanation of mental processes. Discussion of such concepts as action, intention, and causation.

105. Philosophy of Religion (4) III. The Staff Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Logical, methodological, epistemological and existential aspects of selected religious concepts and problems. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Philosophy 1 or Religious Studies 1, 2, 21, or 40.


106. Philosophy of the Social Sciences (4) III. Givens Lecture—3 hours; discussion—1 hour. Prerequisite: one course in biology or one course in philosophy. Scientific method in linguistics. Nature of biological theories, explanations and models. Problems of evolution theory, ecology, genetics, and sociobiology. Science and human values. General Education credit: Civilization and Culture or Nature and Environment/Non-Introductory. Recommended GE preparation: (CC) any introductory GE course in philosophy; (NE) Biological Sciences 10, 10a, or 10b.


110. Intermediate Logic (4) II. Friedman Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy recommended. Development of the full quantifier logic, with identity and descriptions; decision procedures; advanced translation of English into the formal language; elementary theory of descriptions and Russell's paradox.

114A. History of Ethics (4) I. Arbin Lecture—3 hours; term paper. Prerequisite: one philosophy course recommended. Introduction to major writings of philosophers on central problems of right conduct; principles

NOTE: For key to footnote symbols, see page 131.
treatment of one or more general topics in the philosophy of physics, such as foundations of space-time theories, the interpretation of quantum mechanics, foundations of statistical mechanics. May be repeated for credit with consent of instructor. Offered in odd-numbered years.

208. Philosophy of Biology (4) I. Gornummer Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. Intensive treatment of one or more general topics in the philosophy of biology, such as foundations of evolutionary theories, reductionism in biology, sociobiology, and cultural evolution. May be repeated for credit with consent of instructor. Offered in odd-numbered years.

210. Philosophy of Science (4) I. Heasly Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. Intensive treatment of one or more general topics of current interest in the philosophy of science, such as scientific explanation, theory of confirmation, scientific realism, reduction in physics and biology. Course may be repeated for credit with consent of instructor. Offered in odd-numbered years.

212. Philosophical Logic (4) I. Matney Seminar—3 hours; term paper. Prerequisite: course 112 and Mathematics 108, or the equivalent. Uses of logic in philosophy, including applications of logic to philosophical problems and formalization of philosophical theories. Philosophical issues in logic, including the nature of logical truth, the correctness of logical systems, and the metaphysical presuppositions of logic.

214. Ethics (4) I. The Staff Seminar—3 hours.

217. Political Philosophy (4) III. Hampton Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Contemplation of current political philosophy. May be repeated for credit with consent of instructor.

218. Plato (4) II. Malcolm Seminar—3 hours.

222. Aristotle (4) II. Ireton Seminar—3 hours.

225. Kant (4) II. Ireton Seminar—3 hours.


236. Group Study (1-5) I, II, III. Staff (Chairperson in charge)

239. Research (1-12) I, II, III. Staff (Chairperson in charge) (S/U grading only.)

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Physical Education

(College of Letters and Science)

E. Dean Ryan, Ed.D., Chairperson of the Department
Herbert A. Schmalenberger, M.A., Vice-Chairperson of the Department
Department Office, 264 Hickey Gymnasium (752-0351)

Faculty
William C. Adama, Ph.D., Professor
Richard L. Tohill, Ph.D., Professor (Chemical Engineering)
Edmund M. Bernauer, Ph.D., Professor
G. Robert Biggs, B.A., Associate Supervisor
Robert B. Brown, M.A., Supervisor
Keith A. Brown, M.A., Lecturer
Joseph E. Carlson, M.A., Supervisor
Gary J. Collberg, M.A., Lecturer
E. Leroy Curry, M.A., Supervisor
Kathleen M. DeYoung, B.A., Associate Supervisor
Robert L. Foster, M.A., Supervisor
Pamela L. Gill, A.A., Supervisor
Raymond S. Goldfarb, M.A., Supervisor
Robert I. Hamilton, M.S., Supervisor
Jerry W. Hinsdale, A.B., Supervisor
Joria E. Hoehn, M.S., Lecturer
Jeffery B. Hogan, B.A., Lecturer
Robert G. Holley, Ph.D., Assistant Professor
Barbara A. Jahn, M.S., Supervisor
Susan E. Jennings, Ph.D., Lecturer
Charles R. Kovacic, Ed.D., Professor Emeritus
Willard S. Lotter, Ed.D., Senior Lecturer
Paul A. Molé, Ph.D., Associate Professor
Donald G. Murphy, B.S., Lecturer
John E. Nelson, M.A., Lecturer
Becky Hybey, B.S., Lecturer
John W. Peppa, M.A., Supervisor
Marlene F. Ripper, M.A., Assistant Supervisor
Melvin R. Remy, Ph.D., Professor (Civil Engineering)
E. Dean Ryan, Ed.D., Professor
Herbert A. Schmalenberger, M.A., Supervisor
Joe L. Singleton, M.A., Supervisor
James L. Sochor, Ed.D., Supervisor
Phillip S. Swinney, M.A., Supervisor
Jon E. Voight, M.S., Associate Supervisor
Keith R. Williams, Ph.D., Assistant Professor
Suzanne C. Williams, M.S., Supervisor
Sabbie J. Wynn, M.A., Assistant Supervisor

The Major Program

The major in Physical Education is designed to effect a broad scholarly understanding of human movement. This is achieved primarily by completion of a core or lower division courses in the biological, physical and behavioral sciences, and a required departmental upper division core of courses. The latter are designed to develop a scientific, integrative understanding of man's acute and chronic responses to physical activity and to provide an overview of the spectrum of developmental and stressors.

The undergraduate major may select either the Bachelor of Arts or the Bachelor of Science degree program. The Bachelor of Arts is designed primarily for those students desiring a liberal arts program with a broad-based liberal education. The Bachelor of Science major offers a broader and deeper knowledge of the natural sciences. It involves more extensive physical and life science preparation in lower division courses, and requires additional upper division coursework more specific to either biomechanics or exercise physiology. This degree program provides preparation for graduate study in exercise and sport science, for careers in the allied health sciences, and for professional schools in medicine, physical therapy, and podiatry.

Physical Education

A.B. Major Requirements:

Preparatory Subject Matter 12-24

Biology Sciences 1 5
Chemistry 1A 5
Physical Education 15
Phyisc 1A 3
Psychology 1 or 15 3-4
Statistics 13 4

Depth Subject Matter 47

Human Anatomy 101 2
Human Anatomy 102 2
Human Anatomy 103 2
Human Anatomy 104 2
Physical Education 101, 102, 103, 104, 105 16
Physiology 110 5
Minimum of 12 upper division units in physical education chosen with approval by a major advisor 12

Biological emphasis:

Students selecting this emphasis must select a minimum of 9 units from:

Physical Education 110, 111, 112, 113, 119, 120, 121

Psychological emphasis:

Students selecting this emphasis must select a minimum of 7 units from:

Physical Education 120, 121, 122, or 125

NOTE: For key to footnote symbols, see page 131.

Minimum 9 of 12 upper division units in either the biological or the psychological area selected with approval by a major advisor.

Students are expected to demonstrate above biological or psychological concentration by the end of the sophomore year. In special circumstances an individualized curriculum may be elected, but only after consultation with and approval by a major advisor. No variable-unit coursework may be used to fulfill this requirement.

Total Units for the Major 70-74

Recommended

Students interested in the biological emphasis of physical education are strongly urged to take Chemistry 8A, 8B.

Physical Education

B.S. Major Requirements:

Preparatory Subject Matter 33-59

Anthropology 1 4
Biological Sciences 1 4
Chemistry 1A-1B or 4A-4B 10
Computer science (Computer Science Engineering 10, 30, or Engineering 5) 3
Mathematics 10A-10B or 18A-18B 6-8
Physical Education 45 3
Physical Education 68-A or 68-B 3
Psychology 1 or 15 3
Statistics 13 or 102 4

Additional Requirements

Biomechanics emphasis: Zoology 2, and Physics 60 or 80 8
Exercise Physiology emphasis: Chemistry 8A-8B, or 128A-128B and 129A-129B 6-10

Depth Subject Matter 93

Human Anatomy 101, 102, 103, 104, 105 16
Physiology 110, 110L 7
Restricted electives 24

1 Minimum of 12 upper division units from outside the major selected with advisor's approval and as specified below. (Variable-unit courses may not be used to fulfill this requirement.)

2 Minimum of 12 upper division units from Physical Education courses, including:

Biomechanics emphasis: Physical Education 113, 115, 125
Exercise Physiology emphasis: 9 units selected from Physical Education 110, 111, 112, 113

Total Units for the Major 106-112

Honors Program

Those students with outstanding records in the major requirements may elect to enter the Honors Program with the consent of an advisor. A senior project must be completed, for which up to 10 units of Physical Education 199 (split over two quarters) may be earned. These units are taken in addition to the major requirements and should be realized that only a maximum of ten 199 units may be counted toward the B.S. degree total unit requirement.

Major Advisers

Teaching Major:
The teacher-training curriculum in physical education requires courses in addition to the departmental major requirements.
Minor Program Requirements:

**Units Required:** 18

### Physical Education

At least 18 upper division units in physical education.

#### Minor Advisers
Same as major advisers.

**Teaching Credential Subject Representative:** A. Schmalenberger. See also the section on the Teacher Education Program.

**Graduate Study:** A program of study and research leading to a master's degree is available in physical education. For detailed information regarding graduate study, write to the Graduate Adviser, Department of Physical Education. See also the Graduate Division section in this catalog.

**Graduate Adviser:** W.C. Adams.

### Class and Recreational Use of Facilities

The indoor physical activity facilities are available to all students of the time of registration, and are available to the use of gymnasium, showers, lockers, tenants courts, and the athletic fields. Certain equipment for 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, i.e., 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** (1) I, II, III. The Staff (Chairperson in Charge)

   - Lecture—2 hours. Section in: a) sports skills, rules and strategy; b) physical fitness and personal health; c) recreation; d) dance, and e) intercollegiate athletics. May be repeated for a total of 6 units. (P/NP grading only.)

2. **Principles of Basic Exercise Conditioning** (2) I, II, III. (Swimming in charge)

   - Lecture—1 hour; laboratory—2 hours. 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 and conditioning, flexibility and maintenance, and limitations of environment, age and gender on fitness levels. (P/NP grading only.)

3. **Foundations of Emergency First Aid Services** (2) I, II, III. The Staff (Chairperson in charge)

   - Lecture—1 hour; laboratory—1 hour. An introduction to the basic principles and practices that fulfill the prerequisites for advanced study in First Aid and Emergency Medical Services. Upon successful completion of course the Standard Red Cross Certificate is awarded.

4. **Professional Physical Education Activities: Men and Women** (1) I, II, III. The Staff (Chairperson in charge)

   - Lecture—1 hour; or laboratory—2 hours. Prerequisite: activity-level background comparable to that in course 1 for specific activity; intensity of competition for special sports for: a) athletic Hindus; b) classroom teaching and coaching; and c) classroom teaching and officiating. May be repeated for a total of six units.

5. **Administration of Intramural Sports** (2) I. Colberg

   - Lecture—2 hours. Prerequisite: course in intramural sports programs at the high school and college level.

6. **Theories of Lifesaving and Water Safety** (2) I, II. Hindale, Jahn

   - Lecture—1 hour—laboratory—2 hours. Prerequisite: course 5; sound physical condition, and no physical handicap that would render student unable to perform the required skills and ability to pass preliminary testing. Provides the student with the knowledge, organizational procedures, and skill development necessary to provide for water safety and save one's life or the life of another in an aquatic emergency. (American Red Cross Advanced Lifesaving Certificate awarded upon successful completion of necessary requirements.)

7. **Training Course for Water Safety Instructors** (2) I, II. Hindale—Lecture—1 hour; laboratory—2 hours. Prerequisite: advanced swimming (course 1) or consent of instructor; course 5 and current American Red Cross Certificate. Theoretical knowledge and practical experience necessary for the organization and teaching of swimming and lifesaving classes. (American Red Cross Water Safety Instructor's Certificate awarded upon successful completion of necessary requirements.)

8. **Basic Scuba** (2) I, II. Morns

   - Lecture—2 hours; laboratory—2 hours. Prerequisite: good physical condition, ability to pass preliminary swim test, and consent of instructor. Introduction to the knowledge required for SCUBA diving; fundamental maintenance of equipment, physics and physiology of diving, diver first aid and CPR, oceanography, and underwater communication. Pool and open water sessions available for certification. (P/NP grading only.)

9. **Dance Composition** (2) I, II. Wynn

   - Laboratory—5 hours. Prerequisite: course 35A or consent of instructor. Study of elements of dance production and its application to the use of lighting, costume design, selection of music, and building of stage props.

10. **Dance Composition II** (3) I, II. Wynn

    - Laboratory—5 hours. Prerequisite: courses 35A, 35B, or consent of instructor. Encourages the student to create new dance forms and prepare them for a 4-7 minute presentation in a spring concert on stage. Costumes and lighting will be created and correlated for each dance by the choreographer.

11. **36A-36B. History of Dance** (3-3) I-I. Curry

    - Lecture and laboratory. 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.

12. **Principles of Healthful Living** (2) I, II, III. Hunter, Gill

    - Lecture—2 hours. Application of scientific and empirical knowledge to personal, family, and community health problems. (P/NP grading only.)

13. **Foundations of Physical Education** (3) I. Adams

    - Lecture—3 hours. Introduction to historical, biomechanical, physiological, psychological and sociological foundations of physical education.

14. **Physical Education Internship** (2-8) I, II, III. The Staff

    - Chairperson in charge

15. **Directed Group Study** (1) I, II, III. The Staff (Chairperson in charge)

    - Lecture—1 hour. Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

16. **Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

    - Prerequisite: consent of instructor. (P/NP grading only.)

**NOTE:** For key to footnote symbols, see page 131.

### Upper Division Courses

1. **Field Experience in Teaching Physical Education** (2) I, II, III. The Staff (Chairperson in charge)

   - Discussion—1 hour; field work—3 hours. Prerequisite: upper division standing and appropriate course 1 or 7; consent of instructor. Tutoring or teacher's aide in physical education activities, including athletic coaching, and guidance of a regular teacher with supervision by a departmental faculty person. (P/NP grading only.)

2. **Physiological Regulation During Exercise** (4) I. Bernauer, Meli

   - Lecture—3 hours; discussion—1 hour alternate weeks with laboratory 3 hours. Prerequisite: Biological Sciences 1; Physiology 119A. A study of the processes of maintaining homeostasis, cardiovascular, respiratory, and other regulatory systems. Focus on physiological and environmental factors limiting capacity and causing fatigue. Role of physical activity in maintaining optimal regulatory functions.

3. **Physiological Adaptations to Exercise** (2) I. Adams,

   - Lecture—2 hours. Prerequisite: course 101 or consent of instructor. Study of physiological capacities with reference to genotypic and adaptive aspects. Analysis of physiological adaptations to chronic physical activity and selected environments.

4. **Analysis of Human Movement** (4) I. K. Williams

   - Lecture—3 hours; laboratory—3 hours. Prerequisite: course 101; consent of instructor. Introduction to the mechanical fundamentals of human motion. Qualitative and quantitative application of kinesthetic principles to a variety of movement situations.

5. **Introduction to Motor Control and Skill Acquisition** (3) I. K. Williams, Jennings

   - Lecture—2 hours; discussion—1 hour alternate weeks with laboratory 3 hours. Prerequisite: upper division standing: Psychology 1 or 15, and course 45. Analysis of variables affecting the ability to produce, learn, and retain movement skills. Basic neuropsychological and behavioral accounts of motor control processes are examined. Theories of movement selection and motor learning are covered.

6. **Psychosocial Factors in Motor Performance** (3) I. K. Williams

   - Lecture—3 hours. Prerequisite: Psychology 1, 15, or 16. Social psychological theories and experiments to find a social psychology and human motivation and their application to motor performance, including sex differences, success and failure, expectations, anxiety, competition, and aggression.

7. **Exercise Metabolism** (3) I. Meli

   - Lecture—2 hours; laboratory—5 hours. Prerequisite: course 101; and Chemistry 1A. Focus on energy metabolic pathways 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.

8. **Environmental Effects on Physical Performance** (3) I. Bernauer, Adams

   - Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 101 and 102, or consent of instructor. The effects of thermal, barometric and environmental conditions on physical performance and physical performance of humans. Acute and chronic effects, emphasizing physiological adaptations and limitations will be studied.

9. **Clinical Exercise Physiology** (4) I. Holly

   - Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 101 and 102, or consent of instructor. Physical activity as a therapeutic modality is examined in normal and diseased populations (cardiovascular, pulmonary, diabetic). Assessment (graded exercise testing), exercise prescription and effects of exercise conditioning are examined in detail.

10. **Growth and Development in Human Performance** (3) I. Meli

    - Lecture—3 hours. Prerequisite: Biological Sciences 1, Human Anatomy 101, and Physiology 110. Development of human performance potential from conception to old age, including influence of exercise, athletic participation and preventive medicine. Alterations in motor skill patterns, morphology and composition, and physiological capacities with aging.

11. **Biomechanical Bases of Movement** (3) I. K. Williams

    - Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing and appropriate course 1 or 7; consent of instructor. Biomechanical bases of human movement investigated; topics include mechanics, kinematics, electromyography, and measurement and analysis techniques. Application made to sport, clinical, and work environments, including extensive analysis of foot motion.
Physical Medicine and Rehabilitation

See Medicine, School of

Physics

(College of Letters and Science)

Robert N. Shelton, Ph.D., Chairperson of the Department

Wendell H. Potter, Ph.D., Vice Chairperson of the Department

Department Office, 225 Physics-Geology Building (752-1200)

Faculty

Wendell H. Potter, Ph.D., Associate Professor
Roderick V. Ricketts, Ph.D., Associate Professor
Richard T. Scofield, Ph.D., Assistant Professor
Robert N. Shelton, Ph.D., Professor
Raj P. Singh, Ph.D., Assistant Professor
William T. Wang, Ph.D., Professor
David J. Webb, Ph.D., Assistant Professor
Philipp M. Yager, Ph.D., Professor
Georgelye Zimny, Ph.D., Assistant Professor

The Program of Study

While many people think of Physics as levers and pulleys or space ships 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, and 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 what holds the nucleus 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 become more difficult to understand. Yet appearances can be deceiving, and many of the most complex phenomena and devices are easily understood and used by those with a good understanding 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 technical 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 production and sales in industry.

A major in either Physics or Applied Physics provides an excellent foundation for graduate work in physics. UCD physcics graduates are regularly admitted to the best physics graduate departments in the country. These majors also provide a strong base for graduate-level work in such interdisciplinary areas as chemical physics, biophysics and medical physics, geophysics and environmental physics, astrophysics and astronomy, computer science, materials science and energy.

The Major Programs

The Department of Physics offers three degree programs: The Bachelor of Arts in Physics, and the Bachelor of Science in Physics and in Applied 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.S. degree in either Physics or Applied Physics should be followed by the student who plans to enter physics as a profession. 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.

All three are developed in a highly sequential manner, i.e., Physics 8A-8B-8C-8D and Mathematics 21A-21B-21C and 22A-22B-22C are required for most upper division courses and must be taken in the

physicist and upper division years. Some Applied Physics students have additional recommended lower division courses.

In the freshman year, Astronomy 2 and Physics 7 are recommended for the student who wishes to take a class in this department prior to enrolling in Physics 5 in the Spring Quarter. These courses are introductory to the department and are not prepa-

ratory to Physics 8. Honors mathematics is highly recommended for the both the freshman and sophomore years.

Students who have completed a high school course in differential and integral calculus can finish the Physics 8 sequence during the freshman year and begin upper division physics courses in the sopho-

more year by taking Physics 5BA in the first summer session prior to entering the University in the fall. This gives these students extra time in the junior and senior years to be used, for example, to complete a double major, to undertake interdisciplinary studies, to participate in research, or to take graduate courses in physics.

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 modern fields of physics are selected. Laboratory courses may be taken both years. All specifically listed physics courses required for a bachelor's degree in physics should be taken for a letter grade.

Applied Physics

B.S. Major Requirements:

Preparatory Subject Matter

Physics 8A, 8B, 8C, 8D

Mathematics 21A, 21B, 21C, 22A, 22B, 22C

Engineering 5 (or equivalent programming course)

Chemistry 1A-1B-1C or 4A-4B-4C

Any recommended courses for a particular concentration

Depth Subject Matter (Common Core)


At least 19 units from approved courses within one of the following concentrations, chosen in consultation with a major advisor:

Materials science, physical electronics, quantum optics, energy, applied nuclear physics, chemical physics, astrophysical physics, geophysics, physical oceanography. (One concentration course must be elected in each concentration with representative programs are available from the Physics Department.)

Total Units for the Major

109

Physics

A.B. Major Requirements:

Preparatory Subject Matter

Physics 8A, 8B, 8C, 8D

Mathematics 21A, 21B, 21C

Engineering 5 (or equivalent programming course)

Depth Subject Matter


At least 7 units from Physics 105C, 110C, 112B, 112C, 129A, 129B, 140A, 140B...

Total Units for the Major

79

Recommended Courses:

Chemistry 1A-1B-1C or 4A-4B-4C. See also recommended elective courses following the B.S. program below.

NOTE: For key to footnote symbols, see page 131.
Physics

B.S. Major Requirements:

- **Preparatory Subject Matter**: 55
  - Engineering 5 (or equivalent programming course): 3
  - Chemistry 1A-1B or 4A-4B-4C: 15

- **Depth Subject Matter**: 54
  - At least 11 additional upper division units from physics. (No more than 6 units in courses numbered 194H, 195, 196B, and 199 may be applied in satisfaction of this requirement.) 11

- **Units for the Major**: 109

- **Recommended Electives**: 233
  - Computer and numerical analysis: Mathematics 128A or Applied Science Engineering 115.
  - Statistics: Statistics 131A.

- **Physics**: 18-24

- **Classical Physics emphasized**: 22
  - Physics 10A, 10B, 106, 108L, 110A-110B. 22

- **Quantum Physics emphasized**: 24

- **Teaching Credential Subject Representative**: 24
  - R. Reid. See also the section on the Teaching Education Program.

- **Graduate Study**: The Department of Physics offers programs of study and research leading to the M.S. and Ph.D. degrees. The M.S. and Ph.D. degree with an Applied Physics Research Specialty. Further information regarding the requirements for these three degrees, graduate research, teaching assistantships, and research assistantships may be obtained by writing to the Chairperson, Department of Physics, University of California, Davis 95616.

Astronomy. There is no major program leading to a degree in Astronomy. Introductory courses are offered in general and astrophysics. Students who wish to use the observatory or the portable telescopes may do so through the Astronomy Club. The graduate program in physics provides research opportunities in radio-astronomy or microwave astrophysics.

Courses in Astronomy

**Lower Division Courses**

1. **Introduction to Modern Astronomy and Astrophysics (4)**
   - Lecture—3 hours; laboratory-discussion—2 hours. Prerequisite: good facility in high school physics and mathematics (algebra and arithmetic). An introduction to the study of astronomical phenomena using the laws of modern physics. Modern astronomical instrumentation. Gravitational, relativistic, electromagnetic radiation, atomic and nuclear processes in relation to the structure and evolution of stars, the solar system, galaxies, and the Universe. Not open to students who have received credit for course 10.
   - 10

2. **Introduction to General Astronomy (4)**
   - The Staff Lecture—3 hours; laboratory-discussion—2 hours. A non-mathematical description of modern astronomy with emphasis on the structure and evolution of stars, galaxies, and the Universe. The Sun and the solar system. Optional topics include pulsars, black holes, quasars, and extra-terrestrial communication. Freshmen may not receive credit for course 20 or any other physics course (except 7, 37, 137). General Education credit: Nature and Environment/Introducory.

3. **Principles of Physics (4)**
   - Lecture—3 hours. Prerequisite: trigonometry, or consent of instructor. Mechanics. Introduction to general principles and analytical methods used in physics with emphasis on applications in aeronautical and space sciences and in physics education. Not open for credit to students who have completed course 6A or 8A (or former 2A). 18

4. **Analytical Methods (4)**
   - Lecture—3 hours. Prerequisite: course 1A or 6A (or former 2A); and consent of instructor. Continuation of course 1A. Not open for credit to students who have completed course 6B, 8C, 8D, or 8D (or former 2B or 2C). 18

5. **Electricity and Magnetism (4)**
   - Lecture—3 hours; laboratory—2.5 hours. Prerequisite: course 6A, or 1A with consent of instructor; Mathematics 16B or Physics 8A. Continuation of course 6A. Electricity and magnetism, kinetic theory and thermodynamics. Students who have had course 2B or 8B may not receive credit for course 6B; those who have had course 1B may receive only three units of credit. (CAN Phys Seq A)

6. **General Physics (4)**
   - Lecture—3 hours; laboratory—2.5 hours. Prerequisite: course 6A, or 1A with consent of instructor; Mathematics 16B or Physics 8A. Continuation of course 6A. Electricity and magnetism, kinetic theory and thermodynamics. Students who have had course 2B or 8B may not receive credit for course 6B; those who have had course 1B may receive only three units of credit. (CAN Phys Seq A)

7. **Contemporary Directions in Physics (1)**
   - Lecture—1 hour; one field trip to campus laboratory. Prerequisite: open to Physics majors only. A series of talks by invited speakers describing the various fields now under intensive study: high energy physics, nuclear, atomic and condense matter physics, interstellar phenomena, such as atmospheric physics, will also be discussed. (PNP grading only.)

8. **Classical Physics (4)**
   - Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 21B. Mechanics. Introduction to general principles and analytical methods used in physics for physical science and engineering majors. Only two units of credit allowed to students who have completed course 1A (or former 2A); only one unit of credit allowed to students who have completed course 6A. (CAN Phys Seq A)

9. **Classical Physics (4)**
   - Lecture—3 hours; laboratory—3 hours. Prerequisite: course 6A or 8A with consent of instructor; Mathematics 21C, and 21D. Continuation of course 6A. Fluid mechanics, electricity and magnetism including circuits and Maxwell’s equations. Only two units of credit allowed to students who have completed course 1B (or former 2B); and only one unit allowed to those who have completed course 6B. (CAN Phys Seq B)

10. **Basic Concepts of Physics (4)**
    - Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Survey of basic concepts of mechanics, motion, electricity and magnetism, light, relativity, atoms, quanta, nuclei, elementary particles. Includes lecture demonstrations and elementary problem solving. Recommended for the freshmen office for the emphasis (history/philosophy, energy/environment, natural phenomena, etc.) Each quarter. Students who have had any other physics courses (except 37, 137) will not receive credit for course 10. General Education credit: Nature and Environment/Introducory.

11. **Physics of Nuclear Arms Effects and Control (1)**
    - Lecture-discussion—1 hour. Prerequisite: high school algebra. Survey of basic concepts of mechanics, motion, electricity and magnetism, light, relativity, atoms, quanta, nuclei, elementary particles. Includes lecture demonstrations and elementary problem solving. Recommended for the freshmen office for the emphasis (history/philosophy, energy/environment, natural phenomena, etc.) Each quarter. Students who have had any other physics courses (except 37, 137) will not receive credit for course 10. General Education credit: Nature and Environment/Introducory.

12. **Directed Group Study (1-5)**
    - Lecture-discussion—1 hour. Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

13. **Special Study for Undergraduates (1-5)**
    - Lecture-discussion—1 hour. Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses**

14. **Introduction to Methods of Mathematical Physics (3)**

15. **The Staff Lecture—3 hours; laboratory—2.5 hours. Prerequisite: course 6A, or 1A with consent of instructor; Mathematics 16B or Physics 8A. Continuation of course 6A. Continuation of course 6A. Electricity and magnetism, kinetic theory and thermodynamics. Students who have had course 2B or 8B may not receive credit for course 6B; those who have had course 1B may receive only three units of credit. (CAN Phys Seq A)
Victor W. Burns, Ph.D., Professor Emeritus
Charles E. Cornelius, D.V.M., Ph.D., Professor
Donald L. Curry, Ph.D., Professor
Richard A. Freedland, Ph.D., Professor
Robert J. Hansen, Ph.D., Professor
Benjamin L. Hart, D.V.M., Ph.D., Professor
Alfred A. Heusner, Doctor-at-Sciences, Professor
James H. Jones, Ph.D., D.V.M., Assistant Professor
James G. Morris, Ph.D., Professor
Stuart A. Peoples, M.D., Professor Emeritus
Quinton R. Rogers, Ph.D., Professor

Courses in Physiological Sciences

Upper Division Courses

101A-101B. Physiological Chemistry (4-3) I, II. Freedland Lecture—4-3 hours. Prerequisites: organic chemistry. Recommended: a course in chemistry (may be taken concurrently) and quantitative analysis. Chemical and physical properties of substances comprising the animal body, with major emphasis on the changes during metabolism and factors influencing these reactions. Biochemistry of the endocrine glands and other specialized tissues and body fluid chemistry; respiration, energy metabolism and nutrition.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

Graduate Courses

205A. Intermediary Metabolism of Animals (4) I. Freedland Lecture—4 hours. Prerequisite: a course in biochemistry or physiological chemistry or consent of instructor; a course in physiology recommended. Biochemical data related to metabolism of intact animals. Pathways and control in biosynthesis and degradation of carbohydrates and lipids; including hormonal, nutritional, and genetic effects. Dynamics of animal metabolism, including poisons and turnover rates. Offered in even-numbered years.

205B. Intermediary Metabolism of Animals (3) II. V. Rogers, Hanson, Hersey (Biological Chemistry), Ruoker (Nutrition) Lecture—3 hours. Prerequisite: course 205A or consent of Instructor. Pathways and control in animals of the biosynthesis and degradation of amino acids, proteins, nucleotides and porphyrins; includes hormonal, nutritional, and genetic effects. Offered in odd-numbered years.

220. Physiology of the Liver (3) I. Burns, Cornelius Lecture—27 hours total; laboratory—12 hours total. Prerequisite: systems physiology; biochemistry or physiological chemistry. Topics in functional morphology, physiology, intermediary metabolism, and disorders of the liver. Emphasis on bile formation; bile pigments; bile acids; drug and toxic metabolism; circulation; carbohydrate, lipid, and protein metabolism; ion transport; and function tests. Offered in odd-numbered years.

230. The Secretory Process (2) I. Curry Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Structural and functional events involved in secretion with emphasis on physiological initiators and modifiers. All secretory systems, but emphasis on the beta cell of the adrenal gland as case model. Offered in odd-numbered years.

233. Animal Behavior and Disease Management (2) I. Hart Lecture—2 hours. Prerequisite: graduate standing and upper division course in animal behavior or consent of instructor. Examination of the ways in which animals use behavioral strategies to avoid debilitating viral, bacterial and parasitic diseases, or to overcome such diseases once they occur. Main emphasis is on vertebrates, especially wild and domestic mammals. Offered in even-numbered years.

243A-243B. Use of Isotopes as Tracers in Biological Research (2-2) III. Burns Lecture—2 hours. Prerequisite: biochemistry or physiological chemistry. Elements or their atoms, with emphasis on physiological and cultural or consent of instructor. Discussion of the properties of isotopes and their use as tracers in biological systems.

244L. Laboratory in Use of Isotopes as Tracers in Biological Research (2) I. Burns Laboratory—8 hours. Prerequisite: course 243A-243B (concurrent). Study of radioisotope properties, uses and measurement methods relevant to the biological sciences.

260. Comparative Bioenergetics (4) I. Heusner Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 107A. Fundamentals of thermodynamics and their application in physiology; entropy, probability, information, and thermodynamic potentials. Theory of biological similarity.

NOTE: Key to footnote symbols, see page 131.

Physiology

See Animal Physiology; Human Physiology (School of Medicine); Physiology (below); and Plant Physiology

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 foundation 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 and 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)
Physiology

Preparatory Subject Matter

- General Physiology
- Anatomy
- Pathology
- Biochemistry
- Physiology

Mathematics

- Calculus
- Linear Algebra
- Differential Equations

Physics

- Mechanics
- Electricity
- Waves

Chemistry

- Organic Chemistry
- Inorganic Chemistry
- Physical Chemistry

Biology

- Zoology
- Botany
- Microbiology

Preparatory Subject Matter

UNITS

46-50

21-25

13

12

27

12

16

7

9

160

54-58

180

2. Introductory Physiology (4) I. The Staff

Lecture—9 hours. Prerequisite: Biological Sciences 1. Physiology of muscular contraction, neural transmission, sensation, circulation, respiration, excretion, and digestion.

2L Introductory Physiology Laboratory (2) I. The Staff

Lecture—6 hours. Prerequisite: course 2 completed or in progress.

10. Elementary Physiology (4) II. The Staff

Lecture—3 hours, discussion—1 hour. Prerequisite: not open for credit to students who have had Biological Sciences 1. Introduction to the course in physiology for non-science majors.

Upper Division Courses

100A. General Physiology (3) I. Horvitz

Lecture—4 hours. Prerequisite: 100 and 100B or Chemistry 1 and 101B or Chemistry 1 and 101C. Physiology of mammalian function and general principles of mammalian physiology.

100B. General Physiology (3) II. Pappone

Lecture—3 hours. Prerequisite: course 100A. Continuation of course 100A, with emphasis on physiology of the nervous system, cell recognition and communication, and properties of excitable cells.

100L. General Physiology Laboratory (2) I. Horvitz, Horowitz Discussion—5 hours. Laboratory—5 hours. Prerequisite: courses 100A, 100B, concurrently, Biological Sciences 1 or permission. Study of physiological processes, mechanisms, and techniques used in experimentation.

106A. Experiments in Physiology: Design and Execution (3) I. The Staff (Barney in charge)

Laboratory—5 hours. Prerequisite: course 106 and consent of instructor. Consent of instructor. Consent of instructor.

110. Systemic Physiology (5) I, II, III. Barney, Colvin, Goldberg, Fuller, Isidore, Biihman, Iskiw

Lecture—5 hours. Prerequisite: Biological Sciences 1, Physiology of organ systems; including concepts of integrative and homeostatic mechanisms.

110L. Systemic Physiology Laboratory (2) I, III. Isidore, Ad- amson Discussion—1 hour, laboratory—2 hours. Prerequisites: courses 110 and 110L. Consent of instructor. Consent of instructor.

111A. Advanced Systemic Physiology Laboratory (3) II. Burger, Adamson Lecture—1 hour, discussion—5 hours. Prerequisites: courses 110L, 110, and consent of instructor. Consent of instructor.

111B. Advanced Systemic Physiology Laboratory (3) III. Burger, Adamson Lecture—1 hour, discussion—5 hours. Prerequisites: courses 110L, 110, and consent of instructor. Consent of instructor.

112. Neurosciences (3) I. Horvitz, Carstens Laboratory—6 hours. Prerequisites: course 110. Advanced presentation of concepts of neurophysiology, including neural systems, motor systems, and higher neural integration.

113. Cardiovascular, Respiratory, and Renal Physiology (4) II. Goldberg, Weidner Lecture—4 hours. Prerequisites: 110L and 110B. Physiology of the cardiovascular, respiratory, and renal systems, including function and control of these systems.

114. Gastrointestinal Physiology (3) III. Merckel Lecture—3 hours. Prerequisites: courses 110 and 110L. Physiological Sciences 110B recommended. Advanced gastrointestinal physiology covering development, structure, function, and special topics of gastrointestinal physiology. 

117. Avian Physiology (3) III. Burger Lecture—3 hours. Prerequisites: courses 110 and 120. Physiology of various systems of birds with emphasis on digestion, respiration, excretion, and endocrine system.

This course is in a group from which one or more may be chosen; however, to be considered having full exposure to advanced systemic physiology, a student must complete courses 112, 113, 114, 120A, 121, 121L, and 130. A student with some background in physiology may wish to select courses from the 120 series.

NOTE: For key to footnote symbols, see page 131.

120A. Comparative Physiology: Neuroregulatory Mechanisms (3) Ill. Wochley

Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in different species, with emphasis on the mechanisms of regulatory mechanisms in relation to aspects of phylogenetic development at both neuronal and systemic levels.

120B. Comparative Physiology: Circulation (3) Ill. Goldberg

Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: circulation. Comparative approach to cardiovascular function in vertebrates and invertebrates.

120C. Comparative Physiology: Digestion (3) III. Colvin

Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: digestion. Offered in even-numbered years.

120D. Comparative Physiology: Endocrinology (3) III. Mendel

Lecture—3 hours. Prerequisite: course 110. Comparison of physiological functions in the animal kingdom: animal hormones and their functions.

120E. Comparative Physiology: Respiration (3) III. Burger, Cach

Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: respiration. Offered in even-numbered years.

120F. Comparative Physiology of Sensory Systems (3) III. Sacks

Lecture—3 hours. Prerequisite: course 110. Basic physiological mechanisms involved in sensory systems. Comparative analysis of mechanisms of information processing in various sensory systems (auditory, visual, taste, olfactory, chemosensory systems).

121. Physiology of Reproduction (3) II. Anderson

Lecture—3 hours. Prerequisite: course 110. Comparative analysis of endocrinological mechanisms related to reproduction, breeding, and fertility, with special reference to domestic animals.

121L. Physiology of Reproduction Laboratory (1) II. Anderson Lecture—3 hours. Prerequisite: course 121 (may be taken concurrently) recommended. Experiments on the reproductive systems of domestic animals, including male and female gametes.

136. Physiology of the Endocrine Glands (4) I. Moxon

Lecture—4 hours. Prerequisite: course 110. Advanced presentation of concepts in endocrinology with emphasis on the role of hormones in reproduction, metabolism, and disease.

147. Aviary Physiology (3) III. Smith

Lecture—3 hours. Prerequisite: course 110. The nature and physiological consequences of the avian environment (altitude, temperature, disease, and other factors) affecting avian physiology. Field trips will be available (as course 198) to visit conventional avian physiology facilities. Offered in odd-numbered years.

148. Principles of Environmental Physiology (3) III. Fuller

Lecture—3 hours. Prerequisite: courses 110 and 100A or Biology 100B. Physiological adaptation of interactions of organisms and environment at cellular, tissue, and organismal levels. Emphasis on regulatory responses to thermal, pressure, and osmotic environmental variables.

149. Environmental Physiology of Domestic Animals (3) III. Millam

Lecture—3 hours. Prerequisite: courses 110L-110L, or Zoology 2. Influences of environmental factors on physiological processes related to animals. The nature of environmental variations which influence physiological responses are given emphasis.

190. Seminar in Physiology (3) I, II, III. The Staff (Chair- person in charge)

Seminar—3 hours. Prerequisite: courses 110 and 100A, one additional upper division course in any science or related course in science, and consent of instructor. Student presentations, discussion, and critical evaluation of material in important areas of physiology. Topics may vary from year to year. Limited enrollment.

190C. Introduction to Physiological Research (1) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: upper division standing in physiology or related biological science; consent of instructor. Introduction to research findings and methods in physiology. Presentation and discussion of research problems in physiology and students. May be repeated for credit. (P/N grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: completion of 84 units and consent of instructor. Work-experience learning on and off campus, in all subject areas offered in physiology. (P/N grading only.)
Plant Physiology

See Botany for undergraduate majors, and below for graduate study.

NOTE: For key to footnote symbols, see page 131.
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; Land, Air and Water Resources; 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 applicable to the technology required for the production, protection, and maintenance of crop plants, and their quality following harvest.

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 option selected will be identified immediately following the name of the major, Plant Science, on the transcript.

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.

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 greenhouse management, farming, technical and sales positions in agricultural businesses and associated enterprises, such as banking and equipment and supply companies, as well as in private, state and federal service in consulting and research.

Plant 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 parentheticals are required.)

UNITS

Preparatory Subject Matter

59-81

Computer science (Agricultural Science and Management 21).

3

English and/or Rhetoric and Communication (see College requirement).

7

English (English 102 in plant science or related area, or English 104).

1-3

Economics (Economics 1A or 1B).

5

Physics (Physics 1A-1B).

6

General chemistry (Chemistry 1A-1B).

10

Organic chemistry (Chemistry 8A-8B).

6

Biology (Biology Sciences 1).

5

Botany (Botany 2).

5

Plant science (Plant Science 2).

5

Mathematics (Mathematics 16A-16B).

6

Upper-Division Subject Matter

37

Statistics (Agricultural Science and Management 150).

4

Soil science (Botany 120).

3

Entomology (Entomology 111, 112, 113).

4

Plant pathology (Botany 130, 140, 150).

4

Genetics (Genetics 100).

4

Water science (Water Science 104 or 110).

3-4

NOTE: For key to footnote symbols, see page 131.

Plant nutrition (Botany/Plant Science 135 or Soil Science 109).

4

Depth Subject Matter

45-55

(Select one of the following eight options)

Agronomy Option

Specific course requirements.

20-21

Agronomy 100, 100L.

5

Botany 111, 112, 113.

7-8

Plant Science 101.

4

Soil Science 109.

4

Additional courses to be selected with consent of the adviser from the following.

24-25

Agricultural Economics 130, 140, 150.

Agricultural Engineering Technology 103, 104AT, 105.

Agricultural Practices 49, 149.

Animal Science 2, 114, 116.

Atmospheric Science 103.

Botany 110, 110.

Plant Pathology 125.

Plant Science 102, 103, 113.

Soil Science 102, 120, 150.

Water Science 105, 111, 172.

Courses offered in other production departments (e.g., Vegetable Crops, Pomology, Viticulture and Enology, etc.) or in Range Science may be selected in consultation with adviser to satisfy specific individual goals.

Natural sciences electives, not to exceed 6 units, may also be included.

Floriculture/Nursery Management Option

Specific course requirements.

28

Environmental Horticulture 6, 105, 120, 125, 133.

20

Plant Science 102, 109.

8

Additional courses to be selected with consent of the adviser from the following.

17

Agricultural Economics 18, 113, 119.

Agricultural Engineering Technology 114; Agronomy 100; Botany 105, 111L; Economics 11A, 11B; Environmental Horticulture 107, 115, 125; Geography 3; Landscape Architecture 40, 131, 155; Microbiology 3; Plant Pathology 125.

Plant Science 101, 112, 121L, 133; Pomology 102; Psychology 144; Soil Science 109, 125, Crops 101; Viticulture and Enology 110, 116, 101B.

Courses offered in the natural sciences may be selected in consultation with adviser.

Landscape Horticulture Option

Specific course requirements.

30

Environmental Horticulture 6, 105, 120, 130, 131.

17

Landscape Architecture 40, 131, 155.

9

Plant Science 102.

4

Additional courses to be selected with consent of the adviser from the following.

15

Agricultural Economics 18, 112.

Agronomy 100; Botany 105; Economics 11A, 11B; Environmental Horticulture 107, 115, 125; Geography 3; Landscape Architecture 111, Plant Science 125; Plant Science 101, 109, 113; Pomology 101; Plant Pathology 112, 119; Vegetable Crops 101; Wildlife and Fisheries Biology 10.

Courses offered in the natural sciences may be selected in consultation with adviser.

Plant Pathology Option

Specific course requirements.

40

Biochemistry 101A, 101B.

8

Botany 105, 119.

19

Chemistry 1C, 5.

9

Microbiology 3, 111L (plant pathology).

4

Nematology 100.

4

Plant Pathology 125, 130.

7

Plant Science Option

Specific course requirements.

46-49

Plant science (Plant Science 181, 199, 122).

11

Agricultural economics (Agricultural Economics 18, 113, Plant Pathology 120).

3-5

Agronomy (Agronomy 100, 100L).

5

Environmental Horticulture (Environmental Horticulture 6, 105, 125, 130).

3-4

The Plant Protection and Pest Management (A Graduate Group)

James J. Marois, Ph.D., Chairperson of the Group

Group Office, 367 Briggs Hall (752-0475)

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 Graduate Announcement.

Graduate Adviser. L.E. Ehler (Entomology).

Courses in Plant Protection and Pest Management

Graduate Courses

201. Concepts and Systems of Plant Protection and Pest Management (4) I. Marois (Plant Pathology)

Lecture—2 hours; discussion—1 hour; laboratory—2 hours; field experiment and data analysis. Prerequisite: Entomology 110, Plant Pathology 120, Botany 120 (may be taken concurrently). Nematology 100; Botany 117 or Zoology 135 recommended. Ecological perspectives of agricultural systems, the role of pests and pest management in these systems, and the monitoring and modeling of the systems.

202A-202B. Diagnosis of Plant Pest Problems and the Control of Causal Agents (4-4) J. Norris (Botany); J. Wilson (Entomology)

Discussion—1 hour; fieldwork—9 hours. Prerequisite: Entomology 110, Plant Pathology 120, Botany 120, Nematology 100 (may be taken concurrently). 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.

256. Seminar (1-2) I, II, III. The Staff (Chairperson in charge)

(SU grading only.)

258. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

(SU grading only.)

259. Research (1-12) I, II, III. The Staff (Chairperson in charge)

(SU grading only.)
Courses in Plant Science

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center (see above).

Lower Division Courses

2. Production of Cultivated Plants (5) I, II, III, IV (Botany 101, 102)

Lecture—3 hours. Prerequisite: Genetics 100; Botany 111A, 111B; or consent of instructor. Topics cover basic genetics and its application in the physiological genetics of plants. Plant developmental processes related to yield will be considered at several levels: genetic control, biochemical interaction and the impact of the environment on development of plants. Offered in odd-numbered years.

125. Physiology of Environmental Stresses in Plants (3) I. Lucchi (Land, Air and Water Resources)

Lecture—2 hours; discussion—1 hour. Prerequisite: Botany 111B (may be taken concurrently) or the equivalent. Principles and selected topics in plant growth and development under stress conditions in plants. Areas emphasized are general stress concepts, physiological responses of plants to selected environmental stresses and integration of the responses.

135. Mineral Nutrition of Plants (4) III. The Staff

Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 111A or the equivalent. Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; petrology and ecological aspects of plant nutrition. (Same course as Botany 135.)

140. Principles of Plant Biotechnology (3) II. Dandekar (Pomology)

Lecture—3 hours. Prerequisite: Biological Sciences 1 and Genetics 100. Principles and concepts of plant biotechnology including recombinant DNA technology, plant molecular biology, plant cell and tissue culture and crop improvement.

170. Reproductive Biology of Flowering Plants (2) I. Wu (Environmental Horticulture)

Lecture—1 hour; seminar—1 hour. Prerequisite: Botany 111B, Genetics 100, or equivalent. Basic concepts of reproductive biology in plants. Effect of these mechanisms on genetic variation, evolution and agriculture. Offered in even-numbered years.

197. Tifton Aging in Plant Science (4-1-4) I, II, III. The Staff

Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

202. Advanced Physiology of Cultivated Plants (2) I. Sachs, Labovitch

Lecture—1 hour; discussion—1 hour. Prerequisite: courses 101 and 102; Botany 111A-111B. Selected physiological topics generally focusing on source-sink behavior affecting crop production and quality. (P/NP grading only.) Offered in even-numbered years.

216. Advanced Topics in Mineral Nutrition (4) III. Lucchi (Land, Air and Water Resources)

Lecture—2 hours; discussion—1 hour. Prerequisite: course 101 or Botany 111B or consent of instructor. Cellular compartmentation of mineral elements, new metabolic processes and selective topics in absorption, translocation, metabolism and function of mineral elements; nutrition and transport in plants adapted to special nutrient environments. (P/NP grading only.)

221A-221B. Applied Crop Physiology (4-4) III. Sherman (Vegetable Crops)

Lecture—1 hour; seminar—1 hour; laboratory—4 hours. Prerequisite: courses 101 and 102 or Botany 111B or consent of instructor. Research methods in applied plant physiology with examples drawn primarily from agronomic and vegetable crops. Fundamental concepts and projects, data reduction, and preparation of suitable reports.

291. Seminar in Postharvest Biology (1) I, II, III. (Faculty of the Interdepartmental Postharvest Biology Group)

Discussion—1 hour. Prerequisite: consent of the instructor: open to advanced undergraduates. Intensive study of selected topics in the Postharvest Biology of fruits, vegetables and ornamentals. (S/U grading only.)
Plastic Surgery
See Medicine, School of

Political Science
(College of Letters and Science)
Larry Berman, Ph.D., Chairperson of the Department
Department Office, 227 Voorhis Hall (752-0966)

Faculty
Donna L. Bahry, Ph.D., Professor
Larry Berman, Ph.D., Professor
Edmond Costantini, Ph.D., Professor
Philip L. Dubois, Ph.D., Professor
John Freeman, M.A., Visiting Professor
Richard W. Gabie, Ph.D., Professor
John B. Gates, Ph.D., Assistant Professor
Emily G. Goldman, Ph.D., Assistant Professor
Alexander J. Groth, Ph.D., Professor
Charles M. Hardin, Ph.D., Professor Emeritus
Stuart L. Hill, Ph.D., Associate Professor
Mary Jackman, Ph.D., Professor
Robert Jackman, Ph.D., Professor
Clyde E. Jacobs, Ph.D., Professor Emeritus
Joyce K. Kallgren, Ph.D., Professor
Lloyd D. Musolf, Ph.D., Professor Emeritus
Miroslav Nincic, Ph.D. Professor
John R. Owens, Ph.D., Professor
Larry J. Petersman, Ph.D., Professor
Donald S. Rothchild, Ph.D., Professor
Richard Sinopoli, Ph.D., Assistant Professor
Randolph M. Siverson, Ph.D., Professor
Andrew Skalaban, Acting Assistant Professor
Alvin D. Sokolow, Ph.D., Professor
Larry J. Wade, Ph.D., Professor
Geoffrey A. Wandesforde-Smith, Ph.D., Associate Professor
(Political Science, Environmental Studies)
Young-Kwan Yoon, Ph.D., Visiting Assistant Professor
Martin Zeiterbaum, Ph.D., Professor
Paul E. Zimmer, Ph.D., Professor

A.B. Major Requirements:

Preparatory Subject Matter

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Three courses from Political Science 1, 2, 3, 4, and either 5 or 7: 11-12

(Course 7 may not be taken if course 5 is taken.)


Depth Subject Matter

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Select two courses in each of three fields, listed below. The fields must be chosen from at least two Groups, A, B, or C: 24

Group A
(1) Political theory: Political Science 111-119
Group B
(2) American government: Political Science 100-109, 171-175, 191-199
Group C
(3) Parties and political behavior: Political Science 160-170
(4) Public law: Political Science 150-159
(5) Public administration: Political Science 160-189

Group C
(6) Comparative government: Political Science 140-149, 177-179
(7) International relations: Political Science 120-139

Additional upper division units in political science to achieve a total of 36: 12

Only 5 units of Political Science 192 (internship) may be counted toward the 36-unit requirement; and Political Science 192 or 192B may not be counted toward a field requirement.

Total Units for the Major: 55-56

A.B. Major Requirements—Public Service:

Preparatory Subject Matter

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One course from Political Science 1, 5, or 7: 3-4

Two courses from Political Science 2, 3, or 4: 8

Recommended: Economics 1A-1B

Depth Subject Matter

<table>
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<th>Units</th>
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Core program: 12

Two courses chosen from Political Science 100, 104, 105, 106, 113, 180, 181; and one course from Political Science 114

Internship, Political Science 192A, 192B: 10

Research paper, Political Science 193: 2

Fields of concentration: 24

Select six upper division courses from two or three fields of concentration listed below with at least two courses in each field selected; at least 16 of the units must be in political science. (Core Program courses may not be counted toward this requirement.)

NOTE: For key to footnote symbols, see page 131.

Fields of Concentration

(1) Policy formulation:
(2) Policy implementation and evaluation:
Political Science 156, 180, 181, 182, 183, 187, 188, 189; Economics 131.
(3) Policy interpretation—Substance and procedures (public/pre-law):
Political Science 151, 152, 153, 156, 157A-157B; 159.
(4) Policy areas:
(a) Urban policy and implementation:
(b) Environmental policy and implementation:
Political Science 107, Economics 123, Environmental Studies 160, 161, 166, 188A-188B, 179.
(c) — policy and implementation:
open field that might include courses relevant to health care, welfare, education, community development, transportation, science and technology, etc. (with the approval of the Public Service adviser).

Major Advisers. Consult Department Office.

Minor Program Requirements:

Students electing a minor in Political Science may choose one of two plans:

Plan I: 24

Political Science:

Plan II: Upper division units in political science, with the approval of the minor adviser:

This plan does not require a distribution of courses in any particular group, inasmuch as the courses chosen will be those most appropriate to the student's academic major.

Teacher Credential Subject Representative. Consult Department Office. See also the section on the Teacher Education Program.

Graduate Study. The Department offers programs of graduate study and research leading to the M.A. and Ph.D. degrees. Information concerning admission to these programs and requirements for completion are available in the department office.

Graduate Advisers. Consult Department Office.

Public Affairs Internship Program. This program is open to upper division students in any major who want to obtain an internship in the area of government and public service. Information and applications are available from the Intern Coordinator, Political Science Department, 226 Voorhis Hall, 752-1989.

American History and Institutions. This University requirement may be satisfied by passing any one of the following Political Science courses: 1, 5, 100, 101, 102, 103, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163. (See also under University requirements.)

Courses in Political Science

Lower Division Courses

1. American National Government (4) I, II, Hill, Costantini; III, Hill, Costantini, and staff

Lecture—3 hours; discussion—1 hour. Survey of American National Government, including the constitutional system, political culture, parties, elections, the Presidency, Congress, and the courts. General credit. Contemporary Societies/Introduction. (CAN Govt 2)

2. Introduction to Comparative Politics (4) I, III, Groth and staff

Lecture—3 hours; discussion—1 hour. Introduction to basic concepts in political analysis and application of them in comparative studies of selected countries. Coverage is given to cultural and other informal dimensions of politics as well.
as to more formal political and governmental structures. Graduate Education credit: Contemporary Societies/Introductory.

3. International Relations (4) I, II, Ill. Siverson, Goldman, and staff. Lecture—3 hours; discussion—1 hour. International conflict and cooperation, including the Cold War, nuclear weapons, and new techniques for understanding international politics.

4. Basic Concepts in Political Theory (4) I. Zetterbaum. Lecture—3 hours; discussion—1 hour. Analysis of such concepts as the individual, community, liberty, equality, justice, and natural law as developed in the works of the major political philosophers. Graduate Education credit: Civilization and Culture/Introductory.

5. Contemporary Problems of the American Political System (4) II. Berman. Lecture—3 hours; discussion—1 hour. In-depth treatment of selected problems and issues of American politics, governmental institutions, and policies.

6. The American Legal System (3) II. Felster (Law). Lecture-discussion—3 hours. Prerequisite: sophomore standing recommended. The law, the courts, and the lawyers. The organization and power of American courts. Public and private law as instruments of politics. The role of lawyers in the American legal system. Offered in even-numbered years.

7. Special Study for Undergraduates (1-5) I, II, Ill. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Local Government and Politics (4) I. Sokolow. Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Politics and government of the United States, including cities, counties, and special districts. Emphasizes sources and varieties of community conflict, legislative and executive-political processes, and the politics of structure. Observation of local governing boards.

101. Urban Political Economy (4) I. Thompson (Afro-American Studies) Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or consent of instructor. Historical development of urban political economies. Focuses on ways in which different groups have struggled for authority to achieve their objectives and why they succeeded or failed.

102. Urban Public Policy (4) II. Thompson (Afro-American Studies) Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Political and economic relationships among central cities, suburbia, and regional, state, and federal governments. Focuses upon policy areas such as poverty, transportation, welfare, and housing, and upon who governs and who benefits from the policies they make.

103. American Federalism (4) III. Sokolow. Lecture—3 hours; research paper. Prerequisite: course 1 or 2 recommended. American politics and policy in the context of national-local relations. Constitutional roots of Federalism, centralizing and decentralizing tendencies, fiscal relations, current policy issues, and management of intergovernmental relationships.

104. California State Government and Politics (4) II. Sokolow. Lecture—3 hours; research paper. The California political system. Political culture, constitution, elections and parties, direct democracy, legislature, governor, executive branch, courts, finances, state-local relations, and policy issues.

105. The Legislative Process (4) II. Owens. Lecture—3 hours; discussion—1 hour. Analysis of the legislative process with emphasis on the United States Congress: legislative organization and procedure, legislative leadership andWhip system, party and independent constituents, relations between Congress and other agencies.

106. The Presidency (4) I. Berman. Lecture—3 hours; discussion—1 hour; optional term paper. The American presidency's origins and development, presidential power and influence as manifested in relationships with Congress, courts, parties, and the public in the formulation of national and domestic policy; nominations, campaigns, and elections.

107. Environmental Politics and Administration (4) III. Wendorf-Smith. Lecture-discussion—1 hour. Introduction to the environment as a political issue in the United States and to the development of administrative mechanisms for handling environmental problems. Role of Congress, the presidency, the bureaucracy, and the courts in environmental policy formulation and implementation.

108. Policy Making in the Public Sector (4) I. The Staff. Lecture—3 hours; research paper. The theoretical rationale for governmental activity, program evaluation, PPBS, positive theoretics of public management, major contemporary studies of policy making, implementation, and proposals for improved decision making.

109. Public Policy and the Governmental Process (4) II. Wade Lecture—4 hours; research paper. The processes of formulating public policy, including individual and collective decision making, political exchange, competition, bargaining, coalition formation, and allocation of public goods, resources and opportunities.

110. Systematic Political Science (4) II. The Staff. Lecture-discussion—4 hours. Philosophical basis of modern political science; major approaches; concepts relevant to modern political concerns; and research design and execution.

112. Contemporary Democratic Theory (4) I. Wade Lecture—5 hours; term paper. Major contemporary attempts to reformulate 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) I. Sinozich. Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Origins and nature of American political thought. Principles of American thought as they emerge from the founding period to the present.

114. Quantitative Analysis of Political Data (4) III. The Staff Lecture—3 hours; term paper. Logic and methods of analyzing quantitative policy data. Topics covered: central tendency, probability, correlation, and non-parametric statistics. Particular emphasis will be placed on understanding the use of statistics in public policy research. Offered in odd-numbered years.

115. Medieval Political Thought (4) I. Petersen. Lecture—3 hours; term paper. Prerequisite: course 118A. Examination of the ideas central to medieval political thought will be upon the thoughts of the major political thinkers of the period, rather than upon political history.


117. Marxism (4) I. Zetterbaum. 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.


120. History of Political Theory (4) III. Sinozich. Lecture—3 hours; term paper. Critical analyses of the works of major political philosophers. Contemporary political thought—Hegel, Tocqueville, Mill, Marx, Nietzsche, Santayana.

119. Modern Political Thought (4) III. The Staff. Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Study in depth of philosophers considered central to modern political thought, especially nineteenth and twentieth century political thought. Emphasis will be upon an individual philosopher or concept rather than upon a survey of modern political thought.

120. Theories of International Politics (4) I. Siverson Lecture—4 hours; research paper. Prerequisite: upper division standing or consent of instructor. Major contemporary approaches to the study of international politics, including balance of power, realism, liberalism, constructivism, functionalism, holism, Marxism, and idealism.

121. War (4) I. Siverson Lecture—3 hours; discussion—1 hour. Prerequisite: course 120 recommended. The political, social, and economic influences involved in the initiation, conduct, and termination of modern international warfare.

122. International Law (4) II. The Staff Lecture—4 hours; term paper. Prerequisite: course 120 recommended. Study of the law of nations, international organizations, and international organizations.

123. The Politics of Interdependence (4) II, III. Yoon Lecture—4 hours; research paper. The politics of interdependence divides standing or consent of instructor. In the past several decades, growing economic interdependence has generated new problems in international relations. Course deals with difficult problems in managing complex interdependence and its implications for national politics.

124. The Politics of Global Inequality (4) III. Yoon Lecture—3 hours; term paper. Prerequisite: upper division standing; course 123 recommended. Long-standing division of the world's political system into rich and poor nations causes many important problems in international political economy. Course presents a theoretical background to North-South debates and analyses of current problems in economic and political relations.

126. Ethnic Self-Determination and International Conflict (4) III. Rothchild Lecture—3 hours; individual meetings with students to discuss term papers. Prerequisite: one international relations course recommended. Compares the claims of the state and ethnic peoples in countries undergoing internal conflicts, e.g., South Africa, Northern Ireland. Analyzes the role of the international community in facilitating the peaceful resolution of conflicts.

127. Nationalism and Imperialism (4) I. Kallgren Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Theory of nation building illustrated by Western and non-Western experiences. Offered in even-numbered years.

128. International Communism (4) III. Zinner Lecture—4 hours. Prerequisite: upper division standing; course 2 or 3, or consent of instructor. International communist movement: ideology, organization, strategy. Relations among communist parties; problems of leadership and social composition; the Sino-Soviet conflict; apes of revolution or revolutionary struggle. Offered in even-numbered years.

129. Special Studies in International Politics (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: upper division standing; intensive examination of special topics in international politics. May be repeated once for credit when different topic is studied.

130. Recent U.S. Foreign Policy (4) I, II, III. Goldman and staff. Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Detailed presentation and examination of the formulation of execution of U.S. foreign policy. Survey of numerous factors influencing policy outcomes and how such determinants vary according to policy issue areas.

132. National Security Policy (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: upper division standing; Development of American security policy since 1945. Analysis of deterrence and assumptions upon which it is based. Effects of nuclear weapons upon conduct of war, alliances, and American foreign policy. Prospects of security and stability through arms control.

133. The American Role in East Asia (4) I. Kallgren Lecture—4 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Overview of American foreign policy toward Africa. Relations to global adversenaries. Legacies of colonialism. Challenge of national self-determination and white racism. Policies on nonalignment, producer cartels, multinational corporations, continental integration, and trade and aid relations.

136. Soviet Foreign Policy (4) I. Zinner Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Conduct of Soviet foreign relations in context of world affairs: ideology and power as manifestations of policy; foreign policy as an instrument of revolution; the role of diplomacy, economic aid and nuclear armaments.

137. International Relations in Western Europe (4) I. Zinner Lecture—4 hours. Prerequisite: upper division standing. Analysis of European unity, problems of the Atlantic alliance, Atlantic political economy, West-East relations, Communism in Western Europe and the relationship between domestic politics and foreign policy.

138. International Relations: East Asia (4) I. Kallgren Lecture—4 hours. Prerequisite: upper division standing; courses 2 or 3 recommended. Advanced study of current foreign policy and diplomacy in East Asia. Emphasis upon twentieth century problems with examples from China, Japan, Korea, and Southeast Asia.
Special Studies in Foreign Policy (4) I, II, III. The Staff Lecture—4 hours; term paper. Prerequisite: upper division standing or consent of instructor. Extensive examination of one or more special problems in foreign policy. May be repeated once for credit when different topic is studied.

Comparative Public Policy (4) I. Groth Lecture—3 hours; term paper. Ideological orientations, institutional processes, and public policies of modern states. Emphasis on democratic, socialist, communist and fascist experience.

Communist Political Systems (4) III. Zinn Lecture—4 hours. Prerequisite: courses 2 or consent of instructor. Systematic comparative analysis of the origin, structure and function of communist political systems with emphasis on the Soviet Union and the states of Eastern Europe.

Government and Politics in Emergent Nations (4) III. Zinn Lecture—4 hours. Prerequisite: course 2. Conceptual study of problems of political organization and procedure in the context of rapid change engendered by social revolution in *emergent nations.* Offered in even-numbered years.

Comparative African Politics (4) I. Rothchild Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Analysis of party systems, military coups, bureaucracy, regional integration, and democratization, and economic development in African states.

Politics and Policy in Western Europe (4) I, II. The Staff Lecture—4 hours. The revolution, politics, and contemporary problems of selected political systems of Western Europe.

Government and Politics in East Asia: China (4) II. Kalfrin Lecture—4 hours. Prerequisite: course 2 recommended. Evolution of political institutions and political culture in China with emphasis on the post-1949 period. Primary attention to nationalism, modernization and political efficacy.

Government and Politics in East Asia: Pacific Rim (4) I. Kalfrin Lecture—4 hours. Prerequisite: course 2 recommended. Establishment and evolution of political cultures and establishment of political institutions in selected countries of the Pacific Rim namely: Japan, Korea, Taiwan. Emphasis on wider war II.

Politics of Development in East Africa (4) III. Rothchild Lecture—3 hours; discussion—1 hour. Prerequisite: course 134 recommended. Analysis of the developmental process in the region of East Africa. Emphasis will be placed upon colonial impact, socioeconomic environment, strategies of development, party systems, bureaucracy and military coups. Course is considered part of a year-long interdepartmental sequence of courses on East Africa, including History 115B.

Comparative Political Systems (4) I. Rothchild Lecture—4 hours. Analysis of the nature and functions of law. Particular attention will be directed to law as an instrument of social control and the relationships between law and morality. Offered in even-numbered years.

Civil Rights and the Constitution (4) III. Gates Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Constitutional rights and possibilities of minority groups. Citizenship in the American federal system.

The Politics of Justice (4) I. Dubois Lecture—3 hours; discussion—1 hour. Criminal and civil justice in America with emphasis upon such problems as legal representation for the poor, control of law enforcement processes, and problems in imprisonment and rehabilitation.

Due Process of Law and the Constitution (4) I. Dubois Lecture—3 hours; discussion—1 hour. Study of the procedural and substantive meaning of the concept of "due process of law" and its implications for American politics. Major focus on the provisions and interpretations of the Bill of Rights and the Due Process Clause of the 14th Amendment in the area of criminal procedure.

American Constitutional Law (4) I, II, III. Banzhaf Lecture—3 hours; discussion—1 hour. The political legal factors in the decision-making processes of administrative agencies and the courts. The role of legal constraints as an aspect of administrative responsibility; relationship of substance and procedure in regulatory action.

American Constitutional Law (4) II. Banzhaf Lecture—3 hours; discussion—1 hour. Political legal factors in the decision-making processes of administrative agencies and the courts. The role of legal constraints as an aspect of administrative responsibility; relationship of substance and procedure in regulatory action.

American Constitutional Law (4) III. Banzhaf Lecture—3 hours; discussion—1 hour. Political legal factors in the decision-making processes of administrative agencies and the courts. The role of legal constraints as an aspect of administrative responsibility; relationship of substance and procedure in regulatory action.

Government and the Economy (4) III. Murdock Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Political basis of economic policy (taxation, spending and regulation); impact of private business on political demands; elite responses to economic conditions; policy alternatives and the public interest.

Science, Technology, and Policy (4) III. Hill Lecture—3 hours; discussion—1 hour. Analysis of policy-making for science and the use of scientific expertise for making decisions about technology. Topics include funding of basic research, relationship of science to technological development, science and military policy, technological risks, technology assessment, and international law and politics.

Modern Dictatorships (4) III. Groth Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Selected processes and institutions of dictatorships in Germany, Italy, Russia, Spain, Japan, and other states. Topics include executives, legislatures, parties, courts, bureaucracies, communications, and public opinion with comparisons to U.S. processes.

Political Development in Modernizing Societies (4) I. Gable Lecture—3 hours; discussion—1 hour. Nature and sequence of political development: its economic and social concomitants; role of elites, military, bureaucracy, and party systems; social stratification and group politics; social mobilization and political participation; instability, violence, and the politics of integration.

Comparative Politics in Comparative Perspective (4) I, II. Jackman Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Focus on bureaucratic policy in a comparative context, with emphasis upon challenges between governments and the economy; consequences of rapid technological and social change for bureaucratic structures and processes; the problems of reconciling expertise and democracy and increasing the responsiveness of public bureaucracy.

American Administrative System (4) I. The Staff Lecture—3 hours; discussion—1 hour. Political aspects of the American administrative system, including the role of the executive departments, the processes of substantive policy analysis; problems and developments in planning, budgeting, personnel, and administrative reform.

Administrative Behavior (4) II. The Staff Lecture—3 hours; discussion—1 hour. Implications for American public administration of evolving concepts about behavior in organizations.

Administrative Theory (4) II. Hill Lecture—3 hours; discussion—1 hour. Historical and critical analysis of the principal theories of organization and management of public agencies in the light of such concepts as decision making, bureaucracy, authority and power, communication and control; an examination of the role of government bureaucracies in the total society.

Manager Policy and Personnel Administration (4) III. Gable Lecture—3 hours; discussion—1 hour. Policy and economics of effective manpower programs; planning manpower needs; recruitment, selection, and training; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Focus on bureaucratic policy in a comparative context, with emphasis upon challenges between governments and the economy; consequences of rapid technological and social change for bureaucratic structures and processes; the problems of reconciling expertise and democracy and increasing the responsiveness of public bureaucracy.

*NOTE:* For key to footnote symbols, see page 131.
218. Political Theory (4) III. Stronpol
Seminar—3 hours. Analysis of problems in political theory.

223. International Relations (4) III. The Staff
Seminar—3 hours. Analysis of international relations.

225. The International System (4) III. Swenson
Seminar—3 hours. Analysis of the international system by methods of textbook reading and analysis; use of various techniques of data collection and analysis.

230. American Foreign Policy (4) I. The Staff
Seminar—3 hours.

231. U.S. Political Culture and Foreign Relations (4) I. Rothchild
Seminar—3 hours. Topics include: U.S. political culture and foreign policy. Analyzes American ideological preferences in historical perspective, contemporary foreign policy decision-making and implementation. Concludes with examining the relationship between U.S. foreign policy and democratic process.

241. Communist Political Systems (4) II. Zinner
Seminar—4 hours. Course content: 141 or the equivalent, or consent of instructor. Systematic analysis of selected topics dealing with the political process of Communist political systems.

242. Seminar in Comparative Politics (4) II. Groth
Seminar—4 hours. Prerequisite: graduate status or consent of instructor. Systematic survey of theories and methods used in the study of Comparative Politics.

246. Policy Making in Third World Societies (4) I. Rothchild
Seminar—3 hours. Policy making standing or consent of instructor. Inclusion in an analysis of economic and social problems in Third World countries such as political resources, institutional resources, decision-making, resource allocation, planning, and budgeting, implementation, and distribution of world resources. Offered in odd-numbered years.

248. Politics of East Asia (4) III. Katzen
Seminar—4 hours. Selected topics dealing with the problems of government and international relations in East Asia.

260. Political Parties (4) II. Owens
Seminar—4 hours. Survey of selected topics in American political parties.

261. Political Behavior (4) III. Costantini
Seminar—4 hours. Survey of selected topics in political behavior and public opinion.

262. Concepts and Problems in Public Administration (4) I. Gable
Seminar—4 hours. Nature of administrative processes in modern society; analysis of complex organizations; contemporary management practices and processes; means of controlling bureaucracy. Offered in even-numbered years.

283. Organizational Behavior (4) II. The Staff
Seminar—4 hours. Organizational behavior as it relates to public sector decision making.

286. Administrative Values (4) III. Mussof
Seminar—3 hours. Examination of administrative values. Offered in odd-numbered years.

296. Research in American Government and Public Policy (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on problems and issues in the study of American government and public policy.

298. Research in Political Theory (4) II. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of political theory.

299. Research in International Relations (4) II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of international relations.

300. Research in Judicial Politics (4) II. Dubois, Gates
Seminar—4 hours. Prerequisite: graduate standing in political science or consent of instructor. Contemporary research on judicial politics, judicial institutions, jurisprudence, and judicial behavior.

306. Research in Political Parties, Political Behavior (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of comparative government and policy.

309. Research in Comparative Government and Policy (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of comparative government and policy.

310. Research in Public Administration (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of public administration.

297. Internships in Political Science (2) I, II, III. The Staff
Seminar—2 hours. Open only to persons who have internships or other positions in government agencies, political parties, etc., including participants in the State and Local Government Internship Program. Deals with the application and evaluation of theoretical concepts through work experience or systematic observation in public and political agencies. May be repeated for credit.

298. Group Study (1-5) 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)

300. Directed Reading (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only)

Professional Courses

302. The Teaching of Political Science (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate student standing in Political Science. Methods and problems of teaching political science at the undergraduate level.

Pomology

(College of Agricultural and Environmental Sciences)

Adel A. Kader, Ph.D., Chairperson of the Graduate Program
Department Office, 1045 Wickersham Hall (752-0123)

Faculty

Adel A. Kader, Ph.D., Professor
Frederick A. Blais, Ph.D., Professor
Royce S. Bringhurst, Ph.D., Professor Emeritus
Dillon S. Brown, Ph.D., Professor Emeritus
Robert M. Carlson, Ph.D., Lecturer
Peter B. Caffin, Ph.D., Lecturer
Julian C. Crane, Ph.D., Professor Emeritus
Abhay M. Dandekar, Ph.D., Assistant Professor
Theodore M. De Jong, Ph.D., Associate Professor
Lourdes Ferguson, Ph.D., Lecturer
Thomas M. Gradziel, Ph.D., Assistant Professor
William H. Griggs, Ph.D., Professor Emeritus
Paul E. Haneschke, Ph.D., Professor
Hudson T. Hartmann, Ph.D., Professor Emeritus
Scott Johnson, Ph.D., Lecturer
Adel A. Kader, Ph.D., Professor
David E. Kester, Ph.D., Professor
John M. Labavitch, Ph.D., Professor
Omund Lillevand, Ph.D., Professor Emeritus
George C. Marvin, Ph.D., Professor Emeritus
Dale L. Mcgilligan, Ph.D., Lecturer
Warren C. Micke, M.S., Lecturer
F. Gordon Mitchell, M.S., Lecturer
Dan E. Paffett, Ph.D., Lecturer
Vito S. Polito, Ph.D., Associate Professor
David E. Ramos, Ph.D., Lecturer
Roger J. Romani, Ph.D., Professor
Kay Ryogo, Ph.D., Professor Emeritus
Kenneth A. Shackel, Ph.D., Assistant Professor
Douglas V. Shaw, Ph.D., Assistant Professor
Noel F. Sommar, Ph.D., Lecturer
Stephen M. Southwick, Ph.D., Lecturer
Ellen G. Sutter, Ph.D., Associate Professor
Kiyoko Uru, Ph.D., Professor Emeritus
Steven A. Weinbaum, Ph.D., Professor

Related Major Programs. See the majors in Plant Science and in Agricultural Science and Management (Plant Science option).

Related Courses. See Plant Science 108, 112, 121, 131, 140, 190.

Graduate Study. For graduate study related to the field of pomology, see the M.S. degree program in Horticulture. See also the Graduate Division section in this catalog.

Courses in Pomology

Lower Division Courses

10. Fruit and Nut Crop Production and Utilization (3) I. Martin in charge

NOTE: For key to footnote symbols, see page 131.
Lecture—3 hours; discussion—1 hour; all day Saturday field trip. The course discusses the interactions of plants with soil, water, and air, as well as their responses to environmental factors. It also covers the role of plants in the ecosystem and their impact on human activities. (P/NP grading only.)

92. Internship in Pomology (1-12) I, II, III. The Staff (Chairperson in charge). Laboratory—8-24 hours. Prerequisite: Botany 2 or Plant Science 102 or consent of instructor. The course introduces students to the practical aspects of pomological research and practice. Students work with Pomological Research and Extension staff in the field and laboratory and may participate in the production and management of orchards, vineyards, nurseries, and other specialized operations. (P/NP grading only.)

Upper Division Courses

101. Tree Growth and Development (4) I, II. DeJong, Catin. Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 2 or Plant Science 102 or consent of instructor. The course covers the principles of tree growth and development, including growth and development of roots and shoots, flowering and fruiting, and the influence of environmental factors on these processes. (P/NP grading only.)

102. Principles of Plant Nutrition (4) II, III. Weinbaum, Gradziel. Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 2 or Plant Science 102. The course covers the principles of plant nutrition, including the functions and sources of nutrients, nutrient uptake and transport, and the effects of nutrient deficiencies and excesses on plant growth and development. (P/NP grading only.)

103. Tropical and Subtropical Plants (3) II. Shackel in charge. Lecture—3 hours; field trips. Prerequisite: Botany 2 or Plant Science 102. The course covers the diversity and ecology of tropical and subtropical plants, including their adaptation to the warm, humid climate of these regions. (P/NP grading only.)

107. Small Fruit Production (2) I, II. Shaw Lecture—2 hours per week, mutual consent of instructor. Prerequisite: Botany 2 or Botany 3. The course focuses on the cultivation and management of small fruit crops, including blueberries, raspberries, and strawberries. (P/NP grading only.)

170A-170B-170C. Applied Entomology (2-2-2) I, II, III. Ramos, Southwick, Micke, Martin. Lecture—several 2-hour sessions; 2 full-day field trips. Prerequisite: Botany 2 or Botany 3. The course covers the identification and control of insect pests in agricultural systems, including the use of biological control and chemical pesticides. (P/NP grading only.)

192. Internship in Pomology (1-12) I, II, III. The Staff (Chairperson in charge). Laboratory—3-48 hours. Prerequisite: consent of instructor. Work experience on and off campus in the production and management of orchards or closely related enterprises. (P/NP grading only.)

196, 198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

208. Current Perspectives in Fruit Tree Physiology (3) I. DeJong, Catin. Lecture—3 hours; discussion—1 hour. Prerequisite: Biochemistry 101A or 101B. Botany 111A or 111B or Plant Science 102. Courses 101 and 102. Current advances and concepts regarding the physiology of fruit trees, including the role of hormones, carbohydrates, and water in growth and development. (P/NP grading only.)

205. Water Relations and Nutrient Nutrition of Deciduous Fruit Crops (3) I. Carlsson, Shackel. Lecture—3 hours; two full-day field trips. Prerequisite: Soil Science 109, Botany 111A or 111B or Plant Science 102. Development and management of rootstocks, irrigation and water relations, mineral nutrient status, deficiencies and excesses, symptoms of nutrient deficiency and toxicity, soil fertility, and their impact on orchard management. Offered in odd-numbered years.

219. Fruit Morphology (4) III. Polito. Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Botany 50 or 111A. Reproductive morphology of fruit crops with emphasis on tree crops. Topics include flower initiation and development, pollination and fertilization, fruit and seed development. Offered in even-numbered years.

212. Postharvest Biology and Biotechnology of Fruits and Nuts (3) III. Kader, Mitchell. Lecture—3 hours. Prerequisite: Plant Science 112 or the equivalent. Review of postharvest biology of fruits and nuts in relation to biological, physiological, and biochemical processes in handling and processing. Emphasis on identifying problems and developing solutions. Offered in odd-numbered years.

220. Quantitative Genetics and Fruit Crop Improvement (3) II, Shaw. Lecture—3 hours; discussion—3 hours. Prerequisite: Genetics 105, Plant Science 113, and Agronomy 205A. Theory and application of quantitative genetic principles to the breeding, testing, and selection of horticultural crops. Topics include: heritability, selection using information from relatives, index selection, genetic correlations, multiple trait selection, inbreeding, crop stability, and field testing. Offered in odd-numbered years.

229. Seminar (1-5) I, II, III. The Staff (Chairperson in charge). Seminar—1 hour. (S/U grading only.)

239. Group Study (1-5) I, II, III. The Staff (Chairperson in charge). (S/U grading only.)

249. Research (1-12) I, II, III. The Staff (Chairperson in charge). (S/U grading only.)

Preventive Veterinary Medicine (A Graduate Program)

The Program of Study

The Davis campus of the University of California is strongly oriented toward the biological sciences and can offer a complete background in preventive medicine. The professional portion of the medical degree (generally meaning the last two years of course work plus the four-year summer field program) is conducted by the Department of Preventive Medicine and the Department of Environmental Health.

The courses offered at Davis provide full preparation for admission to the Berkeley campus. To qualify for such admission, 90 quarter units of credit must be completed with a grade-point average of C or higher in the prescribed subject major requirements.

Specialty courses in the University's undergraduate program emphasize basic sciences and mathematics as well as preparatory experience in English and rhetoric and those elective subjects of particular interest or need to the individual student.

Students should consult with a Preventive Medicine faculty member in their career in order to plan a comprehensive two-year program.

Preparatory Subject Matter

Biological sciences (Biological Sciences 1, Botany 2, and 3-4 units from Entomology 10, Genetics 2, Microbiology 2, or Plant Pathology 10) 13-14
Chemistry (Chemistry 3A or 3B) 15
Computer science (Computer Science Engineering 10, Mathematics 21A, 21B, 21C, 21E, Engineering 5, or Agricultural Science and Management 21) 6
Economics (Economics 1A or 1B) 9
Agricultural Science and Management (10) 9
Agricultural Engineering (10) 9
Agricultural and Biological Engineering (10) 10
Written and oral expression (see College requirement) (5) 5
Geology (Geology 1 or 50) 12
Mathematics (Mathematics 16A, 16B) 6

NOTE: For key to footnote symbols, see page 131.

Preventive Veterinary Medicine (A Graduate Program)

Tim E. Carpenter, Graduate Advisor of the Program

Graduate Office, 112 Surge-IV (752-2375/1376)

Graduate Study. The School of Veterinary Medicine offers a program of study and research leading to the Master's degree in Preventive Veterinary Medicine (M.P.V.M.). Detailed information on this program may be obtained by writing Louise W. Catlin, Program Coordinator in the Department of Epidemiology and Preventive Veterinary Medicine.

Graduate Advisor, Tim E. Carpenter (Epidemiology and Preventive Medicine).

Psychiatry

See Medicine, School of

Psychology (College of Letters and Science)

Donald H. Owings, Ph.D., Chairperson of the Department

Department Office, 149 Young Hall (752-1880)

Faculty

Angelo A. Acredolo, Ph.D., Professor
Janis R. Bastian, Ph.D., Professor Emeritus
Lori L. Chelima, Ph.D., Professor
Richard G. Coss, Ph.D., Professor
William F. Dukes, Ph.D., Professor Emeritus
Alan C. Elms, Ph.D., Professor Emeritus
Robert A. Emmons, Ph.D., Assistant Professor
Karen P. Erickson, Ph.D., Professor
Albert A. Hartman, Ph.D., Professor
Kenneth R. Henry, Ph.D., Professor
Joel T. Johnson, Ph.D., Associate Professor
Neal E. Kroll, Ph.D., Professor
Debra Long, M.S., Acting Assistant Professor
Joseph Lyons, Ph.D., Professor Emeritus
William A. Mason, Ph.D., Professor
Sally P. Mendoza, Ph.D., Assistant Professor
G. Mitchell, Ph.D., Professor
Robert M. Murphy, Ph.D., Professor

Statistical methods (Statistics 13 or Agricultural Science 150 with consent of instructor) 4
Additional courses (especially recommended): Geography 161, Physics 1 or 6A-69.4C, Resource Sciences 2, Water Science 141) 15-18
Summer Field Program 15

The 10-week Summer Field Program (at Meadow Valley Summer Camp in Plumas County) is completed between the sophomore and junior years. The program includes three courses totaling 15 units which mark the beginning of the professional program. The course provides an introduction to practical skills involved in land management, but emphasis is on concepts and principles, along with development of an understanding of the whole series of related elements that constitute a wild land environment.

Preventory Adviser, C.C. Delwiche (Land, Air and Water Resources), Hoagland Hall, 752-1511/1407.
The Major Programs

Psychology is both a science and a form of human inquiry. It provides knowledge about human and animal behavior and constitutes a background for examining your own behavior and that of other people. The UCSD Psychology program has several objectives: it provides 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. (Consulting 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, developmental psychology, humanistic psychology, and motivation. Psychological emphasizes the biological correlates of behavior and includes such topics as sensory psychology, physiological psychology, and comparative psychology. Perception/Cognition emphasizes how information from the physical world is sensed, perceived and used, and stresses the roles of consciousness, language, perception 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 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 gender, aging and maturity, environmental awareness, altered states of consciousness, and primate behavior.

Psychology

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>UNITS</th>
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</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>21-25</td>
</tr>
<tr>
<td>Psychology 1 or the equivalent</td>
<td>4</td>
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<tr>
<td>Psychology 41</td>
<td>4</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
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<tr>
<td>Biological Sciences 10</td>
<td>4</td>
</tr>
<tr>
<td>Anthropology 1</td>
<td>6</td>
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<tr>
<td>Anthropology 2</td>
<td>6</td>
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<tr>
<td>Psychology 41</td>
<td>4</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics 15A-15B or 21A-21B</td>
<td>8</td>
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<tr>
<td>Physics 10 or 6A-6B</td>
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<tr>
<td>Biological Sciences 1, Psychology 2 or 110</td>
<td>15</td>
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<td>Chemistry 1A, 1B</td>
<td>10</td>
</tr>
<tr>
<td>One course in sociology or cultural anthropology (may be lower or upper division)</td>
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</tr>
</tbody>
</table>

Total Units for the Major: 72-84

Psychology

B.S. Major Requirements:

<table>
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<th>Requirement</th>
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<tr>
<td>Psychology 1 or the equivalent</td>
<td>4</td>
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<tr>
<td>Psychology 41</td>
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<tr>
<td>Statistics 13 or 102</td>
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<tr>
<td>Mathematics 15A-15B or 21A-21B</td>
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<tr>
<td>Physics 10 or 6A-6B</td>
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<tr>
<td>Biological Sciences 1, Psychology 2 or 110</td>
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<tr>
<td>Chemistry 1A, 1B</td>
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<td>One course in sociology or cultural anthropology (may be lower or upper division)</td>
<td>4-5</td>
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Total Units for the Major: 72-84

Mathematics Emphasis

<table>
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<tbody>
<tr>
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<td>Psychology 1 or the equivalent</td>
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<td>Psychology 41</td>
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<tr>
<td>Statistics 13 or 102</td>
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<tr>
<td>Mathematics 15A-15B or 21A-21B</td>
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</tr>
<tr>
<td>Computer Science Engineering 30 or Engineering 9</td>
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<tr>
<td>Chemistry 10 or 1A-1B or 4A-4B</td>
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<tr>
<td>Physics 10 or 6A-6B</td>
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<tr>
<td>Biological Sciences 1 or a combination of Biological Sciences 10 and one course from Anthropology 1, Psychology 15, Genetics 10</td>
<td>5-8</td>
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<tr>
<td>One course in sociology or cultural anthropology (may be lower or upper division)</td>
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Total Units for the Major: 72-84

Physics Emphasis

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<td>47-48</td>
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<td>Psychology 41</td>
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</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics 15A-15B or 21A-21B</td>
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</tr>
<tr>
<td>Computer Science Engineering 30 or Engineering 9</td>
<td>3</td>
</tr>
<tr>
<td>Chemistry 10 or 1A-1B or 4A-4B</td>
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<tr>
<td>Physics 10 or 6A-6B</td>
<td>8</td>
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<tr>
<td>Biological Sciences 1 or a combination of Biological Sciences 10 and one course from Anthropology 1, Psychology 15, Genetics 10</td>
<td>5-8</td>
</tr>
<tr>
<td>One course in sociology or cultural anthropology (may be lower or upper division)</td>
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</table>

Total Units for the Major: 72-84

Biology Emphasis

<table>
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<th>Requirement</th>
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<tr>
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<tr>
<td>Chemistry 10 or 1A-1B or 4A-4B</td>
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<tr>
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<td>Biological Sciences 1 or a combination of Biological Sciences 10 and one course from Anthropology 1, Psychology 15, 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>
</tbody>
</table>

Total Units for the Major: 72-84

Additional units to achieve a total of 20 upper division units: 7

Graduate Study. The Department offers programs of study and research leading to the Ph.D. degree in psychology. Detailed information regarding graduate study may be obtained by writing the Graduate Adviser, Department of Psychology.

Graduate Adviser. See Class Schedule and Room Directory.

Courses in Psychology

Lower Division Courses

1. General Psychology (4) I, II, III. The Staff Lecture—4 hours. Introduction emphasizing empirical approach. Focus on perception, cognition, personality and social psychology, and biological aspects of behavior. Only 2 units allowed to those who have taken course 15 or 18; no credit allowed to those who have taken both courses 15 and 18. (CAN PAY 2)

15. Introductory Psychology (3) I, II, III. The Staff Lecture—3 hours. Survey of genetic, evolutionary and physiological factors affecting behavior. Emphasis on biological and biochemical mechanisms for understanding people and their interaction with their environment. No credit allowed to students who have completed course 1. General Education credit for two-course sequence of non-GE courses (15-16) which will satisfy requirement for one GE course: Contemporary Society/Introduction.

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. No credit allowed to students who have completed course 1. General Education credit for two-course sequence of non-GE courses (15-16) which will satisfy requirement for one GE course: Contemporary Society/Introduction.

41. Research Methods in Psychology (4) I, II, III. Mitchell Lecture—4 hours. Prerequisite: course 1 or the equivalent; completion of Statistics 13 or 102 strongly recommended. Introduction to experimental design, interviews, questionnaires, field and observational methods, reliability and statistical inference.

99. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Primarily for lower division students. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses

103. Advanced Research Design and Data Analysis (5) K. Klein, Johnson, Mitchell Lecture—5 hours. Prerequisite: course 41 and either Statistics 13 or 102. Design and analysis of psychological investigations and the interpretation of quantitative data in psychology.

185. Statistical Inference from Psychological Experiments (4) J. Krogh.
108. Physiological Psychology (5) I, II, III. Chalupa, Henry, Mendota 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, cognition, perception, language, learning, and memory in humans and other animals; introduction to methods of physiological psychology.

112. Developmental Psychology (4) I, II, III. Shields, Acosta 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.

114. Gender and Social Development (4) III. Shields Lecture—4 hours. Prerequisite: course 1. Biological and social factors that influence development and how psychological sex-related differences will be expressed in human development. Special attention to the scientific and social rationale which underlies these differences.

115. Maturity and Aging (4) II, I. The Staff Lecture—4 hours. Prerequisite: course 112. Biological, cognitive, personality, and social aspects of the human life span through late adulthood and death, in its theoretical, methodological, and empirical aspects.

120. History of Psychology (4) III. The Staff Lecture—3 hours; term paper. Prerequisite: course 1; upper division standing, project, or term paper—1 hour. Prerequisite: course 1 or Zoology 3-2; or consent of instructor. Psychology of scientific thought and research in context of history of philosophy and science.

123. Sensory Processes (5) I, II, III. Henry, Mendota Lecture—4 hours; laboratory—1 hour. Prerequisite: course 1 or Zoology 3-2; or consent of instructor. Psychology of sensory systems in man and other animals. Relationship of behavior to physiology, structure and function of the senses.

130. Human Learning and Memory (4) I, II, III, Kroll, Parks Lecture—4 hours; discussion—1 hour. Prerequisite: course 1 or Statistics 13 or 102 or course 41; or consent of instructor. Consideration of major theories of human learning and memory with critical examination of relevant experimental data.


140. Environmental Awareness (4) I, III. Sommer, Coss Lecture—4 hours. Prerequisite: course 1. Interactions of people with built environments. Research methods for evaluating designed environments and reviews of current research in environmental psychology.

145. Social Psychology (4) I, II, III. Simonton, Johnson Lecture—4 hours. Prerequisite: course 1. Behavior of the individual in the group. Examination of basic psychological processes in social situations, varying various social processes: social interaction; group tensions; norm development, attitudes, values, public opinion, status.


149. Gender and Human Reproduction (4) I, II, III. Erickson Lecture—4 hours. Prerequisite: course 1. The social psychology of human reproduction. Examines gender relations over the course of the individual's reproductive cycle.

150. Comparative Psychology (5) I, II, III. Mason, Owings, Mitchell Lecture—4 hours; discussion or project—1 hour. Prerequisite: course 1 or consent of instructor. Perspectives in animal behavior: psychological, ethological, and social systems, with an emphasis on functional behavioral categories from the standpoint of adaptation and evolution.

154. Primate Psychology (4) III. Mitchell Lecture—4 hours. Prerequisite: course 15 or 160 or an equivalent course in biological sciences, and consent of instructor. Comparative survey of primate psychology, based primarily on primate observations in laboratory, learning, communication, cognition, sensation, motivation, emotion, perception, and effects of early experience in many species of primates.

160. Health Psychology (4) II, III. Emmons Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 15. Psychological factors influencing health and illness. Topics include stress, anxiety, coping, personality and health, symptom perception and reporting, heart disease, cancer, compliance, and health maintenance and promotion. Application of principles to bedside practice.

165. Introduction to Clinical Psychology (4) I, II, III. The Staff Lecture—4 hours. Prerequisite: courses 1, 168, and either 112 or 145. Major theoretical formulations in the history of clinical psychology. Designed to prepare students for a temporary existentilism and behavior modification. Survey includes lectures, films, and tapes, of what clinical psychologists do: diagnosis, interpersonal, professional roles, and approaches to treatment.

168. Abnormal Psychology (4) I, II, III. Emmons, Murphey, Sommer Lecture—4 hours. Prerequisite: course 1. Descriptive and functional account of behavioral disorders, with primary consideration given to neurotic and psychotic behavior.

171. Humanistic and Transpersonal Psychology (4) III. Tart Lecture—4 hours. From classical psychodynamic to humanistic, temporary existentilism and behavior modification. Survey includes lectures, demonstrations, of humanistic and transpersonal movements in contemporary psychology, in particular, therapy techniques in the work of Maslow and others who emphasize creativity, self-actualization, and realization of human potential.


180A. Research in General Experimental Psychology (4) III. The Staff Lecture—2 hours; laboratory—4 hours. Prerequisite: four upper division Psychology courses and consent of instructor. Empirical research on selected topics in general experimental psychology. (Behavioral, perception, cognition, developmental, etc.). Specific content will vary from quarter to quarter. May be repeated once for credit when the specific content differs.

180B. Research in Psychology (4) III. The Staff Lecture—2 hours; laboratory—4 hours. Prerequisite: four upper division Psychology courses and consent of instructor. Empirical research on selected topics in psychology (experimental, educational, developmental, etc.). Specific content will vary from quarter to quarter. May be repeated once for credit when the specific content differs.

180C. Research in Personality and Social Psychology (4) III. The Staff Lecture—2 hours; laboratory—4 hours. Prerequisite: four upper division Psychology courses and consent of instructor. Empirical research on selected topics in personality and social psychology (personality, social psychology, organizational psychology, etc.). Content will vary from quarter to quarter. May be repeated once for credit when the specific content differs.

183. Organizational Psychology (4) I, III. Harrison Lecture—4 hours. Prerequisite: introductory psychology course. Survey of interpersonal dynamics among psychological processes, interpersonnel dynamics, and organizational dynamics. Topics include motivation, communication, decision making, leadership, personnel selection and training, stress and conflict, and career development, organizational development, and organization-community relations.

190. Seminar in Psychology (4) The Staff Seminar—4 hours. Prerequisite: junior or senior standing; major in psychology or consent of instructor. Intensive treatment of a special topic or problem of psychological interest. May be repeated for credit in different subject area.

192. Fieldwork in Psychology (1-5) I, II, III. Murphy Fieldwork—3-18 hours; term paper. Prerequisite: upper division standing in psychology and consent of instructor. Supervision of off- and on-campus, in community and institutional settings. Credit not applicable toward 40 units of upper division Psychology required of majors. May be repeated once for credit. Limited enrollment. (P/NP grading only.)

197.77. Tutoring in Psychology (1-3) I, II, III. The Staff Prerequisite: upper division standing and consent of instructor. Tutoring in Psychology Department courses. This course is intended for advanced undergraduate students who will lead discussion sections in Psychology courses. May be repeated for a total of 8 units. No more than 6 units may count toward the Psychology major requirement. (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.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

200. Current Research Topics in Psychology (1) I. The Staff Seminar—1 hour. Prerequisite: consent of instructor. A seminar designed to introduce students to psychology in the department to its ongoing research activities. (Su grading only.)

201. Research Preparatory (4) I, II, III. The Staff Laboratory—discussion—6 hours. Prerequisite: consent of instructor. (Su grading only.)

205. Advanced Statistical Inference from Psychological Experiments (5) II. Kroll Lecture—5 hours; project and term paper. Prerequisite: graduate student standing and consent of instructor. Probability theory, sampling distributions, nonparametric statistics, statistical inference, and theory of estimation. No credit will be required which develops a research proposal with a detailed discussion of the statistical techniques to be employed.

206. Statistical Analysis of Psychological Experiments (4) II, III. Lecture—4 hours. Prerequisite: course 103 or consent of instructor. Statistical analysis of psychological experiments. Multivariate experimental designs; analysis of variance and covariance, factorial and repeated measures, Latin square designs, and test of trends.

207. Multivariate Analysis of Psychological Data (4) III. Simonton Lecture—4 hours. Prerequisite: course 105 or 205 or consent of instructor. The application of multiple regression, factor analysis and related correlational techniques to non-experimental, quasi-experimental, and experimental data. Techniques implemented using computer multivariate statistical packages.

208. Physiological Psychology (4) Chalupa, Henry Sabbath Lecture—4 hours. Prerequisite: graduate standing in psycho-logy or consent of instructor. A conceptual analysis of the contributions of the neuroanatomy, neurophysiology and neurochemistry to an understanding of animal and human behavior.

212. Developmental Psychology (4) II. Acredido, Shields Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The original behavioral repertoire of the child and its development.

220. Topics in the History of Psychology (4) The Staff Lecture—2 hours; seminar—2 hours. Prerequisite: graduate standing in psychology or consent of instructor. A lecture-seminar on selected topics in the history of psychology and on the applicability of early psychological theory and research to contemporary investigations.

229. Sensory Processes (4) Chalupa, Henry, Owings Lecture—3 hours; seminar—2 hours. Prerequisite: graduate
Radiological Sciences

(School of Veterinary Medicine)

Thomas G. Nyland, D.V.M., M.S., Chairperson of the Department

Department Office, 1114 Medical Science-1A
(752-0184)

Faculty

Marvin Goldman, Ph.D., Professor

William J. Horn, D.V.M., M.S., Associate Professor

Philip D. Koblik, D.V.M., M.S., Assistant Professor

Joe P. Morgan, D.V.M., Vet. med. dr., Professor

Thomas G. Nyland, D.V.M., M.S., Associate Professor

Timothy R. O'Brien, D.V.M., Ph.D., Professor

Part-Time Clinical Faculty

Larry Y. Kerr, D.V.M., Associate Clinical Professor

Sam Silverman, D.V.M., Ph.D., Clinical Professor

James Tice, D.V.M., Ph.D., Associate Clinical Professor

Courses in Radiological Sciences

Upper Division Courses

215. Bioenvironmental Consequences of Nuclear Technology (3) III. Goldman

Lecture—3 hours; field trips to power station facilities. Prerequisite: a course in biology. Biophysical implications of radiation on human health and the environment. The effects of radiation on plants and animals. How to assess and predict the long-term effects of nuclear accidents. (Same course as Environmental Studies 115.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. Radiology Staff

Graduate Courses

269. Medical Radiology (3) II. Goldman

Lecture—3 hours; laboratory—2 hours. Prerequisite: an introductory course in physics, anatomy, physiology, and biophysics. This course introduces the student to medical radiology, including the basics of radiation therapy, diagnostic radiology, and nuclear medicine. (Same course as Environmental Studies 115.)

286. Special Procedures Rounds (2) I, II, III. The Staff

Discussion—4 hours. Prerequisite: a DVM degree and consent of instructor. A review of selected cases from previous class. Specific problems covered include radiation therapy, diagnostic radiology, and nuclear medicine. (May be repeated for credit. (SU grading only.)

409. Known Case Conference (1.5) I, II, III. The Staff

Discussion—1.5 hours. Prerequisite: a DVM degree and consent of instructor. Film review of recent case studies. Intended for radiology residents and students with a background in diagnostic radiology. (May be repeated for credit. (SU grading only.)

410. Current Topics in Radiological Sciences (1.5) I, II, III, IV. The Staff

Lecture—1.5 hours. Prerequisite: a DVM degree and consent of instructor. This course provides an up-to-date review of the current literature and recent developments in radiology. Topics are selected by the instructor and may include new radiographic techniques, imaging modalities, and the latest research in radiological sciences. (May be repeated for credit. (SU grading only.)

NOTE: For key to footnote symbols, see page 131.

Radiology

See Medicine, School of

Range and Wildlands Science

See Range and Wildlands Science, below: Range and Wildlands Science (A Graduate Group); and Range Science

Range and Wildlands Science

(College of Agricultural and Environmental Sciences)

The Major Program

Range and Wildlands Science is the study of the physical and biological 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, 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, extension specialists, ranch 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 trainees or apprenticeship experience with that agency be included in the major program of study as an internship. 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. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter

UNITS

Preparatory Subject Matter

54-61

Biology (Biology 1)

5

Botany (Botany 2)

5

Chemistry (Chemistry 1A, 1B, 2A, 2B, 8A, 8B)

16

Physics (Physics 1A, 1B)

6

Mathematics (Agricultural Science and Management 150; either Mathematics 15A or 16A/16B recommended)

4-10

NOTES: For key to footnote symbols, see page 131.
Graduate Study. A program of study is offered leading to the M.S. degree in Range and Wildlands Science. Detailed information can be obtained from the graduate adviser and the Graduate Announcement.

Graduate Adviser. C. A. Ragusa (Agronomy and Range Science).

Related Courses. See Agronomy 112, Nutrition 116, Resources 100, Soil Science 105, 120, Wildlife and Fisheries Biology 151.

Courses in Range Science
Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 132 Hunt Hall.

Lower Division Course
82. Range Science Internship (1-12, 1, 11, 11, summer). The Staff (Department Chairperson in charge). Laboratory—3-6 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
108. Range and Wildland Plants (4) II. Rice Lecture—2 hours; laboratory—6 hours; two Saturday field trips. Prerequisite: Botany 2 and junior standing recommended. Systematic, evolution, and use of plants within and range and wildland ecosystems. Taxonomy and identification of range and wildland plants. Woody perennials, legumes, and forbs.

105. Field Course (2) III. Merkle Lecture—10 hours total; laboratory—30 hours total (given weekly following end of Spring Quarter). Prerequisite: course in plant or range science or equivalent. Study of representative plants of rangeland vegetation as a livestock grazing resource and as wildlife habitat. Range management and improvement for strategies for enhancing multiple-use capacity; grazing systems, water development, seeding of improved species, and prescribed fire. Considered a Spring Quarter course for preenrollment. Offered in even-numbered years.

133. Grassland Ecology (3) II. Ragusa Lecture—3 hours; one Saturday field trip. Prerequisite: course in plant ecology or consent of instructor. Structure, function, and environment of North American grasslands, with emphasis on the California annual type. Concepts and problems in measuring primary and secondary productivity. Principles of grassland management and including vegetation improvement, utilization by animals, and recreation and aesthetic values. Offered in even-numbered years.

134. Comparative Ecology of Major Rangeland Systems (3) II. Merkle Lecture—3 hours; one Saturday field trip. Prerequisite: course 100 or equivalent; general ecology course recommended. Study of vegetation, its correlation, and succession in representative North American rangeland plant communities. Description and function of interactions between vegetation and grazing animals on grassland, desert, forested, and tundra rangelands. Discussion of management strategies used in these communities. Offered in odd-numbered years.

135. Ecology and Community Structure of Grassland and Savanna Herbivores (3) III. Demmert Lecture—3 hours. Prerequisite: Biological Sciences 1 or Botany 2 or Zoology 2 or equivalent; general ecology course recommended. Feeding ecology of grassland herbivores and its evolution in herbivore communities and social systems. Optimal foraging, interspecific interactions, and predation are considered as factors affecting natural and managed grassland and savanna systems. Offered in even-numbered years.

145. Revegetation of Disturbed Lands (2) II. The Staff Lecture—2 hours. Prerequisite: Botany 2 and Soil Science 100. Principles of vegetation and soil applications. Topics include characteristics of disturbed sites, especially soil-related problems; techniques for mechanical stabilization, mounding, and seeding, and plant materials used. Integrated principles and techniques by use of specific case histories. Offered in odd-numbered years.

160. Range Livestock Production (3) III. Morris, Ragusa Lecture—3 hours. Prerequisite: Animal Science 2 and course in feeding livestock production systems from perennial and annual range types. (Same course as Animal Science 160.)

192. Range Science Internship (1-12) I, II, III, summer. The Staff (Department Chairperson in charge). Laboratory—3/6 hours. Prerequisite: completion of 34 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 (Department Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Department Chairperson in charge). Prerequisite: senior standing and consent of instructor. (P/NP grading only)

Graduate Courses
208. Computer Modeling in Range and Crop Management (3) I. Williams Lecture—3 hours. Prerequisite: one course from Agronomy 105B, Animal Science 128, or Environmental Studies 128. Development of computer models involving dynamic simulation and optimization models for range and crop management problems. Modeling philosophy, assumptions, implementation, validation, and experimentation emphasized. Offered in odd-numbered years.

209. Seminar in Range Science (1-2) II. Phillips, III. Merkle Seminar—1–2 hours. Topics of current interest in grassland ecology, range and wildlands management, and related modeling and systems analysis.

298. Group Study (1-5) I, II, III. The Staff (Williams in charge)

299. Research (1-12) I, II, III. The Staff (Williams in charge) (S/U grading only)

Religious Studies

Religious Studies (College of Letters and Science)

Walen W. Lai, Ph.D., Program Director
Program Office, 922 Sproul Hall (752-9932)

Committee in Charge
Paul A. Castelfranco, Ph.D. (Botany)
Richard T. Curley, Ph.D. (Anthropology)
Manfred P. Fleischer, Ph.D. (History)
Lincoln D. Hurst, Ph.D. (Religious Studies)
Naomi Janowitz, Ph.D. (Religious Studies)
Whalen W. Lai, Ph.D. (Religious Studies)
Barbara Metcalf, Ph.D. (History)
David A. Robertson, Ph.D. (English)
Aram A. Yengoyan, Ph.D. (Anthropology)

Faculty
Lincoln D. Hurst, Ph.D., Assistant Professor
Naomi Janowitz, Ph.D., Assistant Professor
Whalen W. Lai, Ph.D., Professor
Barbara Metcalf, Ph.D., Professor (History)

The Major Program
Majoring in Religious Studies provides an opportunity to explore and analyze the written and oral traditions of the world's great religions: Eastern (Hinduism, Buddhism, Taoism, Confucianism), Western Judaism, Christianity, and Islam. The program takes a rigorously academic approach to the study of these religions. In addition to studying religious thought per se, students in the major also study how religion has shaped human behavior within cultures in matters such as family life, ideas of right and wrong, sexual roles and relations, relations between individuals and society, relations between one society and another, and artistic expression. The student majoring in Religious Studies is offered a broad choice of courses in departments in the College of Letters and Science.

The program provides training in reading critically and analytically, and encourages speculative thought on such primal questions as the purpose and meaning of human existence. Courses offered by the Religious Studies faculty emphasize close analysis of texts and therefore train minds rather than test memories. By focusing on the interactions between different traditions, the courses explore the foundations of each tradition and seek an understanding

Range Science

Range Science (College of Agricultural and Environmental Sciences)

Faculty. See under the Department of Agronomy and Range Science.

Major Program. See the major, Range and Wildlands Science.

1Units earned in satisfaction of the American History and Institutions requirement are not considered partial satisfaction of the Social Sciences and Humanities requirements.

Range Science, Graduate Studies, 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 (Department Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Department Chairperson in charge) Prerequisite: senior standing and consent of instructor. (P/NP grading only)

Graduate Courses
208. Computer Modeling in Range and Crop Management (3) I. Williams Lecture—3 hours. Prerequisite: one course from Agronomy 105B, Animal Science 128, or Environmental Studies 128. Development of computer models involving dynamic simulation and optimization models for range and crop management problems. Modeling philosophy, assumptions, implementation, validation, and experimentation emphasized. Offered in odd-numbered years.

209. Seminar in Range Science (1-2) II. Phillips, III. Merkle Seminar—1–2 hours. Topics of current interest in grassland ecology, range and wildlands management, and related modeling and systems analysis.

298. Group Study (1-5) I, II, III. The Staff (Williams in charge)

299. Research (1-12) I, II, III. The Staff (Williams in charge) (S/U grading only)
Religious Studies

A.B. Major Requirements:

Preparatory Subject Matter

Anthropology 2
Religious Studies 1, 2, 21, 40
Religious Studies 23 or 40
Religious Studies 4 or 70
Depth Subject Matter

History 130A, 130B, 130C
Philosophy 105
Anthropology 104 or Sociology 106

Upper division courses in religious studies including
4 units each from Jewish studies, Christian studies, Orientals and
general religious studies (Religious Studies 100, 110, 115, 150)

Total Units for the Major 68

Course Equivalents

The major advisors have a list of lower and upper division courses that can be substituted for courses suggested above.

Recommended

A reading knowledge of a foreign language is highly recommended. Consult major advisor for a complete list of recommended upper division courses.


Minor Program Requirements:

The following four minor program options and other courses approved for students and majors are subject to approval by the major advisor or the Curriculum Committee.

Religious Studies

Religious Studies emphasis

Five courses chosen from Religious Studies 102, 110, 122, 124, 140, 141A or 141B or 141C, 168, 172

Judiasm emphasis

Religious Studies 23, 122, 132

Two upper division courses from Religious Studies 110, History 191A, 194A

Religious Studies emphasis

Religious Studies 70, 168, 172, and two courses from Religious Studies 110, History 191A, 194A

Religious Studies emphasis

Religious Studies 40, 102, 140, and two courses from Religious Studies 110, 141A, 141B, 141C, Philosophy 145, History 130A, 130B, 130C, 131B

Preministerial Training

Seminaries and professional theological schools, as a rule, do not prescribe any specific major program and give equal consideration to all qualified applicants completing a course of study that gives them a broad cultural background. A program combining the Preparatory Subject Matter for the A.B. degree in Religious Studies, with one of the A.B. degree curricula of the College of Letters and Science, is an excellent preparation for most seminaries and professional theological schools. A reading knowledge of a foreign language is highly recommended. Students interested in applying for admission to a theological school should consult the Religious Studies advisor and make an appointment with the preministerial adviser.

Preministerial Adviser: L. D. Hurst.

Courses in Hebrew

Lower Division Courses

1. Elementary Classical Hebrew (5) I. Giller
Lecture—4 hours; discussion—1 hour. Introduction to Hebrew alphabet, basic vocabulary, orthography, morphology and syntax. Readings from the Bible. Continuation of course 1.

2. Elementary Classical Hebrew (5) II. Giller
Lecture—4 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Hebrew alphabet, basic vocabulary, orthography, morphology and syntax. Readings from Hebrew Bible. Continuation of course 1.

3. Elementary Classical Hebrew (5) III. Giller
Lecture—4 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Hebrew alphabet, basic vocabulary, orthography, morphology and syntax. Readings from Hebrew Bible and from post-Biblical Hebrew texts. Continuation of course 2.

Courses in Religious Studies

Lower Division Courses

1. Survey of Religion (4) I. Lai
Lecture—3 hours; discussion—1 hour. Basic concepts introduced through readings of the primary religious literatures. Discussion of central ideas (creation, history, law, prophecy, suffering, mysticism, asceticism, karma, reincarnation, moksha, etc.), read in ancient India, Shiga, Gita, the Koran, selections from Plato and early Buddhist writings. General Education Credit: Contemporary Societies/Introduction.

2. Myth, Ritual, and Symbolism (4) II. Janowitz; III. Lai
Lecture—3 hours; discussion—1 hour. Myths, rituals, and religious symbols found in a variety of religious traditions including examples from ancient and contemporary religious life. Variety of religious phenomena: validity of different approaches to the study of religion. General Education Credit: Contemporary Societies/Introduction.

3. Eastern Religions (4) I. Lai
Lecture—3 hours; discussion—1 hour. Eastern religions, including Hinduism, Buddhism and Taoism from their origins to the present.

4. Introduction to Religious Studies (2) I, II, III. The Staff
Lecture—2 hours. Topic of importance in more than one religion tradition as an introduction to the problems and methods of religious studies. May be repeated for credit in a different subject area.

5. Cosmology and Culture: Interactions between Religion and Science (4) I. Gesner (Philosophy), Janowitz Lecture—3 hours; discussion—1 hour. Prerequisite: one lower division course in philosophy or religious studies recommended. Interdisciplinary introduction to religion and scientific cosmology and their interplay. Primary goal of course is to develop skills in analyzing cultural presuppositions and their fundamental role in science and religion. General Education Credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any introductory GE course in philosophy or religious studies. (Same course as Philosophy 115).

6. Old Testament (4) III. Janowitz
Lecture-discussion—4 hours. Religion of Ancient Israel from the time of Abraham through the post-exilic period, as contained in the Hebrew Bible. Emphasis on such key Biblical themes and institutions as: monotheism, revelation, law, covenant, holiness, creation, prophecy, priesthood, wisdom, and apocalypse. General Education Credit: Civilization and Culture/Introduction.

7. Basic Judaism (4) I. Janowitz
Lecture-discussion—4 hours. General overview of the traditional laws and customs of Judaism, with an introduction to the history, ethics, and underlying beliefs of Judaism. Course requires 1002 Knowledge of Judaism.


9. Introduction to Islam (4) I. The Staff
Lecture-discussion—4 hours. Introduction to topics at core of Islamic tradition and the Qur'an, Islamic law, Sufism and sects as well as to selected topics including Islamic revival.

10. Introduction to Buddhism (4) I. Lai
Lecture—3 hours; term paper (50 pages minimum preparation). Lectures, readings, and discussions on the development of Buddhism in India, China, and Japan; its influence on various Far Eastern cultures.

11. Chinese Philosophy: An Introduction (4) I. Lai
Lecture—2 hours; discussion—1 hour. Introduction to Chinese philosophy from Classical to Modern times: emphasis on basic metaphysics and its change over time, including Confucianism, Taoism, cosmologies, the Han synthesis of Tao, Yin-yang and Five Elements; its impact on Buddhism, Sino-Hitopan tradition and conflict with the West. Offered in odd-numbered years.

12. Directed Study Group (1-5) I, II, III. The Staff (Chairperson or Consultant)
Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

13. Special Study for Lower-Division Undergraduates (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

Lecture—3 hours; term paper. Principal issues and methods of Religious Studies and associated fields.

15. Christian Origins (4) I. Hurst
Lecture-discussion—4 hours; term paper. Prerequisite: course 40; course 23 recommended. Beginning of the Christian faith seen in relation to mission in which it originated. Offered in odd-numbered years.

16. Religious Biographies (4) II. Lai
Lecture-discussion—3 hours; term paper. Lives of selected religious leaders representative of different religious traditions and historical situations.

17. Mysticism (4) II. Janowitz
Lecture-discussion—4 hours. Prerequisite: one lower division Religious Studies course (except 10, 88, or 99). Course intended primarily for Religious Studies majors, but open to others admitted. Historical and descriptive analysis of selected mystical traditions, and of selected key figures; readings of representative mystical autobiographies.

Lecture—3 hours; term paper. Prerequisite: course 21, Study of a book from the Prophets or writings from critical, historical, and religious perspectives. May be repeated once for credit in different subject area.

19. Topics in Judaism (4) I. Janowitz
Lecture—3 hours; term paper. Prerequisite: course 23. Examination of selected aspects of Jewish life, religion, or literature. May be repeated once for credit in different subject area.

20. Talmoed (4) III. Janowitz
Lecture—3 hours; term paper. Prerequisite: course 23. Introduction to the Talmud covering: history of the Talmudic literature; types of Talmudic materials with special reference to narrative and law; place of the Talmud in Jewish life.

21. Readings from the Rabbinc Literature (2) II. Janowitz Seminar—2 hours. Prerequisite: course 125 or consent of instructor; reading knowledge of Hebrew helpful. Examination of selected Rabbinic texts from critical, historical, and theological perspectives. Texts relating to Biblical themes. (P/NP grading only.)

22. Readings from the Rabbinc Literature (2) II. Janowitz Seminar—2 hours. Prerequisite: course 125 or consent of instructor; reading knowledge of Hebrew helpful. Continuation of course 125B. Texts relating to the Second Commonwealth. (P/NP grading only.)

23. Readings from the Rabbinc Literature (2) II. Janowitz Seminar—2 hours. Prerequisite: course 125 or consent of instructor; reading knowledge of Hebrew helpful. Continuation of course 125B. Texts relating to the period of the Amorites. (P/NP grading only.)

24. Christian Theology (4) II. Hurst
Lecture-discussion—4 hours; term paper. Prerequisite: course 40; course 102 recommended. Historical and systematic introduction to Christian doctrine, with attention to divergent traditions and the problems of modernity and heresy.

25. New Testament Literature (4) II. Hurst
Lecture-discussion—4 hours. Prerequisite: course 40. Life and thought of the early Church as reflected by the Synoptic Tradition—Matthew, Mark, Luke and Acts. Offered every second year to alternate with 1418, 141C. General Education Credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Comparative Literature 1, Integrated Studies 2B, Philosophy 1, or Religious Studies 40.


27. New Testament Literature (4) II. Hurst
Lecture-discussion—4 hours. Prerequisite: course 40. LIFE and thought of the early Church as reflected by the Pauline
tradition—the letters of Paul. Offered every third year to alternate with 141A, 141B. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Comparative Literature 1, Integrated Studies 23, Philosophy 1, or Religious Studies 40.

*145. Contemporary American Religion (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 40 and History 178 recommended. Examination of several major movements and phenomena in twentieth-century American religion. Offered in odd-numbered years.

*150. Religious Ethics (4) III. Lai Lecture-discussion—4 hours; term paper. Prerequisite: course 4. Study of the religious bases to ethics through concentration on the ethical tracts of one major tradition, or through a comparison of the attitudes of two or more traditions to a common ethical issue. Offered every three years.

168. Hinduism (4) III. Lai Lecture—3 hours; term paper (30 hours minimum preparation). Prerequisite: course 4. Hindu tradition from ancient to modern times. Multiplicity of religious forms within Hinduism with mention of Jainism, Buddhism and Sikhism and their relation to the mainstream of Hindu religion. Offered in even-numbered years.

172. Ch'an Zen Buddhism (4) II. Lai Lecture-discussion—3 hours; term paper. Prerequisite: course 4 recommended. Doctrines and methods of the Patriarchs and great masters, both ancient and modern in the framework of the orthodox Buddhist tradition. Doctrinal basis of meditative techniques.

189. Senior Colloquium (4) II. The Staff (Chairperson in charge) Seminar—3 hours; term paper. Prerequisite: consent of instructor. Primarily for seniors in Religious Studies. Discussion in depth of a problem in religion which requires the methods of several disciplines and is important in the encounter between religions.

196. Directed Group Study (1-5) II, III. The Staff (Chairperson in charge) Prerequisite: upper division standing and consent of instructor. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/N grading only.)

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**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.

The Major Program

The Resource Sciences major is a program for 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 with interest in careers associated with resource utilization and management, as well as those pursuing post baccalaureate, academic, or professional training.

The curriculum for the major provides flexibility in meeting individual needs, interests, and objectives. But, at the same time, certain courses are required in the basic physical and biological science areas. An upper division general resource sciences course, a resource economics course, and a specified number of units of resource-oriented courses are required for all students in the major. Resource-oriented courses shall be selected in consultation with and with the approval of the student's advisor. Considerable care should be taken to insure effective utilization of the flexibility of the major, to meet individual academic and career objectives. In addition, supportive courses are selected to acquire additional knowledge and skills.

Positions now held by graduates in Resource Sciences are quite varied, but many are employed as resource analysts and planners as well as technical and environmental staff specialists with government agencies, municipalities and private firms. A significant proportion of graduates undertake further studies leading to advanced degrees in resources, the environment and related fields.

**Resource Sciences**

**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.)

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**Preparatory Subject Matter**

- General Education courses (4 units)
- English (1 unit)
- Chemistry (1 unit)
- Physics (1 unit)

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**Units Required**

- English (1 unit)
- Chemistry (1 unit)
- Physics (1 unit)
- Mathematics (2 units)
- Microcomputer skills (1 unit)
- Computer programming (1 unit)
- Biology (2 units)
- Animal and/or plant science (1 unit)
- Atmospheric science (1 unit)
- Geology (1 unit)
- Environmental quality (1 unit)

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**Depth Subject Matter**

- English (1 unit)
- Chemistry (1 unit)
- Physics (1 unit)
- Mathematics (2 units)

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**Additional courses in biological, physical and computer sciences, and in mathematics to be selected with advisor's approval (3 units)**

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**Resources Sciences 100**

- 4 units

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**NOTE:** For key to footnote symbols, see page 131.
Rhetoric and Communication

Graduate Course

203. Solar Energy Conversion Processes (3) II. Flochini Lecture—3 hours. Prerequisite: course 103, Mathematics 16C. Forms of solar energy; solar energy climatology; heat transfer; analysis of systems for space heating and cooling. Offered in odd-numbered years.

Rhetoric and Communication

(College of Letters and Science)
Michael T. Motley, Ph.D., Chairperson of the Department
Department Office, 224 Academic Office Building—IV (752-1221)

Faculty
Don P. Abbott, Ph.D., Associate Professor
Rina Alcalay, Ph.D., Assistant Professor
Leslie A. Baxter, Ph.D., Professor
Robert A. Bell, Ph.D., Assistant Professor
John P. Fokly, Ph.D., Lecturer
Michael T. Motley, Ph.D., Professor
James M. Murphy, Ph.D., Professor
Ralph S. Pomeroy, Ph.D., Associate Professor
John L. Vents, M.A., Senior Lecturer
Sally J. Widmann, M.A., Lecturer

The Major Program

The major in Rhetoric and Communication centers on human beings as communicators, on the ways in which messages and their uses influence our lives. Course offerings allow the student to explore all facets of the communication process, from interpersonal communication through the rhetoric of film, and from major theories through the close analysis of particular messages. The centrality of communication in our lives is the basis for the program, and although specific courses may have quite varied emphases, all are designed to focus attention on communication. The sequence of required courses is designed to establish a coherent and systematic foundation from which the student can proceed in ways suited to individual interests. Whatever those interests may be, the program can become an organizing principle, and in reporting research, students are asked to use the study of communication as a perspective for understanding themselves and their cultural inheritance.

Because of the general orientation and because communication is so basic to education, rhetoric and communication courses can be profitable to any student in any major, and the profit can extend far beyond the immediate scope of a university education. Students who have majored in rhetoric and communication have found that the program has opened a broad vista of career opportunities. Some have entered the job market directly and are pursuing careers in journalism, broadcasting, public relations, advertising, personnel, and sales. Some have chosen graduate work in the field, others in studies ranging from business administration to law and even to medicine. It is impossible to exhaust the possibilities, for in both public and private sectors, opportunities continue to develop for those who have a sound liberal education and who have prepared themselves with special attention to the uses of communication.

Rhetoric and Communication

A.B. Major Requirements:

Preparatory Subject Matter:...

UNITS
Rhetoric and Communication 1, 3...

Depth Subject Matter...

NOTE: For key to footnote symbols, see page 131.
Minor Program Requirements:

UNITS

Rhetoric and Communication ............................. 24
One course from Rhetoric and Communication 1, 2, or 3; 51, 52
A coherent sequence of at least five upper division courses in
communication selected with the approval of
a minor adviser .................................................. 20

Graduate Study. The Department of Rhetoric and Communication offers programs of study and research leading to the M.A. degree in Rhetoric and Communication. Detailed information may be obtained from the Graduate Coordinator, Department of Rhetoric and Communication.

Graduate Adviser, R. A. Bell.

Courses in Rhetoric and Communication

Subject A. Students must have passed the Subject A requirement before taking any course in Rhetoric and Communication.

Lower Division Courses

1. Introduction to Public Speaking (4) I, II, III. The Staff
Lecture—4 hours. Discussion—3 hours. Practice in the preparation and delivery of speeches with an introduction to rhetorical theory and criticism as applied to public address. (Can Syc 46).

3. Group Communication (4) I, II, III. The Staff (Chairperson in charge)
Lecture—4 hours. Study of communication in small group situations. Role of communication in various group processes, including leadership and decision-making. Participation in group activities and simulation exercises.

10. Introduction to Communication Studies (3)
Lecture—3 hours. Introduction to the nature and function of human communication, special reference to messages, sending, receiving, and channels.

42. Rhetoric in the News Media (4) II. Pomory
Lecture-discussion—4 hours. Study of rhetorical concepts and processes influencing the news function of television, radio, newspapers, and mass communication periodicals. Discourses, lectures, and group projects on problems of media bias, and the media's role in society. Critical analysis of journalistic styles.

51. Introduction to Advocacy (4) I, III. The Staff
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.

98. 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

103. Rhetorical Research (4) II.
Lecture—2 hours; discussion—2 hours; term paper. Prerequisite: upper division standing. Aspects of conducting and reporting research in rhetoric and communication. Emphasizes organization and writing style.

105. Analysis of Message System (4) II.
Lecture—4 hours. Examination of elements of the communication process, including sources, messages, media, and receivers. Study of the role of these elements as they are influenced by various communicative situations.

106. Semantics and Pragmatic Functions of Language (4) I.
Lecture—4 hours. Prerequisite: course 115. The role of language in shaping attitudes and behavior toward others. The use and abuse of verbal symbols in communicative situations. Concepts of meaning in discourse.

107. Conversational Analysis (4) II.
Lecture—4 hours. Prerequisite: course 115. Examination of research studies on conversations. Methods for collecting, transcribing and recording naturally occurring conversations for analysis. Study of social impact of rule observance and nonobservance.

109. Origins of Rhetoric (4) I, II, Murphy, Abbott

110. Medieval and Renaissance Rhetorical Theory (4) II. Murphy

113. Current Humanistic Trends in Rhetorical Theory (4) III. Abbott
Lecture—4 hours. Contemporary trends in rhetorical theory. The role of language and rhetoric in shaping the social and political environment of our time.

114. Contemporary Theories of Human Communication (4) I, III.
Lecture—3 hours; discussion—1 hour. Rhetoric as a social science, characteristics of social theories, components of theories, developing a critical viewpoint of hypotheses, general models, theories, and research.

115. Empirical Methods in Communication (4) I, III. Baxter
Lecture—4 hours. Interpretation of formal and informal social responses. The logical and scientific methods of scientific inquiry, with emphasis on experimental and descriptive research in communication.

120. Rhetorical Criticism (4) I, II, III.
Lecture—4 hours. Techniques and methods of analyzing and interpreting in the use of rhetoric and discourse.

124. Public Address in Western Culture (4) I. Pomory
Lecture-discussion—4 hours. Notable and representative speeches from the period of ancient Greece to the present. Lectures are examined both as dynamic and significant events in their historical contexts, and as noted instances of rhetorical artistry.

212. Public Discourse in American Culture (4)
Lecture—4 hours. Major individuals, movements, and media. Case studies of rhetoric as it has contributed to and is influenced by American culture. Variable format; may be repeated once for credit.

123. The Persuasive Campaign (4) III.
Lecture—4 hours; class project. Study of selected political and nonpolitical campaigns, illustrating prolonged efforts to change public opinion, or to garner a message to a given audience through the use of a variety of media and influences.

125. Freedom of Speech (4) II. Abbott
Lecture-discussion—4 hours. Historical developments of and contemporary controversies in freedom of speech. Political dissident, symbolic speech, slander and obloquy. Offered in odd-numbered years.

130. Group Communication Processes (4) III. Vohs
Lecture—4 hours. Examination of current theories of group formation, group interaction, and leadership, as they relate to communication processes.

140. Interpersonal Communication (4) II. Bell
Lecture—4 hours. Prerequisite: course 1, 3, 9, or 10, or the equivalent. Communication between two individuals in social task settings. Verbal and nonverbal, in developing relationships. Consideration of theory and research on relevant variables such as shyness, self-disclosure, reciprocity, anxiety, and conflict.

NOTE: For key to footnote symbols, see page 131.

136. Organizational Communication (4) I. Vohs
Lecture—4 hours. Examination of communication in various organizational situations. Focus on the use of effective communication strategies for achieving organizational and individual goals. Emphasis on identifying and avoiding ineffective communication within organizations.

140. Mass Communication and the Public (4) II.
Lecture—4 hours. Current issues in mass communications policy, with emphasis on broadcast media. Examination of the economic and legal influences on mass media performance; the role of public broadcasting; the social impact of technological advances, including cable television and communication satellites.

141. Mass Communication Theory and Research (4) II. Alcalay
Lecture—4 hours. Prerequisite: course 115, or the equivalent course in Social Science 4 research methods. Recent developments in the study of mass media communications and effects, with emphasis on the broadcast media. Special attention to the function of television for selected audiences: children, minorities, the aged.

142A. News Policies and Practices in Television (2) II. 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) II. 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.

143. Media Criticism: Broadcast (4) III. Alcalay
Lecture—3 hours; discussion—1 hour. Examination of two major writing assignments. Analysis, interpretation and evaluation of broadcast media content, employing various critical frameworks including game studies, mythological and transnational criticism, linguistic analysis, iconographic criticism, and theories of popular culture.

150. Methods of Advocacy (4) II. Pomory
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 nonlogical means of persuasion.

152. Persuasion (4) II. Bell
Lecture—4 hours. Prerequisite: course 114 or 115 recommended. Theory and research on the effectiveness of various communicative techniques used to influence the perceptions and behaviors of others. Focuses on scientific research into the processes of persuasion and resistance to persuasion in various contexts. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Speeches 42, 49.

190. Current Topics in Rhetoric (4) II, III. The Staff
Seminar—4 hours. Prerequisite: upper division standing with a major in Rhetoric and Communication or consent of instructor. Group study of a special topic in Rhetoric and Communication. May be repeated once for credit. Enrollment limited.

192. Internship in Rhetoric and Communication (1-5) II, III. The Staff
Internship—3 to 18 hours. Prerequisite: declared major in Rhetoric and Communication and 20 units of upper division Rhetoric and Communication courses. Work-experience projects, usually at off-campus sites under departmental supervision. May be repeated for credit up to 12 units. Units do not count toward major requirement. (P/NP grading only.)

194H. Senior Honors Thesis (4) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour; individual tutorial on research project—3 hours. Prerequisite: senior standing and approval by Honors Committee. Directed reading, research, and writing culminating in the preparation of honors thesis under direction of faculty adviser.

197T. Tutoring in Rhetoric and Communication (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 Communication and consent of Department Chairperson. Tutoring in upper division Rhetoric and Communication 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.)

198. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)
Professional Course

300. Teaching Communication Skills at the College Level (4) I. Motley
Lecture—2 hours; discussion—1 hour; laboratory—4 hours.
Prerequisite: graduate standing or consent of instructor. Problems and techniques of teaching basic communication skills courses at the college level. (SU grading only.)

Russian

(Russian Language emphasis)

Russian 101A, 101B, 101C, 102, 103, 105, 104, 106, 107, 128, 128d

Russian 102 or 105
Russian 102 or 104
Russian 106
Additional upper division units chosen in consultation with adviser

Russian Area Studies emphasis

Russian 106
Russian 101A, 103, or 104
Russian 150
Three courses, with no more than two in one area, to be chosen from the following two areas:
(a) History 137A, 138, 102F
(b) Social sciences—Political Science 136, Economics 117, Geography 124

To meet special interest course needs, a student should obtain written approval from an advisor.

Total Units for the Major 44-78

Major Adviser. L.J. Grant.

Honors and Honors Program. The honors program comprises at least one quarter of study under course 194H, which will include a research paper. See also the University and College requirements.

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.

Russian

A.B. Major Requirements:

Preparatory Subject Matter

UNITS

3-8

Literature/Language emphasis

Russian 1 through 6 or the equivalent

Russian 41, 42

Recommended, Linguistics 1

Area Studies emphasis

Russian 1 through 6 or the equivalent

Russian 41 or 42 or the equivalent course in basic literary analysis

36-44

Russian Literature emphasis

Russian 101A, 101B, 101C

Russian 102 or 103 or 105

Russian 127

Russian 127 or 128

Additional upper division units chosen in consultation with adviser

NOTE: For key to footnote symbols, see page 131.

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 (5) I, II. Grant in charge

Discussions—5 hours; laboratory—1 hour. Introduction to Russian grammar and development of language skills in a cultural context with special emphasis on Russian folk traditions. (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 (5) II. Grant in charge
Discussions—5 hours; laboratory—1 hour. Prerequisite: course

Graduate Adviser, H. Murav.

Russian

A.B. Major Requirements:

Preparatory Subject Matter

UNITS

3-8

Literature/Language emphasis

Russian 1 through 6 or the equivalent

Recommended, Linguistics 1

Area Studies emphasis

Russian 1 through 6 or the equivalent

Russian 41 or 42 or the equivalent course in basic literary analysis

36-44

Russian Literature emphasis

Russian 101A, 101B, 101C

Russian 102 or 103 or 105

Russian 127

Russian 127 or 128

Additional upper division units chosen in consultation with adviser

NOTE: For key to footnote symbols, see page 131.

Graduate Adviser. L.J. Grant.

Honors and Honors Program. The honors program comprises at least one quarter of study under course 194H, which will include a research paper. See also the University and College requirements.

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.

Russian

A.B. Major Requirements:

Preparatory Subject Matter

UNITS

3-8

Literature/Language emphasis

Russian 1 through 6 or the equivalent

Russian 41, 42

Recommended, Linguistics 1

Area Studies emphasis

Russian 1 through 6 or the equivalent

Russian 41 or 42 or the equivalent course in basic literary analysis

36-44

Russian Literature emphasis

Russian 101A, 101B, 101C

Russian 102 or 103 or 105

Russian 127

Russian 127 or 128

Additional upper division units chosen in consultation with adviser

NOTE: For key to footnote symbols, see page 131.

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 (5) I, II. Grant in charge

Discussions—5 hours; laboratory—1 hour. Introduction to Russian grammar and development of language skills in a cultural context with special emphasis on Russian folk traditions. (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 (5) II. Grant in charge
Discussions—5 hours; laboratory—1 hour. Prerequisite: course

Graduate Adviser, H. Murav.
101A. Advanced Russian (4) I. Tumins
Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 101B. Practice in writing Russian. One composition on a different topic each week. Topics include: history, geography, politics, and literature of Russia; comparison of Soviet society with contemporary literatures; current events. Conducted in Russian. Offered in odd-numbered years.

102. Russian Composition (4) II. The Staff
Discussion—3 hours; individual tutorial with instructor. Prerequisite: course 101C. Techniques of translating Russian scientific texts. Science students will select articles from their fields 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; preparation of texts—1 hour. Prerequisite: course 6. Intensive conversational practice and discussion of current events and contemporary topics. Offered in even-numbered years.

120. Medieval Literature and Eighteenth-Century Classicism (In English) (4) II. Tumins
Lecture—3 hours; discussion—1 hour. Survey of medieval epic, chronicle, and tales; of the early development of prose and of Russian literature. Also Classicism and Romanticism will be studied. Offered in even-numbered years.

121. Nineteenth-Century Russian Prose (In English) (4) II. Murav
Lecture—3 hours; term paper. Development of prose from Pushkin and Gogol, through Dostoevsky and Tolstoy, to Maxim Gorky. Other writers are selected as necessary. Tu- jeev, Gorina, Ponomarev, Safin, Khlebnikov, Romanticism, the Natural School, critical realism, and psychological realism are covered. Offered in odd-numbered years.

122. Twentieth-Century Russian Prose (In English) (4) II. Murav
Lecture—3 hours; term paper. Examination of various trends including Aksakov, Yusupov, Nemirovich, and Socialist Realism in development of prose. Readings from such writers as Genrikh, Zamiatin, Tolstoy, Pasternak, and Solzhenitsyn. Offered in even-numbered years.

126. The Russian Theater (In English) (4) III. The Staff
Lecture—3 hours; discussion—1 hour. The main works of Russian dramatists from Gogol to the present, including Turgenev, Tovstoy, Chekhov, Gorky, Mayakovsky, Bulgakov, Shvarts. Offered in odd-numbered years.

127. Nineteenth-Century Russian Poetry (4) II. Rancour-Laferté
Discussion—3 hours; term paper. Prerequisite: course 6. Introduction to the principles of Russian verse classification followed by historical and poetic analysis of the following figures: Derzhavin, Pushkin, Lermontov, Tolstoy, Pushkin, Dvoryansky, Baratynsky, Lev- montov, Nekrassov, Tchaikovsky, and Fei. Conducted in Russian. Offered in even-numbered years.

128. Twentieth-Century Russian Poetry (4) II. Rancour-Laferté
Discussion—3 hours; term paper. Prerequisite: course 6. Introduction to principles of Russian verse classification followed by historical and poetic analysis of the following figures: Bely, Blok, Akhmatova, Mandelstam, Eessen, Mayakovsky, Khlebnikov, Pasternak, Efrushinovshchikov, Voznesensky, and Brodsky. Conducted in Russian. Offered in even-numbered years.

130. Contemporary Soviet Culture (4) III. Cholst
Lecture—3 hours; discussion—1 hour. Upper division standing required or consent of instructor. Knowledge of Russian not required. Investigation of current trends in Soviet culture and the interactions between the artist and the government. Topics include: history of censorship, official and dissent art, recent changes in the cultural scene. Offered in even-numbered years.

131. Literature of Revolution (4) II. Murav
Lecture—3 hours; term paper. Prerequisite: History 3 or 4C, and/or any introductory literature course. Study of impact of revolution on society and culture: the major artistic, political and historical works surrounding the Russian revolutions of 1905 and 1917. General Education credit: Critical Thinking and Culture/Northern Europe. One term preparation: any course in the GE Literature Preparation List, or History 3 or 4C. Offered in odd-numbered years.

134. Dostoevsky (In English) (4) I. Tumins
Lecture—3 hours; discussion—1 hour. Analysis of Dostoevsky's principal works such as Crime and Punishment, The Idiot, The Brothers Karamozov, and The Diary of a Writer and other works. Offered in even-numbered years.

141. Tolstoy (In English) (4) I. Tumins
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 even-numbered years.

150. Russian Literature: The Eighteenth Century (4) II. The Staff
Discussion—3 hours; term paper. Knowledge of Russian not required. Study of Russian culture in nineteenth and twentieth centuries from its beginnings to the end of the century. Russian art, music, philosophy, church traditions, and daily life. Offered in odd-numbered years.

154. Russian Folklore (4) II. Rancour-Laferté
Lecture—3 hours; discussion—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.

160. Russian Phonology and Morphology (4) II. The Staff
Lecture—3 hours; discussion—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.

192. Research Essay (2) I, II, III
Prerequisite: a Russian literature course (may be taken con-
currently). A research essay, based on primary and secondary sources, dealing in depth with a topic assigned by the instructor. Offered in odd-numbered years.

194H. Special Study for Honors Students (5) I, II, III
The Staff (Chairperson in charge)
Prerequisite: open only to honors students. Guided research leading to an honors paper.

198. Directed Group Study (1-9) I, II, III
The 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

200. Old Church Slavic (4) I. Gallant
Lecture—3 hours; reading projects. A synchronic and diachronic analysis of Old Church Slavic. Offered in odd-numbered years.

202. History of the Russian Language (4) II. The Staff
Seminar—3 hours; individual reading projects—1 hour. Prerequisite: course 200 or consent of instructor. Survey of Russian historical grammar and development of Russian literature. Reading in the original texts from eleventh to eighteenth century. Offered in odd-numbered years.

204. Descriptive Russian Grammar (4) II. The Staff
Lecture—3 hours; reading projects—1 hour. Introduction to modern Russian phonology and morphology. Offered in even-numbered years.

210. Style and Syntax (4) I. Tumins
Discussion—3 hours; reading projects—1 hour. Examination of stylistic differences between spoken and written Russian.

218. Style and Syntax (4) II. The Staff
Discussion—3 hours; reading projects—1 hour. Prerequisite: course 210A or consent of instructor. Examination of stylistic differences between spoken and written Russian.

210C. Russian Style and Syntax (4) III. The Staff
Discussion—3 hours; term paper. Prerequisite: course 210B or consent of instructor. Students present formal papers and talks on political, economic, social, and literary topics, lead and participate in discussions. Conducted in Russian.

220. Old Russian Literature (4) II. Tumins
Seminar—3 hours. Advanced study of intellectual movements and literary styles of works such as "The Song of Igor's Campaign," "Zadonshchik," Epifany's "Lives," Ivan IV's cycle of epistles. May be repeated for credit when different topics are studied. Offered in odd-numbered years.

221. Eighteenth-Century Russian Literature (4) II. Tumins
Seminar—3 hours. Advanced study of literary movements and styles in prose or poetry. The works of writers such as Lavrentiev, Lopukhinsky, Spaletsky, and Kar- amzin will be analyzed. May be repeated for credit when different topics are studied. Offered in odd-numbered years.

222. Nineteenth-Century Russian Literature (4) I. Rancour-
Laferté
Seminar—3 hours. Advanced study of the works of one or several writers or movements of the period. May be repeated for credit with consent of instructor when different topics are studied. Offered in odd-numbered years.

223. Early Twentieth-Century Russian Literature (4) I. Rancour-
Laferté
Seminar—3 hours. Advanced study of the works of one or several writers or movements of the period. May be repeated for credit with consent of instructor when different topics are studied. Offered in even-numbered years.

224. Soviet Russian Literature (4) III. Rancour-Laferté
Seminar—3 hours. Analysis of selected works of Russian prose and poetry with particular emphasis on works of ex-
traneous literary merit or of unusual importance in the development of genre, schools, styles, techniques, and various formal elements. May be repeated for credit when different topics are studied. Offered in odd-numbered years.

226. Group Study (1-5) I, II, III
The Staff (Chairperson in charge)
(S/U grading only)

269. Research (1-12) I, II, III
The Staff (Chairperson in charge)
(S/U grading only)

Professional Course

300. The Teaching of Russian (2) I. Grant
Discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Workshop in language teaching meth-
ods. Includes students audit classes of undergraduate and faculty supervision. Required of new and prospective teaching assistants.
**Scandinavian**

(College of Letters and Science)

Department Office (German and Russian), 416 Sproul Hall (752-2114)

**Faculty**

Frits Sammern, Ph.D., Lecturer (Swedish, German)

**Courses in Scandinavian**

Upper Division Courses

110. Masterworks of Scandinavian Literature in Translation

(4) I. Sammern

Lecture—4 hours; term paper. Scandinavian novels, poetry, and drama are read in the original language and translated into English. Students are required to demonstrate their knowledge of the literature by a term paper at the end of the course.

111. Swedish Film as Narrativ

(4) III. Sammern

Lecture—6 hours; term paper. Swedish films studied as a means of communication within the European context. Students are required to demonstrate their knowledge of the literature by a term paper at the end of the course.

**Courses in Swedish**

Lower Division Courses

1. Elementary Swedish

(5) I. Sammern

Lecture—3 hours; term paper. Basic grammar and culture. Required for all majors and minors.

2. Elementary Swedish

(5) II. Sammern

Lecture—3 hours; term paper. Basic grammar and culture.

3. Intermediate Swedish

(5) III. Sammern

Lecture—3 hours; term paper. Advanced grammar and culture.

4. Intermediate Swedish

(5) IV. Sammern

Lecture—3 hours; term paper. Advanced grammar and culture.

5. Spoken Swedish

(2) I. Sammern

Lecture—2 hours; term paper. Basic grammar and culture.

6. Directed Group Study

(1-3) I, II, III. Sammern

Lecture—1-3 hours; term paper. Advanced grammar and culture.

**Sociology**

(College of Letters and Science)

Department Office, 113 Young Hall (752-0782)

**Faculty**

Nicole W. Biggart, Ph.D., Associate Professor (Sociology, Management)

Lawrence E. Cohen, Ph.D., Professor

James C. Cranmer, Ph.D., Associate Professor

Diane H. Fellmell, Ph.D., Associate Professor

Jack A. Goldstone, Ph.D., Professor

Bruce M. Hackett, Ph.D., Associate Professor

John R. Hall, Ph.D., Professor

Gary G. Hamilton, Ph.D., Professor

Mary Jackman, Ph.D., Professor (Political Science, Sociology)

Carl C. Jorgensen, Ph.D., Associate Professor

Edwin M. Lemert, Ph.D., Professor Emeritus

John F. Lofland, Ph.D., Professor

Lyn H. Lofland, Ph.D., Associate Professor

Leon H. Mayhew, Ph.D., Professor

Dario Melossi, Ph.D., Assistant Professor

Beatriz M. Pescueta, Ph.D., Assistant Professor (Chicago Studies, Sociology)

Julius A. Roth, Ph.D., Professor

John F. Scott, Ph.D., Professor

Judith Stacey, Ph.D., Associate Professor

John T. Wall, Ph.D., Professor

Daniel L. Wolf, Ph.D., Assistant Professor

**The Major Programs**

Sociology is the study of human society in all its manifestations. Its aim is to discover the process and structure of human interaction, to identify the main forces that sustain or weaken social groups, and to determine the conditions that transform social life. Sociology, like any science, is a disciplined, intellectual quest for knowledge about the fundamental nature of things.

The Department of Sociology offers two major programs, Sociology and Sociology—Organizational Studies.

Students selecting the Sociology major may choose one from four options offered within this major: the General emphasis, the Law and Society emphasis, the Social Welfare emphasis, and the Comparative Studies and World Development emphasis. The General Sociology emphasis allows students to obtain a broad understanding of the concepts, methods, and theories of sociology. Students selecting this major have some flexibility in creating a program of study tailored to their individual interests and needs. Typically students pursue such careers as urban planning and business, as well as graduate work in sociology. Students with a special interest in the areas of Law and Society or Social Welfare may choose a more specialized program of course work.

The Sociology—Organizational Studies major is designed to develop a broad understanding of the political, social, and economic organizations that comprise modern society. This major emphasizes a sociological perspective, but incorporates a multidisciplinary field of study. The major introduces students to a range of theories and methods that social scientists use in the analysis of organizations. Majors in Sociology—Organizational Studies will be prepared for a variety of career options, particularly in the field of management. The major has been specifically designed to meet entry requirements for programs of professional training leading to a Master’s degree in public or private management, and may also serve to further study in any of the disciplinary areas incorporated in the major.

In addition to the above majors and options, the Department of Sociology offers several other programs and opportunities for undergraduates. These include internships, fellowships, volunteer research assistantships, and membership in the Undergraduate Sociology Student Association and in the National Sociology Honors Society. The department also sponsors an undergraduate research award. For more information on the majors and special programs, contact the Departmental Advising Office in 139 Young Hall.

**Sociology**

A.B. Degree Requirements:

<table>
<thead>
<tr>
<th>General emphasis</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>24-25</td>
</tr>
<tr>
<td>Sociology</td>
<td>2, or 3</td>
</tr>
<tr>
<td>Select units from Anthropology</td>
<td>2</td>
</tr>
<tr>
<td>Select units from History</td>
<td>3, 4A, 4B, 4C</td>
</tr>
<tr>
<td>Select units from Philosophy</td>
<td>5, 14, Political Science</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>4</td>
</tr>
<tr>
<td>Sociology</td>
<td>126, 140, 150, 170, 170A, 180A</td>
</tr>
<tr>
<td>Select two courses from two of the following seven clusters and one additional course from a third cluster</td>
<td>20</td>
</tr>
<tr>
<td>Family, Gender, and Social Interaction</td>
<td>Sociology</td>
</tr>
<tr>
<td>Law and Social Services</td>
<td>Sociology</td>
</tr>
<tr>
<td>Social Conflict and Change</td>
<td>Sociology</td>
</tr>
<tr>
<td>Race and Ethnicity</td>
<td>Sociology</td>
</tr>
<tr>
<td>Power and Politics</td>
<td>Sociology</td>
</tr>
<tr>
<td>Knowledge and Communication</td>
<td>Sociology</td>
</tr>
<tr>
<td>Methodology</td>
<td>Sociology</td>
</tr>
</tbody>
</table>

Recommended: Sociology 189

**Law and Society option:**

| Preparatory Subject Matter | 25-27 |
| Sociology | 3, 46A, 46B | (or the equivalent) | 17 |
| Select units from Anthropology | 2 | Economics | 1A, 1B, History | 3, 4B, 4C, 17A, 17B |
| Philosophy | 1, 12, 21, 22, 23 | Political Science | 2, 3, 4, Psychology | 1, 15 |
| Depth Subject Matter | 40 |
| Sociology | 155 |
| Select units from Sociology | 120, 150, 152 |
| Select units from Sociology | 118, 122, 123, 130, 131, 136, 140, 141, 143A, 143B, 158, 165B, 169A or 180B, 185 |
| At least 16 additional units in upper division sociology or a second major (combination of 40 units | 16 |
| Total units for the Major | 65-67 |
| Law and Society option | 65-67 |

**Social Welfare option:**

| Preparatory Subject Matter | 25-27 |
| Sociology | 3, 46A, 46B | (or the equivalent) | 17 |
| Select units from Anthropology | 2 | Economics | 1A, 1B, History | 3, 4B, 4C, 17A, 17B |
| Philosophy | 1, 12, 21, 22, 23 | Political Science | 2, 3, 4, Psychology | 1, 15 |
| Depth Subject Matter | 40 |
| Sociology | 131, 140, 150 |
| Select units from Afro-American Studies | 100, Asian American Studies | 110, 111, Native American Studies | 124, 126, 171, Spanish | 124 |
| Sociology | 110, 129, 169 |
| Select units from Sociology | 122, 127, 132, 143A or 143B, 152, 154, 158, 165B, 169A or 180B, 181, 182 |
| At least 8 additional units in upper division sociology, economics, or political science | 16 |
| Total units for the Major | 65-67 |

**Comparative Studies and World Development option:**

| Preparatory Subject Matter | 30-57 |
**Sociology** – Organizational Studies

### A.B. Degree Requirements:

#### Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
<th>Sociology 1, 46A, 46B</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics 1A, 1B</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Anthropology 2</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

At least one course in Geography 2, History 15, Political Science 2, and 3-4 courses in language instruction in modern foreign languages. At least 26 units at UCSD.

#### Depth Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
<th>Sociology 141, 145, 165A, 170</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics 115A, Anthropology 128</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>At least 2 units from Sociology 116, 118, 131, 143A, 144, 156</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Regional focus, three courses from one of the following groups</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

- **(a) Africa/Middle East:** Anthropology 140A, 140B, 142, Economics 175, Geography 125A, 125B, History 115A, 115B, 115C, 116, Political Science 134, 146
- **(b) Latin America/Pacific:** Anthropology 144, 147, Geography 122A, 122B, History 161A, 161B, 162, 165, Spanish 135, 136

#### Total Units for the Major

(Comparative Studies and World Development) 78-105

### Sociology—Organizational Studies

#### Minor Advisers

- Consult the Departmental Advising Office, 139 Young Hall.
- Teacher Credential Subject Representative: Consult the Departmental Advising Office, 139 Young Hall. See also the schedule of recent subject offerings.
- Graduation Study. The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in sociology. Further information and applications regarding graduate study may be obtained at the department office.
- Graduation Advisers: Consult the Departmental Advising Office, 139 Young Hall.

### Courses in Sociology

#### Lower Division Courses

1. **Introduction to Sociology** (S) (5). 3-5 units, discussion—1 hour; Principles and basic concepts of sociological psychology. Includes the study of: the character of the self, identity, roles, socialization, identity change, emotion and social interaction. General Education credit: Comparative Studies/Sociology 101.

2. **Self and Society** (4). 4-5 units, discussion—1 hour; Principles and basic concepts of sociological psychology. Includes the study of: the character of the self, identity, roles, socialization, identity change, emotion and social interaction. General Education credit: Comparative Studies/Sociology 101.

3. **Social Problems** (4). 2-4 units, discussion—1 hour; Principles and basic concepts of sociological psychology. Includes the study of: the character of the self, identity, roles, socialization, identity change, emotion and social interaction. General Education credit: Comparative Studies/Sociology 101.

4. **Sociology of Popular Culture** (4). 2-4 units, discussion—1 hour; Principles and basic concepts of sociological psychology. Includes the study of: the character of the self, identity, roles, socialization, identity change, emotion and social interaction. General Education credit: Comparative Studies/Sociology 101.

5. **Computers and Social Research** (2). 2-3 units, discussion—1 hour; Principles and basic concepts of sociological psychology. Includes the study of: the character of the self, identity, roles, socialization, identity change, emotion and social interaction. General Education credit: Comparative Studies/Sociology 101.

#### Upper Division Courses

- **102. Sociology of the Environment** (4). I. Cramer, Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 3 upper division standing or consent of instructor; enroll in the environmental sciences. Sociological analysis of environmental problems in advanced industrial societies; types of problems and their causes; population growth and affluence; the study of the environment and the environmental movement; impacts of environmental changes on social institutions and structures, e.g., family, economy, stratification.

- **105. Evaluation Research Methods** (4). T. Cramer, Lecture—3 hours; discussion—1 hour or research project. Prerequisite: courses 3 upper division standing or consent of instructor; enroll in the environmental sciences. Sociological analysis of environmental problems in advanced industrial societies; types of problems and their causes; population growth and affluence; the study of the environment and the environmental movement; impacts of environmental changes on social institutions and structures, e.g., family, economy, stratification.

- **106. Intermediate Social Statistics (4).** I. Cramer, Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 3 upper division standing or consent of instructor; enroll in the environmental sciences. Sociological analysis of environmental problems in advanced industrial societies; types of problems and their causes; population growth and affluence; the study of the environment and the environmental movement; impacts of environmental changes on social institutions and structures, e.g., family, economy, stratification.

- **107. Seminar in Sociological Analysis (4).** J. Jorgensen, Seminar—3 hours, to be arranged—1 hour; Research and analysis using basic concepts of sociology, social organization, culture, society, socialization, stratification in application to specific problems. May be repeated for credit with consent of instructor. Limited enrollment.


- **118. Political Sociology (4).** J. Jackman, Lecture—3 hours; discussion—1 hour or term paper or research project. Relation of social cleavages and social cohesion to the functioning of political institutions; the social bases of local and national power structures; social sources of political movement, analysis of concepts of alienation, revolution, ideology, ruling class, and elite.

- **119. War-Peace Institutions (4).** J. J. Lowfield, Lecture—3 hours; discussion—1 hour or term paper or research project. Relation of social cleavages and social cohesion to the functioning of political institutions; the social bases of local and national power structures; social sources of political movement, analysis of concepts of alienation, revolution, ideology, ruling class, and elite.

- **120. Deviation and Society (4).** I. Malossi, Lecture—3 hours; discussion—1 hour or term paper or research project. Theory and studies of deviation in relation to modern reaction, group processes and social roles. Stigma and incapacity; cosmetic defect. Deviation theory applied to selected crimes, prostitution, alcohol use, and mental disorders. Creativity and sociability.

- **122. Sociology of Adolescence (4).** I. I. Scott, Lecture—3 hours; discussion—1 hour or term paper or research project. Chronological, psychological, and sociological changes in the socialization of children and adolescents. The emergence of "yo-youth cultures." Genogram and success as a social problem.

- **123. American Society (4).** I. I. Scott, Lecture—3 hours; discussion—1 hour or term paper or re-
among socializing agencies. Comparison of educational in-
discipline and technology, to determine how they affect socialization. Political
teaching, education and occupational placement,
professionalization of educators. Current trends and recent
research.

[228. Sociological Social Psychology (4) I. J. Lolland
Seminar—3 hours; seminar—1 hour. Prerequisite: course 156A or consent of
Instructor. Behavior, attitudes and personality development in college
years. Interactions and the effect of those of relations in both
the public and private sectors.

181. Social Change Organizations (4) III. J. Lolland
Seminar—3 hours; seminar—1 hour. Prerequisite: consent of instructor.
Analysis of the effect of social change on education and social pro-
cessing. Involvement of voluntary associations and grassroots citizen groups.
Topics treated in include formal organizations, decision-making, leadership,
and the role of local and national factors on the effectiveness of
social movements. (S/U grading only.)

[229. Experimental and Utopian Communities (4) III. Hackett
Lecture—3 hours; seminar—1 hour. Prerequisite: upper division standing or consent of
Instructor. Examination of the history and development of utopian
communities and the role of technological, economic, and social
factors on the success of these communities. (S/U grading only.)

[230. Ethnic (Race) Relations (4) I. Pasquino
Lecture—3 hours; seminar. Advanced study of the determinants of
ethnic groupings and their interrelationships. Major themes
will be the diffusion of ethnic relations and the causes of
ethnic conflict. Specific focus upon dominance and resistance
to dominance. Influence of social science research.

183. Sociology of Social Welfare (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of
Instructor. Sociology of the evaluation and outcomes of social welfare programs
in modern societies.

[231. Social Science Writing (4) III. Jorgensen
Lecture—3 hours; discussion—1 hour. Prerequisite: course 45A, upper division standing
in social science. Students are required to write and present papers,
and must develop their own topics. (S/U grading only.)

189. Internship and Research Practicum (2-12) I, II, III. The Staff
Internship—3 hours; discussion—1 hour. Prerequisite: consent of faculty.
Internship in the field of social science.

[232. Urban Sociology (4) II. J. Lolland
Seminar—3 hours; seminar. Prerequisite: course 189. An integrated course in
urban sociology. Examination of urban life, its structure, and the
various forces that influence urban social processes. (S/U grading only.)

197T. Tutoring in Sociology (1-4) I, II, III. The Staff
Tutoring—3-12 hours. Prerequisite: upper division standing;
completion of a minimum of 12 units of course work with distinction. Activities
are determined by the nature of the course assignment. May include (but not limited to) tutoring on course material,
exam preparation, and leading discussion groups. (P/NP grading only.)

[233. Directed Group Study (1-5) I, II, III. The Staff
Seminar—in charge. Prerequisite: consent of instructor. (P/NP grading only.)

198. Special Study for Advanced Undergraduates (1-5) I, II,
III. The Staff (Hamilton in charge)
Prerequisite: open to seniors only. (P/NP grading only.)

Graduate Courses

207A-207B. Methods of Quantitative Research (4-4) II-Ill.
Cohen
Lecture—3 hours; section—1 hour. Prerequisite: course 105 or the equivalent.
Principles of study design, examination of measure-
ments, data collection methods, and multivariate analysis.
Course will stress actual practice of techniques. Students will
write quantitative data analysis using packaged computer programs. (Deferred grading only, pending com-
pletion of sequence.)

[235. Economy, Polity and Society (4) I. Hamilton
Seminar—3 hours; seminar. Prerequisite: consent of instructor. Open
to graduate students in sociology and related disciplines.
Course introduces students to topics and selected issues in
the related fields of economic and political sociology
and political economy.

[236. Deviance, Law, and Social Control (4) I. Cohen
Seminar—3 hours; projects. Prerequisite: course 120 or consent of
Instructor. Report and discussion of literature on
selected forms of deviance in relation to law and formal
social control. Agency contacts and exploratory research
projects following the topics of discussion.

[237. Sociology of Education (4) I. I. The Staff
Seminar—4 hours. Structural differentiation of and relationship

Soil and Water Science

[300. Organizations and Institutions (4) II. Biggart
Seminar—4 hours. Theory of formal organizations and bu-
reauacracy. Methods of research in organizational and in-
stitutional studies. Historical and comparative analysis of political,
religious, educational, military and economic struc-
ture.

[301. Sociology of Environment (4) I. Lolland
Seminar—3 hours; field trips. Prerequisite: graduate standing in Sociology or consent of
Instructor. The process of collecting, analyzing and reporting qualitative social data: techniques of
intensive interviewing, participant-observation and doc-
ument analysis, generating, developing and evaluating analy-
ses, summarization, reporting, and writing up qualitative data. Emphasis on application of principles;
each participant completes a field work project. (Deferred grading only, pending completion of sequence.) Offered in odd-numbered years.

[302. Field Research (4) II. Lolland
Seminar—3 hours; field trips. Prerequisite: consent of instructor. Sociology of social stratification and In-
equalities. Examination of the role of social factors in the production of stratification and inequality. (S/U grading only.)

Soil and Water Science

(College of Agricultural and Environmental Science)

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 advanced
degrees in Soil Science or Water Science or for a career involving these resources as well as
for a more general interest in the use and protection.
Programs are designed to include land
use, soil survey, soil management and conservation, plant nutrition, diagnostic technology, irrigation and
drainage, water resources management, water
gquality, 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 op-
opportunities which includes managerial and technical
positions with agribusinesses 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 conser-
vation.

Soil and Water 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 coursework can be taken. Courses shown without parentheses are required.)

UNITS

Preparatory Subject Matter

Biology (Biology Sciences 1)

Chemistry (General Chemistry 1

Mathematics, including calculus (Mathematics 16A, 16B, statistics, and computer
programming (Biology 51)

Chemistry, including Chemistry 1A-1B-1C and a

Ecology and Environment Science 3

Economics or agricultural economics 3

Written expression 2
Sciences Teaching Center, 122 Hoagland Hall (752-1659).

Lower Division Courses

10. Concepts of Soil Science (3) I. Zasowski
   Lecture—3 hours; optional Saturday field trip. Not open to students who have received credit for course 100 or similar introductory soil science course. Study of soils as natural bodies formed by interactive environmental processes; their response to use and management; taxonomic and capability classifications; construction practices for preservation of soil resources. Intended for students with diverse interests and backgrounds.
   92. Soil Science 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 opportunity off and on campus in soil science supervised by a member of the faculty. (P/N grading only.)

Upper Division Courses

100. Principles of Soil Science (4) I. Murne
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1A-1B, Biological Sciences 1, and consent of instructor. Geology 50, Botany 2, Microbiology 2, and Chemistry 8 recommended. Formation; properties and behavior of soils. Nature and interactions of solid, aqueous, gaseous and biological components. Soil-plant-atmosphere relationships. Soil development and geography, management, and conservation.

102. Soil and Water Chemistry (5) I. Bureu
   Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 100 or the equivalent preparation in introductory earth science or consent of instructor. Chemical nature of the mineral and organic organic components. Study of soils of soil and the soil solution; ion exchange and other colloidal phenomena including the effect of soil amendments and fertilizers; microbiological processes in soils.

106. Field Studies of Soil Resources (6) Extra-semester summer.
   Dahlgren, Singlet, valued.
   On-campus—daily 1 week; study tour—daily 5 weeks. Prerequisite: consent of instructor; course 100 recommended. In situ soil studies with an emphasis on the interactions between soil characteristics and kinds of land use. Field identification and evaluation of soils for agricultural, range, forest, urban, and natural resource management.

107. Soil Physics (4) I. Rollston
   Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100, Water Science 100, Mathematics 16A, or the equivalent. Description of soil physical properties. Principles of water, gas, heat, and solute movement in soil with selected examples related to soil and water management. Influence of soil physical properties on transfer processes.

109. Soil Fertility and Fertilizers (4) III. The Staff
   Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or the equivalent preparation in elements of soil science. Forms and availability of plant nutrient elements in soil. Effects of fertilizers and soil amendments on crop and soil characteristics; conduct and interpretation of soil fertility assays.

111. Geomicrobiology (4) II. The Staff
   Lecture—3 hours; laboratory—3 hours. Prerequisite: general chemistry and an introductory biology course. Major groups of microorganisms in the geosphere and their responses to environmental variables. Activities of microorganisms in relation to water pollution, solid waste disposal, pesticide degradation, and soil fertility.

118. Soils in Land Use and the Environment (4) III. Singer
   Lecture—3 hours; discussion—1 hour; two 1-day field trips. Prerequisite: course 100 or consent of instructor. Soils are considered as elements in land use planning and environmental quality. Topics include: soil survey reports, remote sensing, land capability classification, soil erosion, waste disposal on soils and soil reclamation.

120. Soil Genesis, Morphology and Classification (5) III. Southard
   Lecture—4 hours; laboratory—3 hours (includes 5 one-day weekend field trips). Prerequisite: course 100 and Geology 1; or consent of instructor. Recognition and description of soils; chemical and physical processes of soil formation; classification of soils; and introduction to soil classification with emphasis on soil taxonomy.

123. Soil Taxonomy (3) II. The Staff
   Lecture—14 hours; discussion—14 hours. Prerequisite: courses 120 or consent of instructor. An intermediate course in soil classification. Study and analysis of the current system of classification used by the United States Geological Survey and the United States Department of Agriculture. Practice in classifying soil individuals with emphasis on their placement in the system. Offered in even-numbered years.

150. Soil and Plant Tissue Testing (3) II. Zasowski
   Lecture—3 hours. Prerequisite: course 106, an upper division crop production course, and consent of instructor. Principles of crop analysis, and use of soil and plant tissue analyses in management of soil fertility, in diagnosis of crop nutritional programs, and in crop quality assessment.

152. Soil Science 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 opportunity off and on campus in soil sciences, supervised by a member of the faculty. (P/N grading only.)

180. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
   (P/N grading only.)

185. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
   (P/N grading only.)

Graduate Courses

207. Transport Processes in Soils (3) II. Rolston

208. Soil-Plant Interrelationships (3) II. Murne
   Lecture—3 hours. Prerequisite: course 100; Botany 111B; or consent of instructor. Plant needs, occurrence and reactions of water and mineral nutrients in soils; root systems and their growth in soils; mass flow and diffusion mechanisms in nutrient acquisition; models relating nutrient uptake to soil and plant characteristics; nutrient assimilation and crop quality.

211. Soil Microbiology (2) II. The Staff
   Lecture—2 hours. Prerequisite: Chemistry 8B, course 102, or consent of instructor. Activities of some important groups of microorganisms. Identification 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) III. Dahlgren
   Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: course in soil chemistry or consent of instructor. Nature, properties, and occurrence of the more common minerals in soils and rocks. Application of mineral analysis methods, including X-ray, thermal and chemical characterization of mineral systems, and in the study of properties of soils and weathering of minerals. Offered in odd-numbered years.

215. Physical Chemistry of Soils (3) III. Bureu
   Lecture—3 hours. Prerequisite: Chemistry 107B or 110B, or consent of instructor. Physical-chemical, colloidal, and surface aspects of the soil system. Offered in even-numbered years.

218. Soil Erosion and Conservation (3) II. Singer
   Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing; courses 118, 120 processes of soil erosion by wind and water in agricultural areas, and methods of soil conservation will be discussed. Methods of predicting rates of soil erosion will be considered. Offered in even-numbered years.

223. Pedology (3) III. Southard
   Lecture—1 hour; discussion—2 hours. Prerequisite: courses 120 and 125 or the equivalent, or consent of instructor. Origin, characteristics, and uses of soils. Emphasis given to soil-forming processes, soil-geomorphic relations, and the importance of soil genesis and morphology to classification and interpretation. Offered in even-numbered years.

229. Special Topics In Soil Science (1, 2, 3) I, III. The Staff
   Seminar—1 hour. Prerequisite: graduate standing; oral presentation and discussion of scientific material and procedures for review and critique of publications. (S/U grading only.)

288. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor.

291. Research (1-12) I, II, III. The Staff (Chairperson in charge)
   (S/U grading only.)

NOTE: For key to footnote symbols, see page 131.
Spanish (College of Letters and Science)
Germán Guillón, Ph.D., Chairperson of the Department
Department Office (Spanish and Classics), 616 Sproul Hall (752-0835)

Faculty
Martëa E. Altisent, Ph.D., Associate Professor
Sandra L. Armitstead, Ph.D., Professor
Donal G. Castanien, Ph.D., Professor Emeritus
Angie C. Chabram, Ph.D., Assistant Professor
Gonzalo Diaz-Migoyo, Ph.D., Professor
Zunilda Gertel, Ph.D., Professor
Mario González, Ph.D., Lecturer Emeritus
Germán Guillón, Ph.D., Professor
Didier T. Jaen, Ph.D., Professor
Daniel S. Kell, Ph.D., Professor Emeritus
Almerindo E. Ofjeda, Ph.D., Assistant Professor
Fabian S. Samaniego, M.A., Senior Lecturer
Antonio Sánchez-Romero, Ph.D., Professor
Robert M. Scari, Ph.D., Professor
Maximo Torreblanca, Ph.D., Professor
Hugo J. Verani, Ph.D., Professor

Faculty
Luisa Quiroz, Visiting Lecturer (Portuguese)

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 on language or on literature, depending on 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 library science, law, medicine, and in government, social service, or business. Spanish majors are strongly encouraged to complement their work in the department through studies in related areas such as Mexican-American studies, international relations, linguistics, comparative literature, art, history, and philosophy.

Spanish
A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Spanish</th>
<th>132</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional upper division units to be selected as follows:</td>
<td>23-24</td>
</tr>
<tr>
<td>Plan 1: Spanish Literature Emphasis</td>
<td>134</td>
</tr>
<tr>
<td>Spanish 104A</td>
<td>104B</td>
</tr>
<tr>
<td>Spanish 108A</td>
<td>108B</td>
</tr>
<tr>
<td>Three electives in literature (at least one must be in Spanish-American literature)</td>
<td>12</td>
</tr>
<tr>
<td>Plan 2: Spanish-American Literature Emphasis</td>
<td>135</td>
</tr>
<tr>
<td>Spanish 135</td>
<td>136</td>
</tr>
<tr>
<td>Spanish 139A</td>
<td>139B</td>
</tr>
<tr>
<td>Three electives in literature (at least two must be in Spanish-American literature)</td>
<td>12</td>
</tr>
<tr>
<td>Plan 3: Chicano Literature Emphasis</td>
<td>136</td>
</tr>
<tr>
<td>Spanish 128A</td>
<td>128B</td>
</tr>
<tr>
<td>Spanish 123</td>
<td>124</td>
</tr>
<tr>
<td>One course from Spanish 105A-105B, 108A-108B</td>
<td>137</td>
</tr>
<tr>
<td>Plan 4: Spanish Language Emphasis</td>
<td>125</td>
</tr>
<tr>
<td>Spanish 133</td>
<td>134</td>
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<tr>
<td>Spanish 137</td>
<td>138</td>
</tr>
<tr>
<td>Three electives (at least one must be in literature)</td>
<td>12</td>
</tr>
</tbody>
</table>

Total Units for the Major 45-79

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Portuguese</th>
<th>24</th>
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<tbody>
<tr>
<td>Portuguese 101 or 108</td>
<td>4</td>
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<tr>
<td>Portuguese 104A or 104B</td>
<td>6</td>
</tr>
<tr>
<td>Portuguese 108A or 108B</td>
<td>4</td>
</tr>
<tr>
<td>One course from Portuguese 114, 115, 116, 117, 118</td>
<td>4</td>
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</table>

Spanish

<table>
<thead>
<tr>
<th>Spanish</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>One course in Hispanic literature (any course)</td>
<td>3</td>
</tr>
<tr>
<td>One course in culture from Spanish 134, 135, 136</td>
<td>4</td>
</tr>
<tr>
<td>One course in advanced composition from Spanish 110A, 110B</td>
<td>4</td>
</tr>
<tr>
<td>One course from Spanish 131, 132, or 133</td>
<td>4</td>
</tr>
<tr>
<td>Two elective courses acceptable for the Spanish major to be chosen in consultation with a major advisor</td>
<td>7-8</td>
</tr>
</tbody>
</table>

Note: Students majoring in Linguistics or Chicano Studies and minoring in Spanish should bear in mind that Spanish courses are used to satisfy the major requirements, only one of these courses may be applied to the minor.

Teaching Credential Subject Representative, The Staff. See also under Teacher Education Program.

The Master of Arts Degree
The Department offers courses leading to the M.A. degree in Spanish to students who have completed with distinction the A.B. degree in Spanish, or the equivalent. Candidates will be recommended for admission to graduate studies in Spanish provided they meet the requirements of the Graduate Division and of the Department of Spanish. Detailed information may be obtained by writing to the Chairperson of the Spanish Department.

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 Chairperson of the Spanish Department.

Courses in Portuguese

Lower Division Courses

1. Elementary Portuguese (5) I. The Staff
   Discussion—1 hour, laboratory—1 hour, recitation—3 hours.

NOTE: For key to footnote symbols, see page 131.

Portuguese grammar, conversation, and reading. (Students who have successfully completed, with a C- or better, Portuguese 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP 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 Portuguese (5) II. The Staff
   Discussion—1 hour, laboratory—1 hour, recitation—3 hours.
   Prerequisite: course 1 or consent of instructor. Continuation of course 1.

3. Elementary Portuguese (5) III. The Staff
   Discussion—1 hour, laboratory—1 hour, recitation—3 hours.
   Prerequisite: course 2 or consent of instructor. Continuation of course 2.

4. Intermediate Portuguese (5) IV. The Staff
   Discussion—4 hours. Laboratory—1 hour, recitation—3 hours.
   Prerequisite: course 3 or consent of instructor. Continuation of course 3. Focusing on European-Brazilian narrative, drama, expository prose, and poetry. In-depth study of syntax with emphasis on the verbal tenses and moods.

Upper Division Courses

101A. Advanced Grammar and Composition in Portuguese (4) I. The Staff
   Discussion—3 hours, discussion—1 hour, recitation—3 hours.
   Prerequisite: course 5 or the equivalent, or consent of instructor. Reading, class discussions, and written analyses of Portuguese essays and articles. Offered in odd-numbered years.

101B. Advanced Grammar and Composition in Portuguese (4) II. The Staff
   Discussion—3 hours, discussion—1 hour, recitation—3 hours.
   Prerequisite: course 5 or the equivalent, or consent of instructor. Readings, class discussions, and written analyses of Portuguese essays and articles. Offered in odd-numbered years.

103A. Survey of Portuguese Literature (4) I. The Staff
   Lecture—3 hours, discussion—1 hour, recitation—3 hours.
   Prerequisite: course 5 or the equivalent. Historical survey of the important periods of Portuguese literature. Medieval, Classic, and Baroque. Offered in even-numbered years.

103B. Survey of Portuguese Literature (4) II. The Staff
   Lecture—3 hours, discussion—1 hour, recitation—3 hours.
   Prerequisite: course 5 or the equivalent. Historical survey of the important periods of Portuguese literature: the nineteenth century, Romanticism, modern realism, Modernism, and Contemporary periods. Offered in odd-numbered years.

106. Survey of Brazilian Literature (4) III. The Staff
   Lecture—3 hours, discussion—1 hour, recitation—3 hours.
   Prerequisite: course 5 or the equivalent. Colonial Period of Brazilian literature: Baroque, Romanticism, Realism, Symbolism, Modernism. Modern trends in fiction and poetry. Offered in even-numbered years.

108A. Culture and Civilization of Portugal and Brazil (4) I. The Staff
   Lecture—3 hours, discussion—1 hour, recitation—3 hours.
   Prerequisite: course 5 or the equivalent. Portuguese and Brazilian civilization through its social institutions, art, cinema, literature and music. Offered in even-numbered years.

108B. Culture and Civilization of Portugal and Brazil (4) II. The Staff
   Lecture—3 hours, discussion—1 hour, recitation—3 hours.
   Prerequisite: course 5 or the equivalent. Portuguese and Brazilian civilization through its social institutions, art, cinema, literature and music. Offered in even-numbered years.

114. Luis de Camões (4) III. The Staff
   Lecture—1 hour, discussion—3 hours, recitation—3 hours.
   Prerequisite: course 5 or the equivalent. Lycamé de Camões including the themes, language and style of the "rendêndas." "Medécina nova" poetry. Sources, characteristics, content and meaning of the Camões "Os Lusíadas." Offered in even-numbered years.

115. Brazilian Novel of the Twentieth Century (4) I. The Staff
   Discussion—4 hours.
   Prerequisite: course 5 or the equivalent. Leading Brazilian novelists from the late nineteenth century to the present. Machado de Assis, Alceu de Andrade, Grajão, Ramos, D. Rego, Jorge Amado, and Eron Verlasso. Offered in even-numbered years.

116. Modern Portuguese Poetry (4) III. The Staff
   Discussion—4 hours.
   Prerequisite: course 5 or the equivalent. The "orfez" group of poets with emphasis on angust and socialism in Mário de Sá-Carneiro; Fernando Pessoa and his heteronomous creation. Alberto César, Alveon de Campos and Ricardo Reis. Offered in even-numbered years.
Courses in Spanish

Lower Division Courses

1. Elementary Spanish (5) I, II, III. The Staff (Samaniego in charge)
   Discussion—5 hours; laboratory—1 hour. Introduction to Spanish grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed, with a C or better, Spanish 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grade basis. Spanish 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grade basis only. All other students will receive a letter grade unless a P/NP petition is filed.

2. Elementary Spanish (5) I, II, III. The Staff (Samaniego in charge)
   Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Completion of course 1 in the areas of grammar and basic language skills.

3. Elementary Spanish (5) I, II, III. The Staff (Samaniego in charge)
   Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Grammar review through oral and written exercises, and expansion of vocabulary through reading of modern texts.

4. Intermediate Spanish (5) I, II, III. The Staff
   Discussion—1 hour; recitation—4 hours. Prerequisite: course 3. Introduction to the study of the principal authors, works, and movements of Medieval and Golden Age literature of Spain, and Spanish-American colonial literature.

5. Spanish-American Modernism (4) II, I, II. Allsett, J. Analysis of the literature of the twentieth century. Offered in odd-numbered years.

6. Advanced Spanish Conversation (2) I, II. I, II. The Staff
   Discussion—2 hours. Prerequisite: course 5 (concurrently) recommended. Continuation of course 8A. Limited enrollment. (P/NP grading only.)

9. Intermediate Spanish Conversation (2) I, II, III. The Staff
   Discussion—2 hours; recitation—2 hours. Prerequisite: course 5 (concurrently) recommended. Direct group conversation including practical exercises in phonetics and language pronunciation. Vocabulary expansion and emphasis on grammatical accuracy. Limited enrollment. (P/NP grading only.)

NOTE: For key to footnote symbols, see page 131.

110A. Advanced Spanish Composition I (4) I. The Staff
   Discussion—3 hours; reports. Prerequisite: course 28. Practice in expository writing, with an aim toward refinement and expansion of vocabulary.

110B. Advanced Spanish Composition II (4) II. The Staff
   Discussion—3 hours; reports. Prerequisite: course 28. Practice in creative writing, with an aim toward refinement and expansion of vocabulary.

111. Don Quixote (4) II. Diaz-Migoyo
   Lecture—3 hours; reports. Prerequisite: course 100.

112. Medieval Masterworks (4) I, Armead
   Lecture—3 hours; term paper. Prerequisite: course 100. Study of major works of Medieval Spanish literature from the 8th century to the 15th century. Offered in even-numbered years.

113. Spanish Romantic Literature (4) II. Guillon, Scari
   Lecture—3 hours; conferences and reports. Prerequisite: course 100. A study of the Spanish Romantic period, from the first half of the nineteenth century with emphasis on drama and poetry. Offered in even-numbered years.

115. Lyric Poetry of the Golden Age (4) II. Sanchez-Romero
   Lecture—3 hours; paper. Prerequisite: Spanish 100. Offered in odd-numbered years.

116. Spanish Novel of the Nineteenth Century (4) II. Guillon, Scari
   Lecture—3 hours. Prerequisite: course 100. Offered in odd-numbered years.

120A. Twentieth-Century Spanish Fiction (4) I. Allsett, Diaz-Migoyo
   Lecture—3 hours; term paper. Prerequisite: course 100. Study of the main literary trends and authors of the modern Spanish novel and short story. Selected works by Unamuno, Vives, Blasco Ibarrondo, and others will be covered.

120B. Twentieth-Century Spanish Drama (4) III. Allsett
   Lecture—3 hours; term paper. Prerequisite: course 100. Offered in odd-numbered years.

122C. Twentieth-Century Spanish Poetry (4) III. Sanchez-Romero
   Lecture—3 hours; paper. Prerequisite: course 100. Offered in even-numbered years.

124C. Chicano Culture (4) I. Chambran
   Lecture—3 hours; term paper. Prerequisite: course 28 or consent of instructor. Study of Chicano culture in the Southwest from 1580 to the present, emphasis on the period after 1848. Lectures and discussions in English; readings in English and/or Spanish. May not be counted as part of major in Spanish. Offered in odd-numbered years.

125A. Spanish-American Modernism (4) II. Gertel, J. Analysis of the literature of the twentieth century. Offered in even-numbered years.

126A. Chicano Literature (4) I. Chambran
   Lecture—3 hours; term paper. Prerequisite: course 100. Consent of instructor. Intensive study of select topics in Chicano literature including Chicano theater, Chicano readings, and writing in Spanish. Offered in even-numbered years.

126B. Chicano Literature (4) II. Chambran
   Lecture—3 hours; term paper. Prerequisite: course 100. Consent of instructor. Intensive study of select topics in Chicano literature including Chicano theater, Chicano readings, and writing in Spanish. Offered in odd-numbered years.

126C. Chicano Literature (4) III. Chambran
   Lecture—3 hours; term paper. Prerequisite: course 100. Consent of instructor. Intensive study of select topics in Chicano literature including Chicano poetry. Bilingual readings, lectures, discussions, and writing in Spanish. Offered in odd-numbered years.

127. Contemporary Spanish-American Poetry (4) III. Gertel, J., Varani
   Lecture—3 hours; term paper. Prerequisite: course 100. Development of Spanish-American poetry from the end of Modernism to the present. Emphasis on works of Huldbob, Nabokov, Valdes, Gorges, and Octavio Paz. Offered in even-numbered years.

128. Contemporary Spanish-American Short Story (4) II. Gertel, J., Varani
   Lecture—3 hours; term paper. Prerequisite: course 100. Literary trends in the development of the short story in Spanish America as seen in the representative works of major contemporary authors. Offered in odd-numbered years.

129. The Mexican Novel (4) III. Chambran, Gertel, J., Varani
   Lecture—3 hours; term paper. Prerequisite: course 100. Major figures in the development of the Mexican novel. Offered in odd-numbered years.
Speech
See Rhetoric and Communication

Statistics

(Intercollege Division)

George G. Roussas, Ph.D., Chairperson of the Division and Associate Dean of Statistics
Division Office, 469 Kerr Hall (752-2561)

Faculties
P.K. Bhattacharya, Ph.D., Professor
Prabir Burman, Ph.D., Assistant Professor
Alan P. Fenech, Ph.D., Associate Professor
Wesley O. Johnson, Ph.D., Associate Professor
Yue-Rok (Eric) Fung, Ph.D., Assistant Professor
Hans-Georg Mueller, Ph.D., Associate Professor
George G. Roussas, Ph.D., Professor
Francisco J. Samaniego, Ph.D., Professor
Robert H. Shumway, Ph.D., Professor
Chih-Ling Tsai, Ph.D., Associate Professor
Jessica M. Uts, Ph.D., Associate Professor
Jane-Ling Wang, Ph.D., Associate Professor
Alvin D. Wiggins, Ph.D., 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 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 needs 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.

Entry-level courses for students are as follows:

(a) Statistics 13, 32, and 102. These three courses are essentially equivalent in content, each designed as an introduction to the basic concepts and methods of probability and statistics. However, they differ from one another in the background expected of the student. Courses 13 and 102 require only high school algebra, although 102 is taught at a faster pace and covers somewhat more material. Course 32 is recommended as an alternative for students who have some background in computer programming and calculus; here students complement the analytical side of the lecture material by writing simulation programs which develop valuable intuitive insight.

(b) Statistics 130A-130B and 131A-131B-131C. These courses require calculus, and present both the methods of statistics and the probability background from which the methods are derived. The two sequences cover the same material, but the 131 course sequence goes into more depth. Neither sequence, course 130 or 131, requires a prerequisite from the set courses 13, 32, and 102, discussed above, but students often find such a background helpful.

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. Current employment opportunities include state and federal government positions with a statistician designation, industrial positions (e.g., in the actuarial series within an insurance company or in the data management unit in a health science facility), and teaching positions.

The major programs in statistics are designed to make possible a wide variety of career choices. The Bachelor of Arts degree is very flexible, facilitating a double major or extensive elective course work in a field in which statistics is applied. The Bachelor of Science degree program has two options: one emphasizes mathematics and is especially recommended as preparation for graduate study in statistics; the other emphasizes computer science. All three programs require theoretical and applied coursework and emphasize the strong interdependence of statistical theory and the applications of statistics.

The concurrent study of statistics and a field of application at an advanced level will serve students well either in preparing for a career in an area of application or in preparing for graduate study. Students with a strong interest in a quantitative discipline are encouraged to pursue a double major combining statistics and this discipline.

Statistics and Computer Science. These two fields interact in many ways, with each discipline having applications to the other. Applied statistical work relies on computer science areas such as database management, numerical analysis, algorithm optimization and graphics; while computer science uses statistics in areas such as pattern recognition, evaluation of operating systems and simulation. Thus advanced courses in computer science are recommended for all students in statistics. In particular, the degree program, Statistics—Computer Science, is designed as an integrated package combining statistics and computer science.

Students interested in one of the following major programs in Statistics are invited to meet with an undergraduate adviser for further information about planning a program.

Preparatory Requirements. Before applying for either the A.B. or B.S. major in Statistics, students must ordinarily complete the following courses with at least C grades:

Mathematics 21A, 21B, 21C
Mathematics 22A, 22B
Computer Science Engineering 30 or Engineering 5
Statistics 32

In addition, due to space limitation in the B.S. major, students admitted to this major will normally be chosen from those having at least a 3.0 grade-point average in the above courses. For further information, please contact a Statistics adviser.

Statistics

A.B. Major Requirements:

Preparatory Subject Matter
Calcium, Mathematics 21A, 21B, 21C
Linear algebra, differential equations, Mathematics 22A, 22B
Computer science, Computer Science Engineering 30 or Engineering 5 (or the equivalent)
Statistics through Calculus, Statistics 32

Depth Subject Matter
Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent
Probability and mathematical statistics, Statistics 131A, 131B, 131C
Three Statistics courses with Statistics 131B as a prerequisite
Three upper division courses approved by major adviser: They may be in mathematics, computer science or in quantitative aspects of a substantive discipline.

Total Units for the Major

62-64

Statistics

B.S. Major Requirements:

(Options: Statistics—general; Statistics—Computer Science)

Preparatory Subject Matter
Calcium, Mathematics 21A, 21B, 21C
Linear algebra, differential equations
Mathematics 22A, 22B
Computer science
General option
Computer Science Engineering 30 or Engineering 5 (or the equivalent)
Computer Science option
Computer Science Engineering 30 and 40 and Electrical and Computer Science Engineering 70
Statistics through computers, Statistics 32
Statistics (general) option

Depth Subject Matter
Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent
Introduction to probability, mathematical statistics, Statistics 131A, 131B, 131C or the equivalent
Four Statistics courses having Statistics 131B as a prerequisite
Linear algebra, Mathematics 167
Related elective courses
Two upper division courses approved by major adviser: These may be in mathematics, computer science or in quantitative aspects of a substantive discipline.

Total Units for the Major

75-85

Computer Science option

Depth Subject Matter
Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent
Introduction to probability, mathematical statistics, Statistics 131A, 131B, 131C
Two courses having Statistics 131B as a prerequisite
Statistics computing, Statistics 141
Operating systems and System programming, Computer Science Engineering 110
Data structures, Computer Science Engineering 110
Data base systems, Computer Science Engineering 165 or Mathematics 160
Two upper division courses approved by major adviser

Total Units for the Major

73-84

Major Adviser. W.O. Johnson.

Students are encouraged to meet with an adviser to plan a program as early as possible. Sometimes before or during the first quarter of the junior year students planning to major in Statistics should consult with a faculty adviser to plan the remainder of their undergraduate programs.

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.

Statistics

UNITS

Note: For key to footnote symbols, see page 131.
12. Introduction to Discrete Probability (3) I. 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; gambler's ruin; 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; ability to program in a high-level computer language such as Pascal. Overview of probability modeling and statistical inference. Problem solution through mathematical analysis and computer simulation. Recommended as alternative to course 13 for students with some knowledge of calculus and computer programming.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

120. Introduction to Probability Modeling and Statistical Inference (4) II, I, II, III. The Staff Lecture—3 hours: discussion—1 hour. Prerequisite: two years high school algebra, and upper division standing. Introductory probability and statistics at a rigorous yet precalculus level. Topics include probability models—binomial, Poisson, geometric; normal and sampling distributions; graphics; exploratory data analysis; parametric and nonparametric estimation; decision, estimation, sampling; and problems. Computing with Minitab package. Students who have had course 13 may receive only 2 units of credit for course 102.

103. Applied Statistics for Business and Economics (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 13 or 32 or 102. Descriptive statistics: probability, random variables; expectation; binomial, normal, Poisson, others; univariate distributions; joint distributions; sampling distributions, central limit theorem; properties of estimators; limit theorems; combinations of random variables; testing hypotheses; Minitab computing package.


107. Applied Statistical Methods (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32 or 102. Simple linear regression, variable selection

120B or 131 or 108 and 108. Variables of categorical data, cross-classifications, contingency tables, measures of association, chi square, test of independence. Multidimensional tables and log-linear models, maximum likelihood estimation; tests of goodness of fit, logit models, linear logistic models, goodness of fit tests, goodness of fit tables. Package computer programs, analysis of real data.

141. Statistical Computing (3) II. The Staff Lecture—3 hours. Prerequisite: course 130A or 131A or the equivalent. Course from This Division or Engineering 30 or Engineering 5; knowledge of regression analysis and matrix algebra. Computational aspects of linear models and nonlinear models; development of modern statistical programs; simulation techniques; graphics.

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, stactistical survival models, reliability measures, maintenance policies and their optimization. Offered in odd-numbered years.

143. Survival Analysis (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 130B, or 131B (may be taken concurrently). Statistical methods for failure time data, assessing risk of failure, parametric and nonparametric estimates of probabilities for time to failure, packaged computer programs, applications to medical and life data. Selected topics from model selection, accelerated failure time models, Cox models, nonparametric methods. Offered in even-numbered years. Bayesian inference.

144. Sampling Theory of Surveys (3) I. The Staff Lecture—3 hours. Prerequisite: course 130B or 131B. Description and analysis of sample surveys with applications to possible and nonpossible sampling. Estimation of sampling variance. Ratio estimation. Problem of nonresponse. Offered in even-numbered years.

145. Bayesian Statistical Inference (3) III. The Staff Lecture—3 hours. Prerequisite: course 130B or 131B or the equivalent. Subjective probability, Bayes Theorem, conjugate priors, non-informative priors, decision theory, estimation, Bayesian nonparametric models. Properties of Bayesian methods, Bayesian robustness, properties of Bayesian procedures, comparisons with classical procedures, approximations techniques, hierarchical Bayesian analysis, applications. Offered in odd-numbered years.

146. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

149. 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

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 incomplete block designs, factorial experiments, confounded designs, split-plot designs, lattice designs, fractional factorial designs, repeated measurements designs, optimal designs based on various criteria, analysis of covariance.

221. Biostatistics: Risk Analysis (3) II. The Staff Lecture—3 hours. Prerequisite: courses 131A and 131B; consent of instructor. Modern methodologies for scientific inference in bioscience and medical trials; low-dose extrapolation problems; retrospective studies; standardization of rates; clinical trials; cohort life tables.

222. Biostatistics: Applied Stochastic Processes and Survival Analysis (3) II. The Staff Lecture—3 hours. Prerequisite: courses 131A and 131B, and consent of instructor; Mathematics 132A recommended. Brief review of Markov models and generating functions; epidemic models; spatial processes, linear and nonlinear epidemic equations; general illness-death (Lotka-Neyman) model, failure-time models; survival analysis; covariate adjustment in survival studies; survival analysis with incomplete data.

230. Brief Advanced Mathematical Statistics (3) I. The Staff Lecture—3 hours. Prerequisite: course 131A, 131BC, or Mathematics 137 or the equivalent. Distribution theory; modes of convergence; laws of large numbers, central limit theorem, Slutsky's Theorem; $\lambda$, consistency and asymptotic normality, maximum likelihood, method of scoring, hypothesis testing based on likelihood ratios, Pitman efficiency, concepts of decision theory, Bayes and minimax estimation. Students who have taken MATH 231A, 231B, or 231C may receive only 2 units, 1 unit, or no credit respectively for course 230.

231A-231B-231C. Mathematical Statistics (3-3-3) I,II,III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: courses 130B or 131B or 131B or the equivalent. Review of statistical inference, estimation, hypothesis testing, confidence intervals, regression analysis, analysis of variance, and design of experiments. Multivariate statistical techniques, inference, discriminant analysis, principal component analysis, factor analysis, clustering, nonparametric inference, Bayesian inference, decision theory, and computer-intensive methods. Applications to fields such as medicine, biology, economics, and engineering.
Statistics (A Graduate Group)

Professional Course
401. Methods in Statistical Consulting I, II, III. The Staff
Prerequisite: graduate standing in Statistics. Students observe faculty consulting with clients and discuss with faculty methods of analyzing their data or of designing their experiments. Students may also perform data analysis, following which, the students do supervised, then unsupervised, but reviewed, statistical consulting. May be repeated once for credit. (SU grading only.)

Statistics (A Graduate Group)

George G. Pousias, Ph.D., Chairperson of the Group

Group Office, 469 Kerr Hall (752-2361)

Faculty. The Group has approximately thirty faculty members from all colleges, schools, and divisions, including thirteen from the Intercollegiate Division of Statistics.

Graduate Study. The Graduate Group in Statistics offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information, see the Graduate Announcement, or contact the Chairperson of the Group.

Graduate Adviser. P.K. Bhattacharya.

Subject A

See under University Requirements, and English A.

Surgery

See Surgery (Medicine, School of), and Surgery (Veterinary Medicine, below)

Surgery

(School of Veterinary Medicine)

Eugene P. Steffey, V.M.D., Ph.D., Chairperson of the Department

Department Office, 2112 Medical Science 1A (752-3599)

Faculty

Cleta S. Bailey, D.V.M., Ph.D., Associate Professor
Roy W. Belthorn, D.V.M., M.S., Professor
Eugene M. Brenzuncio, D.V.M., Ph.D., Professor
Nedim C. Buryakmichi, V.M.D., Associate Professor
Robert M. Cello, D.V.M., Professor Emeritus
Irma M. Gourley, D.V.M., Ph.D., Professor
Clare R. Gregory, D.V.M., Assistant Professor
Steve C. Hawkins, D.V.M., M.S., Professor
Susan V. Hildebrand, D.V.M., Associate Professor
Terrell A. Holliday, D.V.M., Ph.D., Professor
Janet E. Iliik, B.V.Sc., Ph.D., Assistant Professor
David N. Krag, M.D., Ph.D., Assistant Professor in Residence
Robert L. Leighton, V.M.D., Professor Emeritus

NOTE: For key to footnote symbols, see page 131.

Robert L. Linford, D.V.M., Ph.D., Assistant Professor
Bruce R. Madewell, V.M.D., M.S., Professor
Dennis M. Meagher, D.V.M., Ph.D., Professor
Harold R. Parker, D.V.M., Ph.D., Professor
Emeritus

John R. Pascoe, B.V.Sc., Ph.D., Assistant Professor
Peter J. Pascoe, B.V.Sc., Assistant Professor
Eugene P. Steffey, V.M.D., Ph.D., Professor
Gordon H. Thilenius, D.V.M., Professor
Philip B. Vasseur, D.V.M., Associate Professor
John D. Wheat, D.V.M., Professor
Alida P. Wind, M.V.D., Senior Lecturer

Part-Time Clinical Faculty
Gregory L. Ferraro, D.V.M., Associate Clinical Professor
Barbara E. Kitchell, D.V.M., Assistant Clinical Professor
Charles T. Robinson, D.V.M., Associate Clinical Professor
Randal H. Scaglioni, D.V.M., Assistant Clinical Professor
Leigh West-Hyde, D.V.M., Assistant Clinical Professor
Pauline L. Wong, D.V.M., Lecturer

Courses in Surgery

Upper Division Course
199. Special Study for Advanced Undergraduates (1-5). I, II, III. The Staff (Steffey in charge) (P/NP grading only.)

Graduate Courses
230. Principles of Anesthesia and Surgery for Investigators (2) II, Steffey, Gourley Lecture—2 hours. Prerequisite: graduate or professional student. Consent of instructor. Presentation and understanding of principles and techniques of anesthesia and surgery for laboratory animals. Course is not restricted to student number.

230L. Principles of Anesthesia and Surgery for Investigators (2) II. Gourley, Steffey Discussion—1 hour, laboratory—4 hours. Prerequisite: course 230 concurrently. Laboratory to complement course 230. Limited enrollment. (SU grading only.)

251. Anesthesia/Critical Care Basic Science Conference (1) I, II, III. The Staff (Steffey in charge) Discussion—1 hour. Prerequisite: postdoctoral, medical or graduate student; consent of instructor. Advanced course in scientific foundations of animal anesthesia and critical care. The material is directed by discussion following reading of assigned material emphasizing foundations in pharmacology and physiology. (SU grading only.)

252. Anesthesia/Critical Care Case Management Conference (1) I, II, III. The Staff (Steffey in charge) Discussion—1 hour. Prerequisite: postdoctoral, medical or graduate student; consent of instructor. Discussion of VMTH case material to illustrate specific medical problems and their preventive and corrective management. (SU grading only.)

255. Group Study (1-5) I, II, III. The Staff (Steffey in charge)

259. Research (1-12) I, II, III. The Staff (SU grading only.)

Professional Courses
411. Small Animal Surgery (1½ per week) I, II, III. The Staff (Vasseur in charge)
Laboratory—50 hours. Prerequisite: professional standing. House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for care of pet animal patients in the hospital including physical examinations, presumptive work-up, surgery, postoperative care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (SU grading only.)

412. Large Animal Surgery (1½ per week) I, II, III. The Staff (Meagher in charge)
Laboratory—50 hours. Prerequisite: professional standing. House Officer in Veterinary Teaching Hospital, or consent of instructor. House Officers responsible for care of farm animal surgical patients in the hospital including physical examinations, presumptive work-up, surgery, post-surgical care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (SU grading only.)
Textiles and Clothing

(College of Agricultural and Environmental Sciences)

Howard L. Needles, Ph.D., Chairperson of the Division
Division Office, 129 Everson Hall (752-6650)

Faculty
Yoo-Lo Hsieh, Ph.D., Associate Professor
Susan B. Kaiser, Ph.D., Associate Professor
Mary Ann Monis, Ph.D., Professor Emeritus
Howard L. Needles, Ph.D., Professor
Margaret H. Rucker, Ph.D., Associate Professor
Howard G. Schultz, Ph.D., Professor
S. Haig Zeronian, Ph.D., D.Sc., Professor

The Major Program

The Textiles and Clothing major is concerned with the study of textile products. Integrative product and process knowledge are stressed in relation to the production, distribution, and consumer use of textiles and apparel. Within the Textiles and Clothing major there are two options that prepare preparatory subject matter coursework in textiles and clothing, as well as in the social sciences-humanities and the physical sciences.

The Multidisciplinary option provides students with a broad knowledge base in both the physical and social sciences, as relevant to the study of textiles and clothing. This base includes (a) physical and chemical properties of textiles, (b) production, end-use applications, and care of textiles, (c) apparel structures and construction, and (d) social-psychological and economic aspects of textiles and clothing.

Students pursuing this option are expected to have a particular area of emphasis in textiles through careful selection of restricted electives in consultation with an advisor. The option prepares students for (a) advanced studies in textiles and clothing, or related fields in the physical and social sciences, or (b) careers in textiles and clothing such as production, testing, quality control, technical service, marketing, textile journalism, and design. Those students interested in careers in extension service and teaching should consult with their advisors.

The Marketing option involves an emphasis in social science and business coursework, while also providing students with an awareness of the physical nature of textile products. This option prepares students for (a) careers in marketing, management, and merchandising, and as well as for (b) advanced studies in textiles and clothing with emphasis in the social-psychological or economic aspects, in marketing or administration, or in consumer behavior.

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.)

**Textiles (A Graduate Group)**

Margaret H. Rucker, Ph.D., Chairperson of the Group
Group Office, 129 Everson Hall (752-6650)

Faculty. The Group includes the faculty from the Division of Textiles and Clothing as well as from a variety of other departments representing related disciplinary fields.

Graduate Study. The Graduate Group in Textiles offers a program of study and research leading to the M.S. degree. For detailed information regarding the program, address the Chairperson of the Group.

Graduate Advisor. S. H. Zeronian (Textiles and Clothing).

NOTE: For key to footnote symbols, see page 131.

**Textile Science (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 fiber and fabric performance and end-use. All students in this major are required to take a common core of coursework (chemistry, physics, and mathematics), and depth subject matter in textile science, organic chemistry, 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 textile 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 of work, if following chemical program). Graduates are prepared to enter the graduate program in Textiles or Agricultural and Environmental Chemistry with a specialization in Textile Chemistry, and Textile Science or Fiber and Polymer Science programs at other universities.

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.)

**NOTE:** For key to footnote symbols, see page 131.
182. Textile Fabrics Laboratory (I) 2. The Staff Laboratory—3 hours. Prerequisite: course 152 (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 (5) II. Neelands Lecture—3 hours. Prerequisite: course 6, 110, or Chemistry 88. Basic principles of textile dyeing, printing, and finishing; color theory; structure, properties, and application of dyes and finishes; factors affecting application and fastness; maintenance of dyed and finished textiles.

163L. Textile Coloration and Finishing Laboratory (1) II. Neelands Laboratory—3 hours. Prerequisite: course 163 (may be taken concurrently). Demonstrates various aspects of dyeing, printing, and finishing of textiles, including structure and properties 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) III. Hsieh Lecture—3 hours. Prerequisite: course 6 or 8. Overview of clothing technology, design, and production, including the apparel manufacturing industries including study of government statistics, material utilization and fabrication, merchandising, marketing, and production engineering.

170. Advanced Clothing Structure (5) I. Hsieh Lecture—3 hours; laboratory—6 hours. Prerequisite: course 6 and course 8; clothing construction skills required. Introduction of drafting, flat pattern cutting principles for deriving 2-dimensional patterns for 3-dimensional clothing structures. In-depth studies of the interactions between the combined applications of clothing structure principles. Analytical and experimental approaches are emphasized for structural development.

173. Principles of Fashion Marketing (3) II. Rucker Lecture—3 hours. Prerequisite: course 6; Economics 1A, 1B, or 136. Study of basic elements of fashion marketing including philosophy and objectives, organization merchandising, pricing, promotion and personnel.

174. Introduction to World Trade in Textiles and Clothing (2) II. Rucker Lecture—2 hours. Prerequisite: course 8. Structure of the global fiber/textile/apparel complex and its distribution patterns with an overview of political, economic, and technological factors that are changing the global apparel and textile market.

177. Clothing and Social Perception (3) I. Kaiser Lecture—3 hours. Prerequisite: course 107; Sociology 3; Psychology 1. Social and psychological processes related to the meanings people assign to clothing cues when perceiving one another. Particular attention to the following appearance-related topics: age, sex, physical attractiveness, status, ethnicity. Influences of clothing and appearance on social interactions.

180A-B. Introduction to Research in Textiles (2-2) I, II. The Staff Laboratory—6 hours. Prerequisite: senior standing with textile-related major, and consent of instructor. Senior thesis on independent project. Research begun in course 180A will be continued and completed in course 180B. (Deferred grading only, pending completion of sequence.)

192. Internship in Textiles and Clothing (1-12) I, II, III. The Staff Required, including a written report. The Staff (Needles in charge) and production engineering.

197. Tutoring in Textiles and Clothing (1-5) I, II, III. The Staff (Needles in charge) and production engineering.

182L. Textile Fabrics Laboratory (I) II. The Staff Laboratory—3 hours. Prerequisite: course 152 (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 (5) II. Neelands Lecture—3 hours. Prerequisite: course 6, 110, or Chemistry 88. Basic principles of textile dyeing, printing, and finishing; color theory; structure, properties, and application of dyes and finishes; factors affecting application and fastness; maintenance of dyed and finished textiles.

163L. Textile Coloration and Finishing Laboratory (1) II. Neelands Laboratory—3 hours. Prerequisite: course 163 (may be taken concurrently). Demonstrates various aspects of dyeing, printing, and finishing of textiles, including structure and properties 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) III. Hsieh Lecture—3 hours. Prerequisite: course 6 or 8. Overview of clothing technology, design, and production, including the apparel manufacturing industries including study of government statistics, material utilization and fabrication, merchandising, marketing, and production engineering.

170. Advanced Clothing Structure (5) I. Hsieh Lecture—3 hours; laboratory—6 hours. Prerequisite: course 6 and course 8; clothing construction skills required. Introduction of drafting, flat pattern cutting principles for deriving 2-dimensional patterns for 3-dimensional clothing structures. In-depth studies of the interactions between the combined applications of clothing structure principles. Analytical and experimental approaches are emphasized for structural development.

173. Principles of Fashion Marketing (3) II. Rucker Lecture—3 hours. Prerequisite: course 6; Economics 1A, 1B, or 136. Study of basic elements of fashion marketing including philosophy and objectives, organization merchandising, pricing, promotion and personnel.

174. Introduction to World Trade in Textiles and Clothing (2) II. Rucker Lecture—2 hours. Prerequisite: course 8. Structure of the global fiber/textile/apparel complex and its distribution patterns with an overview of political, economic, and technological factors that are changing the global apparel and textile market.

177. Clothing and Social Perception (3) I. Kaiser Lecture—3 hours. Prerequisite: course 107; Sociology 3; Psychology 1. Social and psychological processes related to the meanings people assign to clothing cues when perceiving one another. Particular attention to the following appearance-related topics: age, sex, physical attractiveness, status, ethnicity. Influences of clothing and appearance on social interactions.

180A-B. Introduction to Research in Textiles (2-2) I, II. The Staff Laboratory—6 hours. Prerequisite: senior standing with textile-related major, and consent of instructor. Senior thesis on independent project. Research begun in course 180A will be continued and completed in course 180B. (Deferred grading only, pending completion of sequence.)

192. Internship in Textiles and Clothing (1-12) I, II, III. The Staff Required, including a written report. The Staff (Needles in charge) and production engineering.

197. Tutoring in Textiles and Clothing (1-5) I, II, III. The Staff (Needles in charge) and production engineering.

Graduate Courses

220. Textile Product Quality and Standards (3) II. Zeronian Lecture—3 hours. Prerequisite: course 161. Principles involved in developing standards for implementation of government laws and regulations concerning textiles and contact and quality controls for textile products. Offered in even-numbered years.

239. Behavioral Science Concepts in Textiles (3) II. Kaiser Lecture—3 hours. Prerequisite: course 107, upper division
or graduate course in statistics (e.g., Agricultural Science and Management 150) and one in a behavioral science (e.g., Psychology 145). Examination of theories and research concerning relationships between clothing and human behavior with emphasis on research techniques, including methods of measuring clothing variables. Offered in odd-numbered years.

252A-252B-252C-252D-252E-252F. Special Topics in Polymer and Fiber Science (3) Zeremon Lecture—3 hours. Prerequisite: course 100 or consent of instructor. Selections of current interest from polymer and fiber science. Topics will vary each time the course is offered. (Same course as Materials Science and Engineering 252A-252B-252C-252D-252E-252F.)

209. Seminar (1) I, II. Rucker Seminar—1 hour. Critical review of selected topics of current interest in textiles. (SU grading only.)

290C. Research Conference (1) I, II, III. The Staff (Needles in Textiles and Clothing) Discussion—1 hour. Prerequisite: graduate standing; consent of instructor. Individual faculty members meet with their graduate students. Critical presentations of original research are made by graduate students. Research activities are planned. Discussions are led by major professors for their research groups. (SU grading only.)

291. Recent Advances in Textiles (3) III. The Staff (Zeremon in charge). Lecture—3 hours. Prerequisite: two upper division courses in Textiles and Clothing or consent of instructor. Reading and evaluation of current literature on selected topics of current interest in Textiles and Clothing. Topics of the selected topics will be changed as may be required. (SU grading only.)

296. Group Study (1-5) I, II, III. The Staff (Needles in charge). Research (1-12) I, II, III. The Staff (Needles in charge). (SU grading only.)

Urology
See Medicine, School of

Vegetable Crops
(College of Agricultural and Environmental Sciences)
Donald J. Nevins, Ph.D., Chairperson of the Department
Department Office, 152 Hunt Hall (752-0516)

Faculty
Alan B. Bennett, Ph.D., Associate Professor
Arnold J. Bloom, Ph.D., Associate Professor
Kent J. Bradford, Ph.D., Associate Professor
Marita Cantwell, Ph.D., Lecturer
James F. Harrington, Ph.D., Professor Emeritus
Frederick D. Howard, Ph.D., Senior Lecturer Emeritus
Richard A. Jones, Ph.D., Professor
Oscar A. Lorenz, Ph.D., Professor Emeritus
James M. Lyons, Ph.D., Professor
Richard W. Melchiorre, Ph.D., Associate Professor
Leonard L. Morris, Ph.D., Professor Emeritus
Donald J. Nevins, Ph.D., Professor
Harold A. Plotnick, Ph.D., Professor Emeritus
Carlos F. Quirós, Ph.D., Associate Professor
Lawrence Rapaport, Ph.D., Professor
Charles M. Rick, Ph.D., Professor Emeritus
Vincent Rubatzky, Ph.D., Professor
Dina St. Clair, Ph.D., Assistant Professor
Mikal E. Saltveit, Jr., Ph.D., Assistant Professor
Carole Shennan, Ph.D., Assistant Professor
Paul G. Smith, Ph.D., Professor Emeritus
Arthur R. Spurr, Ph.D., Professor Emeritus
Herman Timm, Ph.D., Lecturer
Ronald E. Voss, Ph.D., Lecturer
Janice E. Wong, Ph.D., Lecturer Emeritus
Masatoshi Yamaguchi, Ph.D., Professor Emeritus
Shang Fa Yang, Ph.D., Professor

John I. Yoder, Ph.D., Assistant Professor
Frank W. Zink, Jr., M.S., Lecturer
Graduate Study. A program of study is offered leading to the M.S. degree in Vegetable Crops. Information on the Graduate Advisor is given in the Graduate Advisor section. Also see the Graduate Division section in this catalog.
Graduate Advisor. A.B. Bennett.
Related Courses. See Plant Science 2, 101, 102, 112, 111, 113, 221A, 221B.

Courses in Vegetable Crops
Questions pertaining to the following courses should be directed to the instructor or to the Advising Office, 152 Hunt Hall.

1. Lower Division Course
   1.1. Internal and External Vegetable Crops (1-6) I, II, III. The Staff (Department Chairperson in charge). Laboratory—3-3 hours. Work-learn experience off or on campus in all subject areas pertaining to vegetable crops. Internship supervised by a member of the faculty. Maximum of 12 units permitted in the Vegetable Crops 92-92 series. (IPN grading only.)

2. Upper Division Courses
   1.1. Principles of Vegetable Crops Production (4) III. Rapaport Lecture—3 hours; discussion—1 hour. Prerequisite: Botany 2 or Plant Science 2. Fundamentals of vegetable crop production, handling, processing, utilization and distribution. (S grading only.)

105. Vegetable Biology, Evolution and Systematics (4) The Staff Lecture—2 hours; laboratory—6 hours, field trips (5) and written and oral reports. Prerequisite: Botany 2; Botany 106 recommended. Taxonomic and horticultural classification of the more important vegetable cultivars, their origin, morphology, nomenclature, classification, domestication and wild vegetable, and exotic vegetabes, and trends in development of new cultivars.

118. Seed Production, Technology and Physiology (4) III. Bradford Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 118; Genetics 100 or Plant Science 113 recommended. Principles of crop seed production, storage and utilization. Physiological, developmental, genetic and environmental factors influencing seed quality. Biological and technological aspects of crop establishment from seed. Laboratory sessions include field trips to seed industry facilities.

150. Vegetables in World Food Production Systems (4) II. Shennan Lecture—3 hours; discussion—1 hour. Prerequisite: Botany 2 or Botany 2; course 101 recommended. World food production systems, including cropping systems and priorities for agricultural research. Examination of selected systems in tropical, subtropical, and temperate regions, emphasizing usage, handling, marketing, nutritional importance and current research priorities for significant vegetable crops.

190. Topics in Plant Science Research (1) I, II. The Staff Discussion—1 hour. Prerequisite: 92 course. Research in vegetable crops in the plant and biological sciences. Discussion and critique of current research by faculty, graduate students and undergraduate students. Must be repeated for a maximum of 3 units. (IPN grading only.)

191. Undergraduate Research: Proposal (2) I. The Staff Lecture—1 hour; discussion—1 hour; independent study—3-3 hours. Prerequisite: upper division standing and Consent of Instructor. Faculty sponsor will individually assist each student to design research, conduct a literature survey, identify objectives, generate testable hypotheses, design experiments, plan data analysis, prepare a working outline, and write and revise a research proposal. (IPN grading only.)

191C. Undergraduate Research: Experiment (1-5) I, II, III. The Staff Laboratory—5 to 15 hours. Prerequisite: course 191C (instructor must be taken concurrently) and consent of instructor. Experiments in vegetable crops will be designed to test the hypothesis developed in course 191C. May be repeated for credit. (IPN grading only.)

192. Internship in Vegetable Crops (1-12) I, II, III. The Staff (Department Chairperson in charge). Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-learn experience off or on campus in all subject areas pertaining to vegetable crops. Internships supervised by a member of the faculty. Maximum of 12 units permitted in the Vegetable Crops 92-92 series. (IPN grading only.)

194. Senior Honors Thesis (1) I, II, III. The Staff Independent study—3 hours. Prerequisite: course 191L and consent of chairperson. Preparation and submission of honors thesis and presentation of the results in a seminar. (IPN grading only.)

195. Field Study of Vegetable Industry (1) III. The Staff Field Study. Prerequisite: consent of instructor. Field study illustrating different aspects of California agriculture, including research, production, extension, service, marketing, processing, equipment, etc. To be determined between the student and the instructor.

197T. Tutoring in Vegetable Crops (1-3) I, II, III. The Staff (Chairperson in charge). Laboratory—3-9 hours. Prerequisite: consent of instructor. Voluntary tutoring for upper division students taking vegetable science courses. Under supervision of students may prepare study materials, experiment in small groups, assist the instructor with technical problems, and help students who are having difficulties. May be repeated up to a total of 6 units. (IPN grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). (IPN grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). (IPN grading only.)

Graduate Courses

212. Postharvest Physiology of Vegetables (4) III. Saltiev and Yang Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 116; Plant Science 113 recommended. Harvested vegetable: emphasis on maturation, senescence, compositional changes, physiological disorders and effects of postharvest factors. May include field trips and laboratory experiments and research procedures. Offered in even-numbered years.

220. Biotechnology and Genetics of Crop Improvement (3) I. Michelmore Lecture—3 hours. Prerequisite: Genetics 100, Plant Science 113; Genetics 102A, 102B recommended. Emphasizes the integration of modern biotechnology and classical plant breeding including: transgenic plants, genetic mapping, gene identification, transformation, tissue culture, incompatibility mechanisms, male sterility, genotypic selection, and disease resistance genes.

220L. Biotechnology and Genetics of Crop Improvement Laboratory (1) I. Michelmore Laboratory—3 hours. Prerequisite: course 220 concurrently. Several class projects in plant genetics and biotechnology: tomato genetics, isozyme segregation, Agrobacterium mediated plant transformation, self-incompatibility in Brassica species, mapping disease resistant genes.

221. Genetics and Cytogenetics of Vegetable Crops (3) III. Quirós Lecture—3 hours. Prerequisite: Plant Science 113 or the equivalent. Genetics and cytogenetics of the principal vegetable crops on a crop by crop basis. Current advances on the cytogenetic technology, genetic linkage and application to practical breeding problems.

221L. Genetics and Cytogenetics of Vegetable Crops Laboratory (2) III. Quirós Laboratory—6 hours. Prerequisite: course 221 may be taken concurrently. Genetic and cytogenetic techniques applicable to vegetables. Includes chromosome squash preparations for pachytene analysis, segregation analysis, and linkage analysis of quantitative traits in interspecific hybrids, gene-centromere mapping, and aneuploid segregations.

225. Transposable Elements in Higher Plants (3) I, II. Yoder Lecture—1-12 hours; discussion—1-12 hours. Prerequisite: Biochemistry 201C or consent of instructor. Examines both the classical and molecular genetic information about plant transposable elements. Topics include the discovery, molecular structure, evolutionary significance and practical uses of these fascinating genetic entities.

231B. Molecular Biology Laboratory (4) II. Bennett, Har- ada (Botany) Lecture—1 hour; laboratory—10 hours. Prerequisite: Biochemistry 101L, a course in molecular genetics, and consent of instructor; Botany 227 recommended. Research methods in plant molecular biology. Topics include analysis of gene expression, characterization of gene structure, and gene transfer technology. Emphasis will be placed on analysis of developmentally regulated gene expression.

230. Selectivity Methods in Vegetable Research (3) II. Bennett Lecture—1 hour; laboratory—10 hours. Prerequisite: course from Plant Science 102, Botany 111A, 111B, Biochemistry 101A-101B, or 101L. Survey of the theory and practice of certain laboratory techniques that can be utilized in vegetable/plant research, with emphasis on determination of plant constituents, physiological functions and cell/tissue culture. Offered in odd-numbered years.

209. Seminar (1) I, II. Bradford, Bloom and staff Discussion—1 hour. (SU grading only.)

NOTE: For key to footnote symbols, see page 131.
Veterinary Medicine, School of

Edward A. Rhode, D.V.M., Dean of the School George H. Cardinet III, D.V.M., Ph.D., Associate Dean
Bennie I. Osburn, D.V.M., Ph.D., Associate Dean—Research
Donald G. Low, D.V.M., Ph.D., Associate Dean—Student Services
Robert J. Hansen, Ph.D., Associate Dean—School Office, 1018 Harri ng Hall (752-1360)

Courses in Veterinary Medicine

Upper Division Course

192. Work-Learn Experience in Veterinary Science (1-12) I, II, III, IV, C-Cardinet
Discussion-laboratory and clinic—3-8 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in Veterinary Medicine. (P/N grading only.)

Professional Courses

401. The Normal Animal, Examination and Topographic Anatomy (3.5) I, II, III, IV, Cardinet
Lecture—22 hours; discussion—2-6 hours; laboratory—4-5 hours. Prerequisite: first-semester standing in School of Veterinary Medicine. Anatomical structures and topography of significant regions of the body as related to normal function will be presented. The relationships of positive and negative factors on normal function will be emphasized. (P/N grading only.)

402. Cell Biology (3.5) I, II, III, IV, Cardinet
Lecture—22 hours; discussion—2-6 hours; laboratory—4-5 hours. Prerequisite: first-semester standing in School of Veterinary Medicine, or consent of instructor. The cellular and molecular structure of the cell is studied by integrating an understanding of the cell's structure and function. (P/N grading only.)

403A. Principles of Pharmacology (2.5) I, II, III, IV, Cardinet
Lecture—12 hours; discussion—2-6 hours. Prerequisite: second-year standing in School of Veterinary Medicine. The mechanisms and effects of drugs on normal and pathological function of the organism and on systems from a comparative and integrated animal-oriented viewpoint. Laboratories are designed to demonstrate the application of such material to therapy and diagnosis. (P/N grading only.)

403B. Pharmacology (2.5) I, II, III, IV, Cardinet
Lecture—21 sessions total; laboratory—24 hours total. Prerequisite: second-year standing in School of Veterinary Medicine. The mechanisms and effects of drugs on normal and pathological function of the organism and on systems from a comparative and integrated animal-oriented viewpoint. Laboratories are designed to demonstrate the application of such material to therapy and diagnosis. (P/N grading only.)

404. Fundamentals of Radiology (2.75) I, II, III, IV, Cardinet
Lecture—23 sessions total; laboratory—24 hours total. Prerequisite: second-year standing in School of Veterinary Medicine. The mechanisms and effects of drugs on normal and pathological function of the organism and on systems from a comparative and integrated animal-oriented viewpoint. Laboratories are designed to demonstrate the application of such material to therapy and diagnosis. (P/N grading only.)

405. Parasitology (3.0) I, II, Cardinet
Lecture—28 hours; demonstration laboratories—20 three-hour sessions. Prerequisite: first-semester standing in School of Veterinary Medicine. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

406. Clinical Pathology (3) I, II, Boyle
Lecture—22 hours; laboratory—10 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

407. Principles of Behavior (3) I, II, Hart
Lecture—6 hours total. Prerequisite: first-year standing in School of Veterinary Medicine. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

408. Principles of Surgery (1.5) I, II, Vasseur
Lecture—9 one-hour sessions total; laboratory—1 one-hour session. Prerequisite: second-year standing in School of Veterinary Medicine. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

409. Techniques of Surgery (2) I, II, Gourley
Lecture—9 sessions total; laboratory—9 three-hour sessions total; discussion—3-3 three-hour sessions total. Prerequisite: first-year standing in School of Veterinary Medicine. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

410. Surgical Anatomy (1) I, Stover
Lecture—3 hours total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

411. Nutrition and Nutritional Diseases in Animals (3.0) I, II, Morris
Lecture—36 hours total; 1 three-hour field trip; laboratory—1 one-hour session. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

412. Veterinary Toxicology (2.5) I, II, Coon
Lecture—22 sessions total. Prerequisite: third-year standing in School of Veterinary Medicine. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

413. Laboratory Animal Medicine (2) I, II, Brooks
Lecture—20 sessions total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

414. Integrative Physiological Chemistry (6.0) I, II, Black, Hansen
Lecture—47 hours total; discussion—10 hours total. Prerequisite: first-year standing in School of Veterinary Medicine. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

415. Management and Disease of Captive Wildlife (2) I, II, Fowler
Lecture—20 sessions total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

416. Aquatic Animal Medicine (2) I, II, Hedicke
Lecture—20 hours total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

417. Cage Bird Medicine (2) I, II, Fowler
Lecture—9 hours total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

418. Diseases of Free Living Wildlife (2) I, II, Fowler
Lecture—20 sessions total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

419. Behavioral Therapy (1.1) I, Hart
Lecture—9 hours total; laboratory—9 hours total. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. Clinical application of management, conditioning procedures, and use of behavior-altering drug therapy to resolve common behavioral problems of dogs, cats, and horses.

420A. Musculoskeletal Basis of locomotion (5.2) I, II, Hyde
Lecture—22 hours total; laboratory—30 three-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

420B. Musculoskeletal System-Abnormal Functions (4.5) I, III, III, W. Morino
Lecture—38 hours total; laboratory—7 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

421A. Neurosciences (4.2) I, II, Mitchell
Lecture—20 hours total; laboratory—9 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

421B. Neurology-Abnormal (3.6) III, III, Bailey
Lecture—28 sessions total; laboratory—7 three-hour sessions total. Prerequisite: second-year standing in School of Veterinary Medicine. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

421C. Veterinary Ophthalmology (2.5) II, Bellhorn
Lecture—21 hours total; laboratory—4 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.

422. Current Topics in Veterinary Oncology (1) I, III, Thelen, Madewell
Lecture—1 hour. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. The course is designed to cover the introduction to parasitology. Emphasis is placed on the recognition and identification of veterinary helminth and protozoan parasites of domestic animals. The relationships of these parasites to disease is discussed in detail.
year standing in School of Veterinary Medicine. It correlated presentation emphasizing anatomical, physiological aspects of the cardiovascular, respiratory, and renal systems of com-
mon domesticated animals. Homeostatic mechanisms govern-
ning body fluids and electrolytes will be included.
425C. Cardiovascular Medicine (2.6) I. Thomas
Lecture—24 sessions total; laboratory—5 sessions total. Pre-
 requisite: third-year standing in School of Veterinary Medicine or consent of instructor. Principles of cardio-
vascular medicine (pathophysiology, diagnosis, and treatment) in an-
imals.
425D. Urinary System, Abnormal (2.5) II. Cowill
Lecture—20 sessions total; laboratory—5 sessions total. Pre-
 requisite: third-year standing in School of Veterinary Medicine or consent of instructor. Principles of urinary sys-
nome, including morphology, clinical presentation, and diagnostic and therapeu-
tic management.
425E. Principles of Anesthesia (1.7) I. Staley
Lecture—15 sessions total; laboratory—2 three-hour sessions total. Pre-
 requisite: second-year standing in School of Veter-
inary Medicine or consent of instructor. Basic principles of anes-
thesia, including general and regional techniques, and their use in animal anesthesia.
427. Equine Internal Medicine (3) III. Magdigan
Lecture—30 hours total. Pre requisite: third-year standing in School of Veterinary Medicine or consent of instructor. Differential diagnosis and treatment of common equine diseases.
428. Food Animal Surgery (1.8) II. Smith
Lecture—16 sessions total. Pre requisite: third-year standing in School of Veterinary Medicine. Principles of surgical diseases of food animals covered in detail. (SU graded only.)
428. Food Animal Surgery Laboratory (0.7) III. Smith
Lecture—9 sessions total. Pre requisite: third-year standing in School of Veterinary Medicine. Laboratory experience in surgical diseases of farm animals. (SU graded only.)
429A. Herd Health Management of Beef, Cattle, Swine, Sheep and Goats (4) II. Hiepe
Lecture—42 sessions total; laboratory—3 two-hour sessions total. Pre-
 requisite: third-year standing in School of Veterinary Medicine or consent of instructor. Practical problems in herd health management of beef, cattle, swine, sheep, and goats. (SU graded only.)
430A. Structure and Function of the Gastrointestinal System (3.5) I. Curry
Lecture—24 sessions total; laboratory—11 sessions total. Pre-
 requisite: first-year standing in School of Veterinary Medicine. Tissue histology, normal and pathologic structure, function, and disease processes. (SU graded only.)
430B. Gastrointestinal Diseases of Small Animals (2.5) II. Strombeck
Lecture—25 one-hour sessions total. Pre requisite: second-
year standing in School of Veterinary Medicine or consent of instructor. Abnormal function of digestive system and diseases affecting that system. Histology, pathology, pathogenesis, diagnosis including special diagnostic procedures, and medical and surgical treatment of gastrointestinal diseases including diseases of the liver and pancreas.
430C. Gastrointestinal Diseases of Large Animals (2.5) III. Smith
Lecture—25 one-hour sessions total. Pre requisite: second-
year standing in School of Veterinary Medicine or consent of instructor. Abnormal function of digestive system and diseases affecting digestive systems in large animals. Man-
festations, pathology, pathogenesis, diagnosis including special diagnostic procedures, and medical and surgical treatment of gastrointestinal disease including diseases of the liver and pancreas.
431. Metabolism (1.5) II. Black, Hansen
Lecture—15 sessions total. Pre requisite: second-year standing in School of Veterinary Medicine. Tissue histology, normal and pathologic structure, function, and disease processes. (SU graded only.)
433. Avian Medicine (1.6) III. West
Lecture—15 sessions total; one examination period. Pre-
 requisite: second-year standing in School of Veterinary Medicine. An Introduction to the biology and pathology of common avian species, including diagnosis, management, and control.
434. Infectious Diseases (4.5) I. Pedersen
Lecture—45 sessions total. Pre requisite: third-year standing in School of Veterinary Medicine. Pathology, diagnosis, and treatment of selected infectious diseases of companion animals.
435. Veterinary Hematology (5.5) II. Join
Lecture—32 sessions total; laboratory—23 three-hour ses-
436. Public Health and Food Safety (2) III. Genigeorgis
Lecture—2 hours. Pre requisite: third-year standing in School of Veterinary Medicine or consent of instructor. Introduction to principles of public health and food safety. The roles of the veterinary pathologist in the assessment of public health and food safety issues.
437. Herd Health Assessment (3) II. Brooks
Discussion—3 hours. Pre requisite: first-year standing in School of Veterinary Medicine or consent of instructor. Introduction to herd health management, pathophysiology, and herd health management. (SU graded only.)
438. Introduction to Methods of Animal Handling, Restraint, Examination and Therapy (1) I. East
Lecture—8 three-hour sessions. Pre requisite: third-year standing in School of Veterinary Medicine or consent of instructor. Techniques of animal handling and restraint and selected techniques of diagnostic examination and therapy, as well as recognition of animal and disease signs, breed characteristics and purpose in animals of veterinary importance. (SU graded only.)
439. Beef Cattle Nutrition (1) I. Herpe
Lecture—1 hour. Pre requisite: third-year standing in School of Veterinary Medicine or consent of instructor. Economic- istically, approaches for maintaining feeding requirements of feedlot and pasture beef cattle. (SU graded only.)
440. Endocrine System (Normal and Abnormal) Structure and Function (2.8) II. Kennelly
Lecture—24 hours total; discussion—3 three-hour sessions; laboratory—1 three-hour session. Pre requisite: second-year standing in School of Veterinary Medicine. Tissue histology, normal and pathologic structure and function of the normal and diseased endocrine glands of domesticated animals.
445A. Reproduction (6.2) II. Staubli
Lecture—42 one-hour sessions; laboratory—20 three-hour sessions. Pre requisite: second-year standing in School of Veterinary Medicine or consent of instructor. Pathology and clinical aspects of reproduction (normal and abnormal). (SU graded only.)
445B. Small Animal Theriogenology (1.2) II. Feldman
Lecture—12 three-hour sessions. Pre requisite: second-year standing in School of Veterinary Medicine or consent of instructor. Conditions affecting the reproductive system in the dog and cat, with emphasis on the management and treatment. (SU graded only.)
445C. Food Animal Theriogenology (3) II. BonDurant
Lecture—12 three-hour sessions. Pre requisite: second-year standing in School of Veterinary Medicine or consent of instructor. Conditions affecting the reproductive system in the cow, sow, ewe and goat, with emphasis on pathophysiology and treatment, control, prevention, and herd health applications. (SU graded only.)
445D. Equine Theriogenology (3) I. Hughes
Lecture—2 hours; laboratory—3 hours. Pre requisite: third-
year standing in School of Veterinary Medicine or consent of instructor. Discussion of special problems of equine repro-
duction with emphasis on methods of diagnosis and interpretation of tracel and labatory findings.
450. Immunology (3) I. Gershwin
Lecture—15 hours total; laboratory—11 two-hour sessions total. Pre requisite: second-year standing in School of Veter-
inary Medicine. Concepts of immunobiology. Dynamics of infection and resistance. Immunological basis for immu-
nological diseases, allergy, cancer immunology.
451. Veterinary Bacteriology and Mycology (5.7) I. Hirsh
Lecture—37 hours total; laboratory—20 two-hour and one-half-
hour sessions. Pre requisite: second-year standing in School of Veterinary Medicine. Tissue histology, normal and pathologic structure and function of the intimate relationship of bacteria and fungi, their role in animal disease, and the methods of diagnosis of infectious and parasitic disease.
452. General Pathology (4.2) I. Moore
Lecture—24 sessions total; laboratory—16 two-hour ses-
sions. Pre requisite: second-year standing in School of Veterinary Medicine. Tissue histology, normal and pathologic structure and function of the intimate relationship of bacteria and fungi, their role in animal disease, and the methods of diagnosis of infectious and parasitic disease.
453. Viral Pathogens of Animals (2.6) I. Zee
Lecture—16 hours total; laboratory—10 sessions total. Pre-
 requisite: second-year standing in School of Veterinary Medicine. Tissue histology, normal and pathologic structure and function of the intimate relationship of bacteria and fungi, their role in animal disease, and the methods of diagnosis of infectious and parasitic disease.
454. Clinical Immunology (2) I. Pedersen
Lecture—14 one-hour sessions; laboratory—6 three-hour ses-
sions. Pre requisite: second-year standing in School of Veter-
inary Medicine or consent of instructor. Principles of the immune system and diseases associated with immunodeficiency. (SU graded only.)
455. Integumentary System (4.9) I. Stenberg
Lecture—48 hours total. Pre requisite: second-year standing in School of Veterinary Medicine. Introduction to principles of the integumentary system. (SU graded only.)
456. Veterinary Business Management (2) I. Wilson
Lecture—10 two-hour sessions. Pre requisite: third- or fourth-
year standing in School of Veterinary Medicine or consent of instructor. Course presents a groundwork of information which is essential to the successful management of a vet-
ery practice. Topics to be covered include basic account-
counting, management, business, management, business, management, business and personal insurance, client relations and law. (SU graded only.)
457. Veterinary Clinical Cytology (1.5) I. Zirkel, Feldman
Lecture—10 one-hour sessions. Pre requisite: third-year standing in School of Veterinary Medicine. Physiology and pathology of selected structures in the integumentary system. (SU graded only.)
458. Emergency and Critical Care (2) III. Hawkins
Lecture—20 sessions total. Pre requisite: third-year standing in School of Veterinary Medicine. Introduction to the essential and practical concepts of care for emergency and critically ill patients.
459. Small Animal Orthopedics (1.7) II. Wind
Lecture—14 sessions total; laboratory—3 sessions total. Pre requisite: second-year standing in School of Veterinary Medicine. Tissue histology, normal and pathologic structure and function of the bones, joints, and muscles of the body. (SU graded only.)
460. Radiographic Diagnosis: Small Animal (2.5) III. Nylander
Lecture—16 one-hour sessions; discussion—8 two-hour and 1 one-hour session. Pre requisite: third-year standing in School of Veterinary Medicine. Introduction to radiographic methods. Discussion of radiographic methods for small animals for the student electing small animal and mixed track. (SU graded only.)
461. Soft Tissue Surgical Diseases of Small Animals (1.0) I. Gregory
Lecture—10 sessions total. Pre requisite: third-year standing in School of Veterinary Medicine or consent of instructor. Tissue histology, normal and pathologic structure and function of the skin, muscle, and subcutaneous tissue. (SU graded only.)
462. Mixed-Animal Anesthesia (1.5) I. Hildebrand
Lecture—15 hours total. Pre requisite: third-year standing in School of Veterinary Medicine or consent of instructor. Course presents a groundwork of information which is essential to the successful management of a veterinary practice. Topics to be covered include basic accounting, management, business, management, business and personal insurance, client relations and law. (SU graded only.)

NOTE: For key to footnote symbols, see page 131.
Veterinary Microbiology and Immunology

(School of Veterinary Medicine)

Laurel J. Gershwin, Chairperson of the Department

Office Department, 2075 Haring Hall (752-1400)

Faculty

Alexander A. Ardans, D.V.M., M.S., Professor (Medicine)
Noran F. Baker, D.V.M., Ph.D., Professor Emeritus
Ernest L. Biberstein, D.V.M., Ph.D., Professor
Walter M. Boyce, D.V.M., Ph.D., Assistant Professor
Anthony E. Castro, D.V.M., Ph.D., Associate Adjunct Professor (California Veterinary Diagnostic Laboratory)
Patricia A. Connard, D.V.M., Ph.D., Assistant Professor
Laurel J. Gershwin, D.V.M., Ph.D., Associate Professor
Sharon K. Hietala, Ph.D., Assistant Adjunct Professor (California Veterinary Diagnostic Laboratory)
Dwight C. Lord, D.V.M., Ph.D., Professor
Richard B. LeRoux, Ph.D., Assistant Professor
Prescott A. Marx, Ph.D., Associate Adjunct Professor
John W. Osebold, D.V.M., Ph.D., Professor
Jeffrey L. Stott, Ph.D., Assistant Professor
Richard L. Walker, D.V.M., M.P.V.H., Ph.D., Assistant Adjunct Professor (California Veterinary Diagnostic Laboratory)

NOTE: For key to footnote symbols, see page 131.

Vaccines and Immunology

Courses in Veterinary Microbiology and Immunology

Upper Division Courses

126. Fundamentals of Immunology (3) I, Ill. Lecture—4 hours. Discussion—1 hour. Prerequisite: Biochemistry 101A or the equivalent. Immune response and defenses of host against infection: antibodies, antigens, antibody-antigen interactions, regulation and manipulation of the immune response, hyper- and hyporesponsiveness, mechanisms of their relationships to disease processes. Clinical applications of immune phenomena emphasized.

128. Immunology Laboratory (2) I, Ill. Lecture—6 hours. Prerequisite: course 126. Laboratory procedures in immunology. The immune response to antigens, antigen-antibody interactions, hypersensitivity mechanisms.

127. Medical Bacteria and Fungi (5) Ill. Hirsch, LaFevre Lecture—3 hours; laboratory—6 hours. Prerequisite: general microbiology; basic immunology. An introduction to the bacterial and mycotic pathogens of man and their relationship to emphasis on pathogenic mechanisms and ecologic aspects of infectious disease. Limited enrollment.


132. Introduction to Parasitology (3) Ill. Conrad Lecture—4 hours; laboratory—6 hours. Prerequisite: Zoology 2-2L. The nomenclature of human and animal parasites, their general morphology, life cycles, epidemiology, diagnostic techniques, and host-parasite relationships. Individual laboratory studies supplemented with demonstrations.

136. Directed Group Study (1-5) I, Ill. The Staff (Gershwin in charge) Prerequisite: consent of instructor. (P/NP grading only.)

139. Special Study for Advanced Undergraduates (1-5) I, Ill. The Staff (Gershwin in charge) (P/NP grading only.)

Graduate Courses

228. Molecular Biology of Animal Virus (3) II. The Staff Lecture—4 hours. Prerequisite: course 128 or Microbiology 162 or the equivalent. Current status of molecular biology of the major groups of animal viruses. Topics of major emphasis include: virus genetics, stages of viral replication and transcription, and regulation of genome expression.

270. Advanced Immunology (3) II. Stott Lecture—4 hours. Prerequisite: course 126 or Veterinary Medicine 450 or consent of instructor. Immunoglobulin structure and function, antigenic determinants, complement, blood groups, lymphocytes; other topics of interest. In-course DVM/MPVM program enroll for the Summer Session I-II and I sequence. (S/U grading only, pending completion of three-term sequence.)

291. Seminar in Immunology (1) I, II, Ill. Gershwin Seminar—1 hour. A discussion of the current topics in immunology. (S/U grading only.)

292. Seminar in Animal Virology (1) I, II, Ill. The Staff Seminar—1 hour. A discussion of the current topics in animal virology. (S/U grading only.) (Same course as Microbiology 292.)

293. Seminar in Infectious Diseases (1) I, II, Ill. Seminar—1 hour. Discussion of current topics and cases of infectious diseases. (S/U grading only.)

294. Seminar in Parasitology (1) I. Boyce Seminar—1 hour. Discussion of current topics in veterinary parasitology and entomology.

296. Microbiological Diagnosis (2-5) I, II, Ill. Biberstein, D.V.M., Hirsch Discussion—1 hour; laboratory—5-14 hours. Prerequisite: laboratory course in veterinary or medical microbiology or the equivalent; course 293 (concurrently) consent of Chief of Microbiology, VM Teaching Hospital. Lab diagnosis of infectious diseases involving case work at the VM Teaching Hospital. (S/U grading only.)

298. Group Study (1-5) I, II, Ill. The Staff (Gershwin in charge)
Viticulture and Enology

259. Research (1-12) I, II, III. The Staff
(S/U grading only)

Veterinary Pharmacology and Toxicology
(School of Veterinary Medicine)
Shri N. Giri, B.V.Sc., Ph.D., Chairperson of the Department
Department Office, 2165 Haring Hall (752-1059)

Faculty
Alan R. Buckpitt, Ph.D., Associate Professor Gaylord M. Conzelman, Jr., Ph.D., Professor Emeritus
Shri N. Giri, B.V.Sc., Ph.D., Professor 1Robert M. Joy, Ph.D., Professor
Michael E. Mount, D.V.M., Ph.D., Associate Professor
Isaac N. Pesah, Ph.D., Assistant Professor Otto G. Raabe, Ph.D., Professor in Residence (Veterinary Pharmacology and Toxicology, Cell End)
Henry J. Segall, Ph.D., Associate Professor Philip R. Vulliet, D.V.M., Ph.D., Assistant Professor Hanspeter Witschi, M.D., Professor (Medicine, Internal Medicine)

Courses in Veterinary Pharmacology and Toxicology
Upper Division Course
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
223. Clinical Pharmacokinetics: Concepts and Applications in Comparative Medicine (2) II. Vulliet
Lecture—2 hours. Prerequisite: organic chemistry, biochemistry 101A-101B, or consent of instructor. (Elective)

243. Heavy Metal Toxicity and Metabolism (2) II. Raabe
Lecture—2 hours. Prerequisite: Biochemistry 101A-101B and Physiology 101A-101B. Toxicity and metabolism of inorganic compounds with emphasis on heavy metals. Examines the relationship between chemical properties and biologic activity of various metals. Includes discussions on metal-to-metal interactions, genetic disorders in metabolism, chelation therapy, and inorganic carcinogenesis.

247. Natural Toxins (2) II. Segall
Lecture—2 hours. Prerequisite: organic chemistry, biochemistry 101A-101B, or consent of instructor. Toxicity and metabolism of natural toxins with emphasis on the toxic spectra present in the western United States. General pathways of metabolism plus the relationship between chemical properties and biologic activity of natural toxins are discussed. Offered in even-numbered years.

252. Drug Metabolism (2) III. Giri, Buckpitt
Lecture—2 hours. Prerequisite: Biochemistry 101A-101B or Physiology 101A-101B, or consent of instructor. General pathways of drug metabolism and factors influencing the drug metabolism. Emphasis laid upon the species, age, and gender factors affecting the biological disposition of the drugs. Offered in even-numbered years.

256. Receptor-Mediated Mechanisms (2) III. Joy, Pesah
Lecture—2 hours. Prerequisite: Pharmacology and Toxicology 201 or the equivalent. Survey of modern methods for studying physiological receptors including radioligand binding analysis, ion transport flux measurements, receptor solubilization and purification strategies, and molecular cloning. Theoretical concepts of receptor-mediated signal transduction, information processing, and mechanisms of drug/toxin interaction. Offered in odd-numbered years.

258. Laboratory in Receptor Methods (1) III. Pesah
Laboratory—3 hours. Prerequisite: Biochemistry and Biology 101L, or course 258 (may be taken concurrently). Design and practical application of receptor binding techniques including subcellular fractionation, equilibrium and kinetic radioligand binding studies, receptor activation/inhibition studies, isotopic ion flux measurements, and analysis of data. Limited to 12 students. Offered in odd-numbered years.

290. Seminar (1-15) I, II, III. The Staff (Chairperson in charge)
Seminars—1 hour. Prerequisite: consent of instructor. Topics vary. Offered in odd-numbered years.

Viticulture and Enology
(College of Agricultural and Environmental Sciences)
Michael G. Mullins, Ph.D., Chairperson of the Department
Department Office, 1023 Wickson Hall (752-0380)

Faculty
Douglas D. Adams, Ph.D., Assistant Professor
Maynard A. Aderiene, Ph.D., Professor Emeritus
Linwood L. Bissom, Ph.D., Associate Professor
Robert D. Boulton, Ph.D., Associate Professor (Viticulture and Enology, Chemical Engineering)
James A. Cook, Ph.D., Professor Emeritus
Richard E. Kapner, Ph.D., Professor Emeritus (Viticulture and Enology, Chemistry)
William M. Kieffer, Ph.D., Professor Emeritus
Eugene A. Land, Ph.D., Assistant Professor
Carole P. Meredith, Ph.D., Associate Professor
Janice C. Morrison, Ph.D., Assistant Professor
Michael G. Mullins, Ph.D., Maynard A. Aderiene, Ph.D., Professor Emeritus
Professor of Viticulture and Enology
Ann C. Nobel, Ph.D., Professor
Harold P. Olmo, Ph.D., Professor Emeritus
Cornelia S. Ough, G.S.C., Professor
DeWey D. V. Ruy, Ph.D., Professor (Chemical Engineering)
Vernon L. Singleton, Ph.D., Professor Emeritus
Robert J. Weaver, Ph.D., Professor Emeritus
A. D. Venison, Ph.D., Professor Emeritus
Lawrence E. Williams, Ph.D., Associate Professor
Albert J. Winkler, Ph.D., L.L.D., Professor Emeritus

The Program of Study. Enology is a specialization under the Fermentation Science major; and viticulture is a specialization under the Plant Science and the Agricultural Science and Management (Plant Science) options majors.

Graduate Study. Various graduate groups offer programs of study leading to advanced degrees in the fields of viticulture and enology. For the M.S. degree see Agricultural and Environmental Chemistry, Botany, Chemical Engineering, Ecology, Food Science, Genetics, Horticulture, Microbiology, Plant Physiology, and Soil Science. For the Ph.D. degree see Agricultural and Environmental Chemistry, Botany, Chemical Engineering, Ecology, Genetics, Microbiology, Plant Pathology, Plant Physiology, and Soil Science.

Courses in Viticulture and Enology

Lower Division Courses
2. Introduction to Viticulture (2) II. Mullins
Lecture—2 hours. Fundamentals of the bases of biology and culture of the grapevine including taxonomy, morphology, physiology, distribution, domestication, utilization, propagation, production systems, harvesting, and processing of grapes. Successful completion of the course should prepare students for upper division courses in viticulture.

3. Introduction to Wine Making (3) I. Nicolai, II. Kunkel, III. Singleton
Lecture—2 hours. This broad overview of wines introduces students having a general interest (or potential fermentation science (enology) majors) to history of wine, physiology of alcohol, wine appreciation, viticulture, fermentation, and wines produced in California and other areas of the United States and world.

9. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only)

Upper Division Courses
101A. Viticultural Practices (2) I. Williams
Discussion-laboratory—4 hours. Prerequisite: course 2. Provides the information required to identify the major wine, raisin, and table cultivars grown in California and elsewhere. Also provides experience in vineyard sampling techniques and vine disease identification.

101B. Viticultural Practices (2) II. Kiewer
Discussion-laboratory—4 hours. Prerequisite: course 2. Field-oriented experience in the principles and practices of grapevine production, including pruning, propagation, weed identification and control, frost protection, and physical examination of soil profiles and root distribution patterns.

101C. Viticultural Practices (3) II. Kiewer
Discussion-laboratory—4 hours. Prerequisite: course 2. Field-oriented experience in the principles and practices of grapevine production, including vineyard establishment, vine training, trellising, canopy management practices, irrigation and water management, and methods of crop adjustment for improvement of fruit quality.

110. Grapevine Growth and Physiology (3) III. Adams, Matthews
Lecture—3 hours. Prerequisite: course 2. Botanical aspects including morphology and domestication will precede lectures covering newer development and energy budget concepts. Impact of physiological variables such as photosynthesis, translocation, mineral nutrition, and water relations on fruit ripening and composition will be studied. Offered in odd-numbered years.

111. World Viticulture (3) I. Meredith
Lecture—3 hours. Prerequisite: upper division standing. Study of the diversity of viticulture, both geographical and historical. History of grape growing and its spread throughout the world will be covered, along with discussions of current viticultural practices in different parts of the world, including California.

115. Raisin and Table Grape Production (2) I. Williams
Lecture—2 hours. Prerequisite: course 2. Overview of the raisin and table grape industries in California and other production areas of the world. Table grape production with raisin and table grape production will also be discussed. Offered in even-numbered years.

116. Winegrape Production (3) II. Kiewer
Lecture—3 hours. Prerequisite: course 2. Covers principles underlying cultural practices associated with winegrape production, including establishing and planting, training, summer and winter pruning, canopy management, irrigation, mineral nutrition, weed control, frost protection, crop regulation, and harvesting.

118. Grapevine Pests, Diseases and Disorders (3) I. Williams
Lecture—3 hours. Prerequisite: course 2. Describes the various pests and diseases of vineyards throughout California. Pest and disease identification and control methods (to include sampling techniques) will also be discussed. Integrated management approaches to pest control methods will be emphasized. Offered in odd-numbered years.

123. Analysis of Musts and Wines (3) I. Ough
Lecture—2 hours; laboratory—3 hours. Prerequisite: Chem-
Water Science

124. Wine Production (3) L. Bisson
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 3, Microbiology I, 3, and Biochemistry 101A; course 123 (may be taken concurrently). Open to undergraduates in students in Fermentation Science and Plant Science, and graduate students in Agriculture and Environmental Chemistry, Food Science, Horticulture, and Microbiology. Principles of grape juice and wine making. The reasons for use of each analysis. Analyses of a practical and useful nature are chosen for the laboratory exercises. Introducing the various chemical, physical, and biochemical methods used.

125. Wine Types and Sensory Evaluation (3) L. Noble
Lecture—4 hours; laboratory—3 hours. Prerequisite: course 124, Agricultural Science and Management 150, and consent of instructor. Open to upper division students in Fermentation Science and Plant Science, and graduate students in Agriculture and Environmental Chemistry, Food Science, Horticulture, and Microbiology; or consent of instructor. Major types of wines and the factors influencing their quality; principles of sensory evaluation.

126. Wine Processing (3) L. Joukov
Lecture—2 hours; laboratory—2 hours. Prerequisite: course 124. Open to undergraduate students in Fermentation Science and Plant Science, and graduate students in Agriculture and Environmental Chemistry, Food Science, Horticulture, and Microbiology. Principles and theory of acidity adjustments, physical processes (pouring, carbonization, metal, latex, protein, color, oxidation). The treatment of wines by adsorption, clarification, refrigeration, filtration, and ion exchange.

127. Winery Aging: Effects and Reactions (3) L. Singleton
Seminar—5 hours. Prerequisite: course 124. Survey of the methods, chemistry, sensory effects, and management of storage and aging of the major commercial wines.

128. Wine Processing Equipment (1) L. Boulton
Lecture—1 hour; field trip. Prerequisite: courses 124, 126; Food Science and Technology 110A, 110B recommended. A laboratory-discussion for which provides a systematic description of units operations and processing equipment used in modern commercial winemaking. Emphasis is given to the design and description of equipment and to the operation and to the performance of this equipment with grapes, juices, and wines.

129. Distilled Beverage Technology (4) L. M. III.
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chem- istry 1A, Physics 2A, and Botany 2 or Plant Science 2; Chemistry 1B and Physics 2B recommended. Introduction to scientific principles as applied to water and water problems. Topics include hydrology (surface and ground water), flow through porous media, water in soil-drainage processes, materials, water quality, flow through pipes and channels, and representative water-resource problems.

130. Water Quality, Salt Control and Reclamation (4) L. Biggar
Lecture—3 hours; laboratory—3 hours. Prerequisite: course in soil or water chemistry or consent of instructor. Water quality parameters, water analysis and salinity control in relation to soil and plant factors; reclamation of soil and disposal of waste water and their effects on receiving waters; localized and regional river basin problems in relation to salinity control and water quality.

131. Plant-Water-Soil Relationships (3) L. Hallo
Lecture—3 hours; discussion—1 hour; mid-quarter examination—1 hour. Prerequisites: Chemistry 100 or the equivalent preparation in elements of water in soil and plants, Soil 100 and one additional course in soil or plant physiology, or consent of instructor. An introduction to the interactions of soil and water environments and their applications in crop and environmental management. Including nutrients and water uptake and aeration; transpiration; soil processes affecting supplies; deficiencies and plant responses.

132. Irrigation Principles and Practices (3) L. Hossman
Lecture—3 hours. General course for agricultural and engineering students dealing with soil and plant aspects of irrigation and drainage. Soil-water movement and storage, plant responses to irrigation regimes, water use by crops; procedures for determining frequency and depth of irrigation, drainage.

133. Introduction to Irrigation Systems (3) L. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: Physics 2B or the equivalent. General course for Agricultural and Engineering students introducing irrigation systems, design, description and design appreciation. Laboratory exercises include field evaluation of surface, sprinkler and trickle irrigation water measurement systems. Review of soil physics affecting distribution of freshwater plants and animals is emphasized in a manner particularly suitable for students of freshwater ecology, soil science, and renewable natural resources.

134. Water Science

Water Science

(College of Agricultural and Environmental Sciences)

Faculty. See under the Departments of Land, Air and Water Resources; Entomology; Civil Engineering; Geology; and Geography.

Related Major Programs. See the major in Soil and Water Science.

Graduate Study. A program of study is offered leading to the M.S. degree in Water Science. Detailed information can be obtained from the graduate advisor. See the Graduate Division section in this catalog.

NOTE: For key to footnote symbols, see page 131.


Courses in Water Science

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 1224 Carroll Hall (752-1859).

Lower Division Courses

10. Water and Society (3) L. Kirk
Lecture—2 hours; discussion—1 hour. Prerequisite: Physics 10 or Geology 1. Occurrence, transport and quality of water; the role of water as an essential natural resource in contemporary society. Aspects of the water use and production models, descriptions of natural phenomena, measurement techniques, and environmental implications for water for municipalities, agriculture, industry, waste management, and fish and wildlife. General Education credits: Culture and Environment/Non-Introductory. Recommended: Pre- preparation: Physics 10, Geology 1, or Chemistry 10.

41. Ecology of Polluted Waters (3) L. Kirk
Lecture—3 hours. Prerequisite: Biological Sciences 1 or the equivalent. Causes and nature of various types of pollution and their effects upon aquatic biota. Particular emphasis on biological effects of toxic compounds, inorganic compounds, suspended matter, organic matter, waste and heated water on aquatic life.

92. Water Science Internship (1-12) L. III. III. The Staff (Chairperson in charge)
Laboratory—3 hours. Prerequisites: lower division standing and consent of instructor. Work-experience off and on campus in water science internship supervised by a member of the faculty. (PRN grading only.)

Upper Division Courses

100. Principles of Water Science (4) L. Grimmer
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1A, Physics 2A, and Botany 2 or Plant Science 2; Chemistry 1B and Physics 2B recommended. Introduction to scientific principles as applied to water and water problems. Topics include hydrology (surface and ground water), flow through porous media, water in soil-drainage processes, materials, water quality, flow through pipes and channels, and representative water-resource problems.

101. Irrigation Systems (3) L. Hallo
Lecture—3 hours; discussion—1 hour; mid-quarter examination—1 hour. Prerequisite: Chemistry 100 or the equivalent preparation in elements of water in soil and plants, Soil 100 and one additional course in soil or plant physiology, or consent of instructor. An introduction to the interactions of soil and water environments and their applications in crop and environmental management. Including nutrients and water uptake and aeration; transpiration; soil processes affecting supplies; deficiencies and plant responses.

102. Water Science

(College of Agricultural and Environmental Sciences)

Faculty. See under the Departments of Land, Air and Water Resources; Entomology; Civil Engineering; Geology; and Geography.

Related Major Programs. See the major in Soil and Water Science.

Graduate Study. A program of study is offered leading to the M.S. degree in Water Science. Detailed information can be obtained from the graduate advisor. Also see the Graduate Division section in this catalog.
Wildlife and Fisheries Biology 349

Water Science
(A Graduate Group)

Westley W. Wallender, Ph.D., Chairperson of the Group
(752-0868)

Group Office, 122 Hoagland Hall (752-1669)

Faculty. The Group includes faculty from four departments in three colleges and schools, in the areas of hydrology, hydrogeology, water quality, irrigation, drainage, plant physiology, soil and atmospheric sciences, and other disciplines.

Graduate Study. The Graduate Group in Water Science offers the M.S. degree in five broad areas of specialization: (1) hydrology, (2) irrigation and drainage, (3) water quality and pollution, (4) water resources management, and (5) biometryology. These options focus on either the physical, chemical and biological processes that interact within water systems or on the integrated behavior of water systems as a whole.

Preparation. Students may enter this program with undergraduate training in, for example, mathematics, physics, soils, engineering or related areas. The curriculum consists of core courses in hydrology, fluid flow, hydrochemistry and biology, and physical and economic aspects of water.

Graduate Adviser. D. E. Relton (Land, Air and Water Resources), 251 Hoagland Hall (752-2113).

Related Courses. Many departments, on campus offer courses which are appropriate for programs of study. The principle departments are Land, Air and Water Resources, Civil Engineering, Agricultural Engineering, Environmental Studies, Botany, Agricultural Economics and others. A list of courses is available at the Group Office.

Wildlife and Fisheries Biology

(College of Agricultural and Environmental Sciences)

Daniel W. Anderson, Ph.D., Chairperson of the Department

Department Office, 66 Briggs Hall (752-5686)

Faculty

Daniel W. Anderson, Ph.D., Professor

Louis W. Bedford, Ph.D., Associate Professor

Joseph J. Ceich, Jr., Ph.D., Professor

Ronald E. Cole, B.S., Lecturer

Edwards, Howard, Ph.D., Professor Emeritus

Nadine K. Jacobsen, Ph.D., Associate Professor

Dale F. Lott, Ph.D., Professor

Rex E. Marsh, A.B., Lecturer

Peter B. Moyle, Ph.D., Professor

Dennis G. Raveling, Ph.D., Professor

Robert G. Schwab, Ph.D., Associate Professor

Charles van Riper, Ph.D., Associate Adjunct Professor

The Major Program

The wildlife and Fisheries Biology major deals with the relationships among the needs of man and the requirements of wildlife (including fishes). Understanding these relationships is vital for the maintenance of ecological diversity, recreational resources, and food supplies for future generations. Certain species of wildlife are threatened because they cannot adapt to man's activities, whereas others

NOTE: For key to footnote symbols, see page 131.
have thrived so well under man-made changes in the environment that their numbers must be controlled. The major reason is the optimal management of recreational or commercial harvests.

Because of the diversity of problems in the field, emphasis in the major is placed on broad training in biological and physical sciences, with specialization in wildlife and fisheries biology. The major is designed primarily for students interested in eventually becoming professionals in wildlife and fisheries biology, but its breadth of course requirements, when combined with suitable electives, also makes it suitable as a preparatory major for such areas as veterinary medicine and secondary school teaching. Certification by professional societies such as the Wildlife Society and the Fisheries Society, or the Ecological Society of America or preparation for specialized resource-related graduate studies may also be achieved by careful planning of electives with a faculty advisor.

Graduate training in the Division of Wildlife and Fisheries Biology leads to M.S. or Ph.D. degrees in such disciplinary fields as Ecology, Physiology, Applied Mathematics, International Agricultural Development, and Animal Behavior, under the supervision of a Wildlife and Fisheries Biology faculty member.

Positions now held by graduates in this major include wildlife, fisheries, animal control, and resource biologists and managers with local, state and federal agencies. Some of the graduates are biologists for consultants with private industries such as commercial fishing businesses, electrical utilities, sportsman’s clubs, government, etc. Environmental consulting firms. Also, some are veterinarians, medical physicians, and professors/researchers who teach and/or conduct research in academic institutions. Most of these positions have been attained after further study and relevant experience.

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 with approval.] Courses shown without parentheses are required.

**UNITS**

Preparatory Subject Matter .......................... 53-60

Biological Sciences .................................

Botany (Botany 2) .................................. 5

Chemistry (Chemistry 1A, 1B, 8A, 8B) ..............

Computer Science (Computer Engineering 10 or Engineering 4) ..............................................

Mathematics (Mathematics 118B) ...................... 3

16 recommended ...................................... 6-9

Physics (Physics 6A, 6B, 6C recommended) ........

12-12

Statistics (Statistics 13, or Agricultural Science, and Management 150) .................. 14

Zoology (Zoology 2-2L) ................................ 6

Depth Subject Matter ................................ 38-41

Chemistry (biochemistry 101B or Physiological Sciences 101A-101B) ......................

Ecology (Environmental Studies 100 or Zoology 125) .................................................. 3-7

Genetics (Genetics 100) .............................. 4

Physiology (Physiology 110) ...........................

Vertebrate Anatomy (Zoology 113) ....................

Evolution (Zoology 148, or Genetics 103) ...........

Wildlife and fisheries biology (Wildlife and Fisheries Biology 122, 130, 140) ................. 13

Breadth Subject Matter ............................... 20

English 1 and Rhetoric and Composition ....

Social sciences and humanities ...........

Restricted Electives (Select Plan I or Plan II) ....

Plan I: Wildlife Biology specialization .............. 24-26

Botany (Botany 102 or 108, 117) ..................

Wildlife Biology (Wildlife Biology 100, 110, 111, 111U) ................................................ 13

Plan II: Fishery Biology specialization ............. 26-32

Aquatic entomology/invertebrate zoology (Environ.

adviser’s approval) ...................................

Fisheries Biology (Wildlife and Fisheries Biology 102, 120, 121L) ..................................

Limnology/oceanography/stream biology (Environment 16 or 150C or 151 or

Water Science 122) ..................................

Statistics (Statistics 104, 106, 110 or 111) ......... 3-4

Unrestricted Electives ................................ 25-45

Plan I .................................................. 31-45

Plan II .................................................. 25-43

(note for requirements of profession certification programs, see adviser.)

Unrestricted Electives ................................ (variable)

Total Units for the Major (minimum) ....... 180

Major Adviser. Contact Department office (56 Briggs).

Graduate Study. See the Graduate Division section in this catalog.

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 Courses

18. Concepts of Wildlife Ecology (3) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1 recommended. Concepts of ecology needed to understand wildlife issues such as endangered species, fisheries management, hunting and pest management. Inclusion of political, economic, social and legal aspects. General Education credit: Nature and Environment/Introduction.

19. Internship (1-6) I, II. The Staff (Department Chairperson in charge).

Laboratory—3-18 hours. Prerequisite: lower division standing and consent of instructor. Work training experience off and on campus in all subject areas offered in the department. Instru-

1. General Education credit: Natural Environment/Introduction.


Discussion—1 hour; laboratory—40-60 hours. Prerequisite: upper division course each in ecology and fish biology; cons.

2. General Education credit: Natural Environment/Introduction.

3. Mammalian Biology and Ecology (5) III. Schwab

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1, Botany 2, and Zoology 2-2L, or the equivalent; course in evolution recommended. Integrated introduction to the biology and ecology of non-


4. Biology and Management of Wild Birds (3) I. Anderson, Reveling

Lecture—3 hours. Prerequisite: upper division course in ecology or consent of instructor; Phycology, distribution, reproduction, population dynamics, behavior, and phy.


5. Laboratory and Management of Wild Birds (2) I. Anderson, Reveling

Laboratory—6 hours. Prerequisite: course 111 (may be taken concurrently); consent of instructor; Laboratory exercises in bird species identification, anatomy, molts, age and sex,

5. General Education credit: Natural Environment/Introduction.

NOTE: For key to footnote symbols, see page 131.
Women's Studies Program

Program (College of Letters and Science)

Judith Newton, Ph.D. Program Director
Program Office, Women's Resources and Research Center, 10 Lower Freeborn Hall (752-3307/3372)

Committee in Charge
Karen P. Erickson, Ph.D. (Psychology)
Susan Crockenborg, Ph.D., Professor (Applied Behavioral Sciences)
Karen P. Erickson, Ph.D. (Psychology)
Jack D. Forbes, Ph.D., Professor (Anthropology, Applied Behavioral Sciences)
Sarah B. Hidy, Ph.D., Professor (Anthropology)
Sarah V. Hutchison, M.Ed., Lecturer Emeritus (Applied Behavioral Sciences)
Sudhajit Bose, Ph.D., Associate Professor (Anthropology)

Faculty
William M. Bowecky, Ph.D., Professor (History)
Cynthia L. Bartlett, Ph.D., Associate Professor (History)
Susan Crockenborg, Ph.D., Professor (Applied Behavioral Sciences)
Karen P. Erickson, Ph.D. (Psychology)
Jack D. Forbes, Ph.D., Professor (Anthropology, Applied Behavioral Sciences)
Sarah B. Hidy, Ph.D., Professor (Anthropology)
Sarah V. Hutchison, M.Ed., Lecturer Emeritus (Applied Behavioral Sciences)
Sudhajit Bose, Ph.D., Associate Professor (Anthropology)

Graduate Courses

201. Field Research in Wildlife Biology (6) (3) Extra-semester summer. The Staff
Lecture—1 hour; laboratory—40 hours. Individual research projects and oral and written reports. Prerequisite: courses 142 and 143 in Wildlife Zoology 125, Statistics 102, or the equivalent; consent of instructor. Field research in wildlife biology: formulation of testable hypotheses, experimental design, execution of the study, data reduction, and preparation of suitable written and oral reports. Limited enrollment. (S/U grading only.)

222. Advanced Population Dynamics (3) II. Belford
Lecture—3 hours. Prerequisite: graduate standing; advanced course in ecology (e.g., Zoology 125), population dynamics (e.g., course 152), and one year of calculus; familiarity with matrix algebra and partial differential equations recommended. Logical basis for population models, evaluation of simple ecological models, current population models with age, size, and stage structure, theoretical basis for management and exemplary case histories. Emphasis on development and use of realistic population models in ecological research.

252. Principles of Vertebrate Control (3) I. The Staff
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Principles and concepts concerning the ecological, behavioral, economic, philosophical, and historical basis of managing wild vertebrates that have become pests.

290. Seminar in Wildlife and Fisheries (1-2) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 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. (S/U grading only)

290C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress and techniques in wildlife and fishery sciences. May be repeated for credit. (S/U grading only.)

292. Physiology of Fishes Seminar (1) I. Cech
Seminar—1 hour. Prerequisite: graduate standing and at least two courses in physiology; consent of instructor. Seminar devoted to current topics concerning the physiological functioning of fishes. May be repeated three times for credit. (S/U grading only.)

203. Seminar in Wildlife Disease Ecology (2) II. Thies (Medical Microbiology) in charge, Raveling, van Riper
Seminar—2 hours. Prerequisite: graduate status or advanced undergraduate in biology; consent of instructor. Presentation and analysis of assigned research papers in wildlife disease ecology related to considerations of habitat quality, population regulation, wildlife management, and/or implications for human or domestic animal health. (S/U grading only.)

297T. Supervised Teaching in Wildlife and Fisheries Biology (1-3) I, II, III. The Staff (Chairperson in charge)
Tutorial—3-9 hours. Prerequisite: meet qualifications for teaching assistant; graduate standing; and consent of instructor. Tutoring and teaching students in undergraduate courses in Wildlife and Fisheries Biology. Weekly conferences with coordinator; evaluations of teaching; preparing for and conducting demonstrations, laboratories, and discussions; preparing and grading examinations. May be repeated for a total of 6 units when a different course is tutored. (S/U grading only.)

298. Group Study (1-5 I, II, III. The Staff (Chairperson in charge)
Lectures and/or discussions—1-5 hours. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

NOTE: For key to footnote symbols, see page 131.

affected not only women's (and men's) cultural achievements, but also the historic events and socio-economic structures in which both sexes participate.

Students majoring in this field may take courses in African-American studies, American studies, anthropology, comparative literature, English, history, linguistics, Chicano studies, psychology, Russian, sociological, Asian-American studies, human development, Native American studies, and other related disciplines. Depending on individual career goals, each student will design a program in consultation with an adviser.

Career Opportunities. Preprofessional students who major in Women's Studies will discover that it offers useful undergraduate training for schools of medicine and law, particularly, in medicine, for specialties in obstetrics-gynecology, family practice, pediatrics or psychiatry; and in law, for special ties in social or family related issues. In addition, students who plan to do practical work in counseling, clinical psychology, social services or political science will find Women's Studies a helpful undergraduate major, while more theoretically inclined students who wish to go on to graduate research in such fields as literature, philosophy, sociology, anthropology, psychology, economics or political science will benefit from a strong undergraduate background in women's studies. Increasingly, positions in this field are being used as consultants in industry, higher education, insurance companies and per sonnel firms. Laterly, moreover, state and federal government agencies require people with the training in social science who can understand the problems that women face in society. Finally, educational institutions need specialists to develop and administer women's studies programs. Men's centers and other institutional structures designed specifically to study and assist women.

Women's Studies

A.B. Major Requirements:

Preparatory Subject Matter

History 72A
Women's Studies 50

All Preparatory Subject Matter listed for a single discipline in an area of student's interest, chosen in consultation with adviser. 12-25

Depth Subject Matter

Women's Studies 198

At least 36 upper division units to be chosen with consent of adviser including at least 8 units from Areas A, at least 8 units from Area B, and up to 16 units of special topic courses.

Area A: Women and the Humanities (minimum 8)
Comparative Literature 135, 159C,
English 1558, 165, Linguistics 113.

Area B: Gender and Society (minimum 12)

Area C: American Studies 123, 133,
American Studies 101B, Anthropology 130, 131, 132, 124, Asian American Studies 112, Chicano Studies 102, Human Development 110, Native American Studies 180, Political Science 166,
Psychology 114, 149, Sociology 131, 132, 133.

Special topic courses.

Total Units for the Major

54-77

Recommended

The following courses are recommended: American Studies 1F, 30, Biological Sciences 10, Economics 151B, Genetics 10, History 728, Physiology 10, Statistics 13.

Minor Program Requirements:

Women's Studies

Women's Studies 80
Zoology

Upper division units in women's studies area with course will be chosen to complete twenty units in Women's Studies and consent of instructor. Guided reading, discussion, and writing, culminating in the preparation of a research proposal.

Major Adviser. See Class Schedule and Room Directory.

Courses in Women's Studies

Lower Division Course

50. Introduction to Women's Studies (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour or term paper (instructor's option). Interdisciplinary introduction which will survey and integrate literary, anthropological, psychological, historical, sociological and biological perspectives on the study of sex roles. General Education credit: Contemporary Societies/Non-Introductory. Recommended preparation: any introductory GE course in the areas of Civilization and Culture or Contemporary Societies.

Upper Division Courses

190A. Senior Research Seminar I (4) I. The Staff Seminar—4 hours. Prerequisite: course 190A. Completion of individual research project formulated in course 190A; senior seminar in topics and problems related to individual projects.

190B. Seminar (4) II. The Staff Seminar—4 hours. Prerequisite: course 190A. Completion of individual research project formulated in course 190A; senior seminar in topics and problems related to individual projects.

192. Internship in Women's Studies (1-12) I, II, III. The Staff or Department. Work-learning experience—3-8 hours: written report. Prerequisite: completion of a minimum of 64 units and consent of instructor; enrollment dependent on availability of intern positions with priority to Women's Studies majors. Supervised internship and study in position/institutional settings dealing with gender-related problems or issues, as for example, a woman's center, affirmative action office, advertising agency, or social welfare agency. Students will submit written report on internship experience. (P/NP grading only.)

198. Directed Group Study (1-6) I, II, III. The Staff (Director in charge). Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge). Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

Zoology

(College of Letters and Science)

John H. Crowe, Ph.D., Chairman of the Department.

Arthur M. Shapiro, Ph.D., Vice-Chairperson of the Department

Department Office, 2320 Storer Hall (752-1272)

Faculty

Hilary E. Anderson, Ph.D., Assistant Adjunct Professor

Peter B. Armstrong, Ph.D., Professor

Ronald J. Baskin, Ph.D., Professor

James S. Clegg, Ph.D., Professor

C. John Crowe, Ph.D., Professor

David W. Deamer, Ph.D., Professor

Ofa Eilers, Ph.D., Visiting Assistant Professor

Carol A. Erikson, Ph.D., Associate Professor

Robert D. Grey, Ph.D., Professor

Richard K. Grosgen, Ph.D., Professor

Jill Hildebrand, Ph.D., Professor Emeritus

Evert W. Jameson, Jr., Ph.D., Professor Emeritus

Roger J. Leslie, Ph.D., Assistant Professor

Marc S. Mangel, Ph.D., Professor

Peter R. Marler, Ph.D., Professor

Milton A. Miller, Ph.D., Professor Emeritus

Brian Mulloney, Ph.D., Professor

Jeanette E. Naito, Ph.D., Assistant Professor

Richard L. Nuccio, Ph.D., Professor

James F. Quinn, Ph.D., Associate Professor (Zoology, Environmental Studies)

Lauren E. Rosenburg, Ph.D., Professor Emeritus

Robert L. Rudd, Ph.D., Professor Emeritus

George W. Salt, Ph.D., Professor

Thomas W. Schriner, Ph.D., Professor

Jonathan M. Scholey, Ph.D., Assistant Professor

H. Bradley Shaffer, Ph.D., Assistant Professor

Arthur M. Shapiro, Ph.D., Professor

Judy Stamps, Ph.D., Professor

Catherine A. Toft, Ph.D., Associate Professor

Kenneth E. F. Watt, Ph.D., LL.D., Professor Emeritus

Martin Wilson, Ph.D., Associate Professor

Stephen L. Wolfe, Ph.D., Lecturer Emeritus

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 related field, 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:

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Zoology

B.S. Major Requirements:

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Physics 8A, 6B, 6C

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Chemistry 1A, 1B, 1C

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Chemistry 8A or 1A, 8B

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Biological Sciences 1

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Zoology 2-6L

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Mathematics 16A-16B or 21A-21B

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NOTE: For key to footnote symbols, see page 131.
Courses in Zoology

Lower Division Courses

2. General Zoology (4) I, II, Milliken; III, Stamps Lecture—4 hours. Prerequisite: BIOL 101 or equivalent. Preparatory 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, II; Milliken; Ill, Stamps Laboratory—6 hours. Prerequisite: course 2 (irreversible taken concurrently). Laboratories on the diversity of animal life and basic principles of organismal biology. (P/N grading only.)

10. Concepts of Zoology (3) III, Watt Laboratory—4 hours. Prerequisites: courses 1 and 2 concurrently. Important issues of modern zoology for nonmajors. Diversity, its causes and consequences, self-stabilization, evolution, levels of organization. Implications of diversity for the future.

19. Internship (1-12) I-I, II, III. The Staff (Chairperson in charge) Laboratory—36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus, in all subjects offered in the Department of Zoology. Internships supervised by a member of the faculty. (P/N grading only.)

99. Special Study for Lower Division Students (1-2) I, II, III, The Staff (Chairperson in charge) (P/N grading only.)

Upper Division Courses

100. Embryology (4) I, Armstrong; II, The Staff; III, Erickson Lecture—4 hours. Prerequisite: Biological Sciences 1 and courses 2-2L; 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, The Staff; III, Erickson Laboratory—4 hours. Prerequisite: course 100 (concurrently). Comparative analysis of the embryonic development of vertebrates. (P/N grading only.)

101. Experimental Analysis of Animal Development (3) Discussion—1 hour; laboratory—6 hours. Prerequisite: course 101A or 101B, and consent of instructor. Principles and techniques of genetic procedure and enzyme maintenance; applications of such techniques to vertebrate embryology and the study of development and genetic control. Laboratory assignments assigned to students who have had Biology/Botany 130 may receive credit for this course.

121. Advanced Cell Biology (4) III, Basin Lecture—4 hours. Prerequisite: Introduction to course 1 in biochemistry and genetics. Introduction to cellular biology which concentrates on the nucleus and cytoplasm. Current research related to DNA, RNA, protein and cell membranes. Students who have had Biology/Botany 130 may receive credit for this course.

121C. Advanced Cell Biology (4) III, Basin Lecture—4 hours. Prerequisite: course 121A or 121B recommended, or consent of instructor. Examinations illustrating the principles of cell biology; emphasis on individual research employing more one or advanced techniques.

122. Histology (4) II, Erickson Laboratory—3 hours; laboratory—2 hours. Prerequisite: course 121A, with emphasis on the function of the cells and their interrelationships. Histology of mammalian tissues. Emphasis will be placed on the use of structural data in elucidating mechanisms underlying physiological and metabolic processes.

122L. Histology Laboratory (3) III, Crow Laboratory—6 hours. Laboratory—2 hours. Prerequisite: course 122 may be taken concurrently. Principles and techniques of histological and cyto-technical techniques; use of such techniques in research. Design and execution of a research project is required.

125. Animal Ecology (4) I, II; Schoener and Watt; III, Mangel Lecture—3 hours. Prerequisite: courses 2-2L. A general survey of the concepts of animal ecology.

130. Survey of Cell Biology (4) I. F. Falk (Botany), Leslie I. Deamer, Pheg (Botany) Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 68 or 128C; Introduction to cell biology strongly recommended. Survey of cell biology presenting the structure and function of the major cellular organelles. Topics discussed include enzyme action, cell membrane structure, and expression, and membranes. Current popular methodologies used in cell biology will be presented in a discussion section. Not open to students who have taken credit for Zoology 121A or 121B. (Same course as Botany 130.)

133. Patterns in Vertebrate Evolution (3) III, Crow Lecture—3 hours. Prerequisite: course 2. Vertebrate thermoregulation and water balance, circadian and circannual activity, communication, breathing, movements and feeding patterns.

133L. Systematics and Field Studies in Cold-Blooded Vertebrates (3) Laboratory—6 hours; field trips. Prerequisite: course 133 and consent of instructor. Systematic and faunal surveys on cold-blooded vertebrates in wild populations in odd-numbered years.

134. Herpetology (3) III, Shaffer Lecture—2 hours; term paper. Prerequisite: courses 2-2L; course 148 recommended. The world-wide diversity of amphibians and reptiles with emphasis on their behavior, ecology, functional morphology, and evolutionary history. Offered in odd-numbered years.

135L, Herpetology Laboratory (3) III, Shaffer Laboratory—3 hours; two weekend field trips. Prerequisite: courses 2-2L; course 134 concurrently. Diagnostic characteristics and functional attributes of amphibians and reptiles. Emphasis on the bioecological, biogeographic and phylogenetic patterns. Field trips will acquaint students with techniques for identifying and studying amphibians and reptiles under natural conditions. Offered in odd-numbered years.

161. Mammalogy (2) I, II. The Staff Lecture—2 hours. Prerequisite: course 125 or equivalent. Survey of representative mammalian orders. Emphasis is on the study of the mammalian systematics of California mammals; techniques of study in professional mammalogy. May be taken concurrently with course 125.

167. Ornithology (2) III, Salt Lecture—4 hours. Prerequisite: course 125 or equivalent. Systematics, distribution, and life history of birds; emphasis on habitats and avian communities. (P/N grading only.)

167L. Ornithology Laboratory (2) III, Salt Laboratory—4 hours. Prerequisite: course 125 or equivalent (may be taken concurrently) and consent of instructor. Individual study and field trips strongly emphasized. Systematics, technological, population dynamics and reproduction of California birds.


183. Patterns of Vertebrate Reproduction (4) I, II. Lecture—3 hours; term paper. Prerequisite: any upper division course in vertebrate biology. Reproductive adaptations and environmental responses of wild vertebrates; seasonal, reproductive diapause, growth and sexual maturity, development of viviparity and other topics.

141. Principles of Systematic Zoology (3) I, Shapiro Lecture—3 hours. Prerequisite: biology courses 2-2L; two hours of biology course 2, 148 or Genetics 103 recommended. Historical background, philosophical rationale, contemporary approaches, and working rules of a discipline which includes International Code of Zoological Nomenclature.

143L. Herpetology Physiology (4) I, Crow Lecture—3 hours; term paper; individual conferences. Prerequisite: courses 122, 68C, 125, or Phys 68; Biochemistry 101A, 101B recommended. Comparative physiological mechanisms of vertebrate organ systems.

143L. Vertebrate Physiology Laboratory (3) I, Crow, Laboratory—6 hours (includes research project). Prerequisite: course 142 may be taken concurrently. Experiments on the physiological mechanisms of vertebrate organ systems. Design and execution of a research project.

143. Neurobiology (4) III, Mullenoy, Wilson Lecture—3 hours; extensive reading. Prerequisite: courses 2-2L; or Biochemistry 101A or 101B; or the equivalent. Neuronal structure; impulse transmission; synapses; transmitters and transmitter pharmacology; receptors; growth and differentiation of neurons and nerve tracts. Introduction to genetics in the nervous system. (P/N grading only.)

148L. Neurobiology Laboratory (8) III, Mullenoy, Wilson Lecture—1 hour; discussion—1 hour; laboratory—12 hours. Prerequisite: course 143 and consent of instructor; Physics 68 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.

149. Zoography (4) III, Lecture—3 hours; term paper. Prerequisite: courses 2-2L, or Entomology 100. Movement of terrestrial animals. The role of geographic, climatic, and biologic change in the geographic distribution of animals.

148. Animal Phylogeny and Evolution (4) III, Shaffer, Groner Lecture—4 hours. Prerequisite: one or two courses in Genetics and 100; ecology and biochemistry recommended. Introduction to current evolutionary theory. The place of evolution as the central unifying theory to biology will be emphasized.

Note: Key to footnote symbols, see page 131.
of instructor. Reports and discussion on current topics in marine invertebrate ecology. Open to qualified undergraduates.

296. Seminar in Geographical Ecology (2) I. Shapiro Seminar—2 hours. Prerequisite: course 125 or 148 or Genetics 103 or consent of instructor. Recent developments in theoretical and experimental biogeography, historical biogeography and related themes in systematics, the biology of colonizing species, and related topics. (S/U grading only.) May be repeated for credit.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

Professional Course

300. Methods of Teaching Zoology (2) I, II, III. The Staff (Chairperson in charge) Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching zoology and related biological sciences. Includes analyses of texts and supporting material, discussion of teaching techniques and preparing and conducting of laboratory and discussion sections. May be repeated for credit for a maximum of 8 units. (S/U grading only.)

NOTE: For key to footnote symbols, see page 131.
OTHER USEFUL PUBLICATIONS

Undergraduate Admissions Circular
A complete statement of the University's requirement 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.)

UC Davis Poster/Calendar
Information for prospective students about UCD programs and activities, plus a wall poster and calendar marking important dates and UC application deadlines.
Office of Undergraduate Admission, 175 Mrak Hall. (No charge.)

Graduate Announcement, 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, 2132 Bainer Hall. (No charge.)

School of Law Catalog
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.)

Graduate School of Management Bulletin
Admission requirements, description of academic programs, courses of instruction, faculty, and general information.
Graduate School of Management, 308 Voorhies Hall, University of California, Davis 95616. (No charge.)

Announcement of the School of Veterinary Medicine
A complete statement of the School of Veterinary Medicine requirements for admission into the Doctor of Veterinary Medicine program.
Office of Associate Dean—Student Services, School of Veterinary 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 50 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, 376 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 at UCD
Information on financial aid; grants, loans, and work-study at UCD.
Financial Aid Office, North Hall. (No charge.)

People and Places at UCD
The student orientation handbook giving descriptions of campus services, activities, and information sources.
Available free from Advising Services, South Hall. (Not available by mail.)

Student Directory
Student directory, combined with information on ASUCD activities and services and campus organizations.

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 Freeborn. (No charge. Available by mail.)

Venture
University Extension quarterly catalog. Complete information about Unex courses, including times and location.
University Extension, 1333 Research Park Drive. (No charge.)

City of Davis Information
Chamber of Commerce, 228 B 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.

Add/Drop Petition A petition used when you want to add, change or drop a course to your study list. (Sometimes referred to as an Add/Drop card.)

Advanced degree Any degree beyond the bachelor's degree.

AOB (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.

CAN (California Articulation Number) A system where participating California colleges use a common number to identify some of the transferable, lower division courses commonly taught within each academic discipline.

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 term. (A student returning from PELP is also considered continuing.)

Credential A license for public school teaching in California. Programs offering the multi-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.

Directed group study A course set up on a one-time basis for a group of students in a subject area where no regular courses have been established.

Discipline A branch of knowledge or teaching. Typically refers to an area of study or a major field.

Enrollment Signing up for a class, either through pre-enrollment or the submission of an Add card; the act of being officially enrolled 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 by dividing the total number of grade points accumulated by the number of course credits taken. Courses taken P/NP or S/U, or outside of the UC system are not considered (exception, see Incomplete or I grade).

Graduate student A student who is enrolled in the Graduate Division for an advanced degree. Graduate courses at UCD are numbered 200-299.

GSA (Graduate Student Association) The elected representative body for graduate students at UCD.

Independent study A course arranged for an individual student who shares with an instructor an academic interest which cannot be accommodated within formal course structure.

Independent Study Program A program intended to provide an opportunity for upper division students to pursue a special interest for a full quarter.

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 83.9 or fewer 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) option 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.

PELP (Planned Educational Leave Program) Any student, new or continuing, can interrupt formal study in a given quarter (or for a maximum of one academic term) by enrolling in the PELP before the tenth day of instruction. You will not be eligible for most University services, but student employment and counseling services and faculty advising are available. PELP ensures your space in registration for the quarter following your leave.

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.

Photo ID card A plasticized identification card with a photo provided to each new student. Upon payment of fees a validation sticker is issued to be affixed to this card. The then validated card serves to identify the carrier as a UCD student. There is a replacement fee if lost.

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, Management, 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.

RA (Research Assistant) RA's are graduate students who do research on a part-time basis while pursuing their degrees. They are selected, trained, and supervised by senior faculty members in departments.

RA (Resident Adviser) RA's are student staff members of the Student Housing Office who help plan, coordinate, and conduct educational and social programs to meet residence hall students interests and needs.

RD (Resident Director) RD's are full-time professional staff members of the Student Housing Office. They help residence hall students with academic, housing, and personal problems, and supervise and train student Resident Advisers.

Registration The payment of fees for a term or summer session. Registration also typically involves giving address information and having a photo ID made. By registering, the student informs the University of intent to begin or continue attendance. (Also, see Enrolment.)

Registration card (see Photo ID card).

Regular session Refers to Fall, Winter, and Spring Quarters. Students in the School of Medicine also attend a Summer Quarter. (See also Semester.)

Repeated courses Courses in which a grade of D or F for undergraduate students and C, D, or F for graduate students can be repeated for a letter grade only. Courses taken on a P/NP or S/U grading basis can be repeated on the same basis or for a letter grade. There are limitations on the number of repeated units that count toward a degree.

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 non-resident tuition must be paid (i.e., legal residence); (4) to indicate the student's place of residence (i.e., living quarters).

Seabatical 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. Your course enrollment form is submitted to the Office of 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 study 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) TA's 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 (Temporary Building) A trailer or pre-fabricated building not intended as a permanent facility.

TBA (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) or semester (fall or spring).

Transcript An official copy of a student's 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 84.0 units; also refers to UCD courses numbered 100-199.

Work-Learn An internship 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.
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 Residence Deputy in determining the residence of each student for fee assessment purposes.

Students who have not been 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 nonresident tuition fee.

The residence determination date is the day instruction begins at the last of the University of California campuses to open for the quarter, and for schools on the semester system, the day instruction begins for the semester.

Establishing Legal Residence for Tuition Purposes

In order to be classified as a resident for tuition purposes upon admission to the University of California, an adult student, other than an adult alien present in the United States under the terms of a nonimmigrant status which precludes the alien from establishing domicile in the U.S., must have established his or her residence in California at least one year immediately preceding the residence determination date for the term during which he or she proposes to attend the University and must 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. 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. 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 the student’s stay in California.

Relevant indicia which can be relied upon to demonstrate one’s intent to make California the permanent residence include, but are not limited to, the following: registering and voting in California elections; designating California as the 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 taxes on income earned outside this state from the date residence is established; 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 places 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 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 last maintained his or her place of abode. A minor, except a minor alien present in the United States under the terms of a nonimmigrant status which precludes the minor alien from establishing domicile in the U.S., 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 (see Exceptions below). Where the residence of the minor is derived, the California residence of the parent from whom it is derived must satisfy the one-year durational requirement.

A man or a woman establishes his or her own residence. A woman’s residence shall not be derivative from that of her husband, or vice versa.

Reclassification

A student seeking resident reclassification for tuition purposes must petition at the Office of the Registrar. Documentation of residence (driver’s license, voter registration receipt, etc.) will be required at that time. Financial independence will be included among the factors considered for students classified nonresident seeking reclassification to resident for tuition purposes. Financial independence will not be considered for graduate students who are teaching assistants, research assistants or teaching associates employed on a 0.49 percent or more time basis for the term for which reclassification is sought. All changes of status must be initiated two weeks prior to the in-person registration period for the quarter or semester for which the student intends to be reclassified.

Detailed information concerning reclassification can be obtained by contacting the Residence Deputy at the Office of the Registrar.

Incorrect Classification

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 Residence Deputy at the Office of the Registrar.

Inquiries and Appeals

Inquiries from prospective students regarding residence requirements for tuition purposes should be directed to the Residence Deputy at the Office of the Registrar. No other University personnel are authorized 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 Legal Analyst—Residence Matters, 590 University Hall, Berkeley, California 94720, within 90 days after notification of the final decision by the Residence Deputy.
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 Office of the Registrar of the campus.

Exceptions

1. A minor who is a U.S. citizen or eligible alien and 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. A student who is a U.S. citizen or eligible alien and who is a minor or 18 years of age may be eligible for resident status if he or she can show that he or she has been totally self-supporting through employment and actually present within California for the entire year immediately prior to the residence determination date and has demonstrated the intent to make California his or her permanent home.

3. A student who is a U.S. citizen or eligible alien 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.

4. A student who has not been an adult resident of California for more than one year and who is the dependent child of a California resident who has been a resident for more than one year immediately prior to the residence determination date may be entitled to resident classification until the student has resided in California for the minimum time necessary to become a resident so long as continuous attendance is maintained at an institution.

5. 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 exemption 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 (1) the member of the military is transferred on military orders to a place outside this state where he continues to serve in the armed forces or (2) the member of the military retires from active duty immediately after having been on active duty in California, the student is entitled to continue receiving the exemption so long as continuous attendance is maintained.

6. 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.

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.

8. The dependent children and spouses of full-time University of California employees whose permanent assignment is outside California may be entitled to resident classification.

Waivers Of Nonresident Tuition

To the extent funds are available, nonresident tuition waivers may be granted to a spouse and unmarried dependent children under age 21 of a University faculty member who is a member of the Academic Senate. Inquiries regarding this waiver should be directed to the Residence Deputy.

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.

UNIVERSITY POLICY ON NONDISCRIMINATION, SEXUAL HARASSMENT, STUDENT RECORDS, AND PRIVACY

Nondiscrimination. 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, and Sections 503 and 504 of the Rehabilitation Act of 1973, the Age Discrimination in Employment Act of 1967, and the Age Discrimination Act of 1975, does not discriminate on the basis of race, color, national origin, religion, sex, handicap, or age in any of its policies, procedures, or practices; nor does the University, in compliance with Section 402 of the Vietnam Era Veterans Readjustment Assistance Act of 1974, and Section 12940 of the State of California Government Code, discriminate against any employees or applicants for employment because they are special disabled veterans or veterans of the Vietnam era, or because of their medical condition (cancer-related) as defined in Section 12926 of the California Government Code, their ancestry, or their marital status; nor does the University discriminate on the basis of citizenship, within the limits imposed by law or University policy; nor does the University discriminate on the basis of sexual orientation. 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 Assistance 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, 525 Mrak Hall, 752-2070. Speech and hearing impaired persons may dial (TDD) 752-7320.

Sexual Harassment. Sexual harassment of students, staff, or faculty members is prohibited by law and by University regulation. Sexual harassment is unacceptable and will not be condoned on the UCD campus. The campus community will take all necessary and appropriate steps to protect students, staff, and faculty from sexual harassment and all forms of sexual intimidation and exploitation. Grievance procedures for student complaints charging legally impermissible discrimination (Policy 280-05) are available in the Office of Student Activities and Conduct and may be used to bring complaints of sexual harassment. Students may receive informal counseling and formal assistance by contacting any of the following offices: Vice Chancellors, Deans of the Schools and Colleges, or the Office of Student Activities and Conduct. In addition, the ASUCD Student Grievance Center, Counseling Center, and the Women’s Resources and Research Center are available to provide referral service.

Disclosures From Student Records. In accordance with the Federal Family Educational Rights and Privacy Act of 1974 and campus procedures implementing the University of California Policies Applying to the Disclosure of Information from Student Records, students at the Davis campus of 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 10.70 of the University’s 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 Education 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 from Student Records.”

Questions about these rights should be referred to Jeanne Wilson, Office of Student Judicial Affairs, 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 may be obtained at the Office of Student Judicial Affairs.

Categories of personally identifiable information designated by the campus as public information are: name, address (campus and/or permanent), telephone numbers, date and place of birth, major field of study, dates of attendance, degrees and honors received, the most recent previous educational institution attended, participation in officially recognized activities, including 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 who desire to withhold their addresses and telephone listings may so indicate by the last day of registration on the Student Data Card included with the registration materials. Students who request this option should understand that their address and telephone number will not appear in the Student Directory or be released by the Office of the Registrar for non-university related reasons. Students who desire to withhold their entire record must file a form available at the Office of the Registrar.

Students availing themselves of this right should understand what the consequences of this action may be. For example, 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 any time.

Privacy Act. A student’s Social Security number is used to verify personal identity in the UCD Student Records System. In accordance with the Federal Privacy Act of 1974, students are hereby notified that disclosure of their social security number is mandatory. This recordkeeping system was established prior to January 1, 1975 pursuant to the authority of The Regents of the University of California under Art. IX, Sec. 9, of the California Constitution.
PROPORTION OF UCD GRADUATES FINDING WORK IN THEIR FIELDS OF CHOICE

The percent of UCD alumni whose full-time job is in the field of their choice is shown by field of study. Figures do not include the 13 percent of graduates who had not decided on a career field at the time of the survey.

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>Animal Science</th>
<th>Applied Economics</th>
<th>Behavioral Science</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>
<th>Total Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>61</td>
<td>77</td>
<td>88</td>
<td>90</td>
<td>100</td>
<td>74</td>
<td>69</td>
<td>97</td>
<td>61</td>
<td>80</td>
<td>70</td>
<td>78</td>
</tr>
</tbody>
</table>

1Source: A 1988 survey of June 1987 UCD graduates conducted by Student Affairs Research and Information, University of California, Davis.
2Fields of Study are groups of related undergraduate majors; for example, "Animal Science" would include such majors at UCD as Animal Science, Avian Sciences, and Wildlife and Fisheries Biology.

RETENTION DATA AND GRADUATION RATES AT UCD

Freshmen
(Retention and graduation rates through Spring 1988 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 4 Quarters</th>
<th>12 Quarters</th>
<th>15 Quarters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>2,255</td>
<td>88%</td>
<td>34%</td>
<td>65%</td>
</tr>
<tr>
<td>1979</td>
<td>2,557</td>
<td>88%</td>
<td>35%</td>
<td>65%</td>
</tr>
<tr>
<td>1980</td>
<td>2,866</td>
<td>89%</td>
<td>35%</td>
<td>67%</td>
</tr>
<tr>
<td>1981</td>
<td>2,610</td>
<td>90%</td>
<td>34%</td>
<td>69%</td>
</tr>
<tr>
<td>1982</td>
<td>2,351</td>
<td>91%</td>
<td>38%</td>
<td>72%</td>
</tr>
<tr>
<td>1983</td>
<td>2,284</td>
<td>92%</td>
<td>31%</td>
<td>65%</td>
</tr>
</tbody>
</table>

Transfer Students
(Retention and graduation rates through Spring 1988 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 4 Quarters</th>
<th>8 Quarters</th>
<th>9 Quarters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>655</td>
<td>86%</td>
<td>37%</td>
<td>73%</td>
</tr>
<tr>
<td>1981</td>
<td>552</td>
<td>87%</td>
<td>41%</td>
<td>75%</td>
</tr>
<tr>
<td>1982</td>
<td>634</td>
<td>86%</td>
<td>39%</td>
<td>60%</td>
</tr>
<tr>
<td>1983</td>
<td>616</td>
<td>89%</td>
<td>36%</td>
<td>74%</td>
</tr>
<tr>
<td>1984</td>
<td>704</td>
<td>89%</td>
<td>35%</td>
<td>71%</td>
</tr>
<tr>
<td>1985</td>
<td>629</td>
<td>90%</td>
<td>35%</td>
<td>66%</td>
</tr>
</tbody>
</table>

*These are not necessarily quarters of continuous enrollment. Students may drop out or go on Planned Educational Leave for a quarter or longer, and then resume their studies. (There are three quarters in each academic year.)

2Source: Student Affairs Research and Information, University of California, Davis (January 1989).

AVERAGE MONTHLY SALARY OFFERED TO GRADUATES WITH BACHELOR'S, MASTER'S, AND DOCTORATE DEGREES

<table>
<thead>
<tr>
<th>Field of Study:</th>
<th>Bachelor's</th>
<th>Average Monthly Salary</th>
<th>Doctorate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$2,106–2,584</td>
<td>$2,467–2,843</td>
<td>$3,773–4,116</td>
</tr>
<tr>
<td>Engineering</td>
<td>1,720–2,051</td>
<td>1,674–2,220</td>
<td>—</td>
</tr>
<tr>
<td>Humanities/</td>
<td>1,754–2,192</td>
<td>1,800–2,664</td>
<td>2,271–3,415</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>1,803–2,378</td>
<td>2,488–3,194</td>
<td>—</td>
</tr>
<tr>
<td>Allied Health/Life Sciences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Sciences</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Source: College Placement Council Salary Survey (July 1988).
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

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George Deukmejian
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Bill Honig
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Sherrill Luke
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Ronald Enomoto
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Clair W. Burgener (2000)
Glenn Campbell (1996)
Frank W. Clark, Jr. (2000)
Tirso del Junco, M.D. (1997)
Jeremiah F. Hallisey (1993)
Willis W. Harman (1990)
Meredith Khachigian (1990)
Leo S. Kolligian (1997)
Vilma S. Martinez (1990)
Joseph A. Moore (1990)
William French Smith (1998)
Yori Wada (1992)
Dean A. Watkins (1996)
Harold M. Williams (1994)
Jacques S. Yeager (1994)

Student Regent
Guillermo Rodriguez, Jr. (June 30, 1990)
UCB

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Senior Vice President—Administration
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Vice Chancellor—Facilities
James F. Sullivan, Ph.D.
Vice Chancellor—Administration

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Executive Assistant to the Executive Vice Chancellor
Gerald R. Halle, M.P.A.

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Bennie I. Osburn, D.V.M., Ph.D., Associate Dean

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Shu Geng, Ph.D., Associate Dean
David Rames, Ph.D., Associate Dean
James N. Selber, Ph.D., Associate Dean
John R. Whitaker, Ph.D., Associate Dean

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Zuhair A. Muntir, Ph.D., Associate Dean
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Ronald J. Baskin, Ph.D., Associate Dean
John L. Vohs, M.A., Associate Dean
Carolyn F. Wall, Ph.D., Associate Dean

Division of Biological Sciences (Intercollege)
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Merna R. Villarejo, Ph.D., Associate Dean

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THE ARTIST

Roy DeForest

Born: 1930 North Platte, Nebraska


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SELECTED RECENT EXHIBITIONS:

1980 Brooklyn Museum, New York, New York
1980 Marian Locks Gallery, Philadelphia, Pennsylvania
1980 Alan Frumkin Gallery, New York, New York
1980 Crocker Art Museum, Sacramento
1980 Richard L. Nelson Gallery, UC Davis, Davis
1980 Susan Whitney Gallery, Regina, Saskatchewan, Canada
1981 Cline/Benton Gallery, Santa Fe, New Mexico
1981 Hansen Fuller Golden Gallery, San Francisco
1982 Palm Springs Desert Museum, Palm Springs
1982 Gallery K, Washington, DC
1983 "Roy DeForest, Paintings & Drawings, "Frumkin & Struve Gallery, Chicago, Illinois

1984 "Brave New Works," Museum of Fine Arts, Boston, Massachusetts
1984 "New American Painting, A Tribute to James & Mort Milchener," Archer M. Huntington Art Gallery, The University of Texas, Austin, Texas
1985 "Fifty Artists, Fifty Prints," The University of New Mexico Art Museum, Albuquerque, New Mexico
1986 "Roy DeForest," Fuller Golden Gallery, San Francisco
1986 "Roy DeForest, Prints," Augen Gallery, Portland, Oregon
1987 "DeForest," Galerie Darte ten Speyer, Paris, France
1988 "Roy DeForest, Journey to the Far Canine Range & the Unexplored Territory Beyond Timber Path," Frumkin/Adams Gallery, New York, New York
1988 "Roy DeForest," Dorothy Golden Gallery, Inc., Santa Monica
1988 "The Dog Show," Braunstein/Guyer Gallery, San Francisco
1988 "Roy DeForest & George Longfish," Natsoulas/Novelos Gallery, Davis
1989 "Art of the '80s," The Montclair Art Museum, Montclair, New Jersey
1989 "Roy DeForest/Mark Bulwinkle," Civic Arts Gallery, Walnut Creek

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